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2020-2021 Undergraduate and Graduate Catalog

University of Alabama in Huntsville

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University of Alabama in Huntsville

The University of Alabama in Huntsville is a research-intensive, internationally recognized technological university serving Alabama and beyond. Our mission is to explore, discover, create, and communicate knowledge, while educating individuals in leadership, innovation, critical thinking, and civic responsibility and inspiring a passion for learning.

Although this catalog intends to reflect currently any policies or rules of The Board of Trustees of The University of Alabama referred to or incorporated herein, users are cautioned that changes or additions to such policies and rules, including those relating to tuition and/or fees, may have become effective since the publication of this material. In the event of such a conflict, the current statements of Board policy contained in the official minutes and manual of rules, by-laws, and guidelines shall prevail.

The University of Alabama in Huntsville also reserves the right in its sole discretion and at any time to modify any policy, procedure, benefit, or program described or set forth in this catalog and to make any other changes it deems necessary and appropriate. Students enrolling in the University are subject to current policies and rules as contained herein and as subsequently stated or modified by official institutional action.

Undergraduate

The Undergraduate catalog is a comprehensive reference for your academic career. It provides a list of programs and courses offered at The University of Alabama in Huntsville. In addition, it gives you valuable information such as suggested and required degree plans and information about tuition, financial aid, and support services.

While we encourage you to follow the pathways outlined in this catalog, it is also recommended that you take every opportunity to consult with your academic advisor to ensure that you are taking advantage of courses and university resources that will help you reach your educational and career goals by graduating on time. A list of advisors by college is provided by the Registrar's Office ([uah.edu/academic-advising](http://www.uah.edu/academic-advising) (<http://www.uah.edu/academic-advising/>)).

For questions regarding the content of this catalog please contact the Registrar's Office at 256.824.7777 or SSB 120.

Academic Information

Charger Success Course

The purpose of the Charger Success 101 course (FYE 101) is to help new students make a successful transition to The University of Alabama in Huntsville, both inside and outside the classroom. This course aims to foster a sense of belonging, promote engagement in the academic life of the university, provide fundamental knowledge and skill sets essential for success at UAH, and articulate to students the expectations of the University. In addition, the course will assist students to develop and apply critical thinking skills and help students to clarify their academic goals and eventual career direction. This course must be taken in the first or second semester for all full-time students as determined by the college of your major..

Degrees Offered

Programs are provided as indicated below for the undergraduate degrees of **Bachelor of Arts, Bachelor of Fine Arts, Bachelor of Science, Bachelor of Science in Business Administration, Bachelor of Science in Education, Bachelor of Science in Nursing, Bachelor of Arts or Science in Professional Studies**.

Bachelor of Arts - Art Studio, Art History, Biology, Communication Arts, Elementary Education K-6, English, Foreign Language and International Trade, History, Mathematics, Music, Philosophy, Political Science, Psychology, Sociology, Theatre, World Languages and Cultures, and Writing.

Bachelor of Fine Arts

Bachelor of Science - Aerospace Engineering, Biological Sciences, Chemical Engineering, Chemistry, Civil and Environmental Engineering, Computer Engineering, Computer Science, Cybersecurity, Earth System Science, Economics and Computational Analysis, Early Childhood/Early Childhood Special Education, Electrical Engineering, Individualized Studies, Industrial and Systems Engineering, Kinesiology, Mathematics, Mechanical Engineering, Physics, Secondary Education.

Bachelor of Science in Business Administration - Accounting, Finance, Information Systems, Management, and Marketing.

Bachelor of Science in Nursing - unified professional curriculum.

Bachelor of Arts or Science in Professional Studies - Professional Studies.

Declaring a Major

When applying to enter UAH, prospective students may declare a major, defined as the primary field of study. Required major semester hours vary by program but typically range from 30-45 semester hours with overall degree requirements ranging from 120-128 semester hours. Some students are not yet decided, and may declare 'undecided'. The Colleges of Arts, Humanities, and Social Sciences, Business, Education, Engineering, Honors, Professional and Continuing Studies, Science, and Nursing assign advisors. Undecided students will be advised by the Exploratory Advisor, Kellee Crawford, in Wilson Hall 143. For information on how to declare a major in the Colleges of Arts, Humanities, and Social Sciences, Business, Education, Engineering, Honors, Professional and Continuing Studies, Science, and Nursing contact the advising office of the college or visit the advising website (<http://www.uah.edu/academic-advising/>).

Minors

Typical minors are offered in all major fields of study and require a minimum of 18 semester hours of work, six of which are at the 300/400 level and must be completed at UAH. Students should consult their advisors and the appropriate subject area portions of the catalog.

Many degree programs that have extensive core requirements for majors do not have a minor component. Students, however, may opt to add a minor to their programs of study. Again, students should work closely with their advisors in constructing their programs of study for timely completion of their degrees.

Army ROTC Program

Army Senior Reserve Officers Training Corps (ROTC) Department

Location: 223D Charger Union (Building #17 (CGU) on UAH campus map)

Telephone: (256) 824-6561

Email: armyrotc@uah.edu (%20armyrotc@uah.edu)

Chair: Professor of Military Science (Alabama A&M University)

Instructor: Military Science Instructor (Military or Army Contractor) /Assistant Professor of Military Science (Military)

Army Senior ROTC Web Page: <http://www.goarmy.com/rotc.html>

Alabama A&M University ROTC Web Page: <http://www.aamu.edu/academics/colleges/agricultural-life-natural-sciences/departments/military-sciences/index.html> (<http://www.aamu.edu/academics/colleges/agricultural-life-natural-sciences/departments/military-sciences/>)

Overview

Alabama Agricultural & Mechanical University (Alabama A&M) established its Army ROTC program in 1971 and serves as the program host. The University of Alabama in Huntsville is an extension of the Alabama A&M program and its students may use the Visiting Student Agreement between the universities to participate in the ROTC program. The Military Science Instructor (MSI)/Assistant Professor of Military Science (APMS) represents Alabama A&M's Professor of Military Science on the UAH campus.

Mission

The Military Science Department produces commissioned officers in the quality, quantity, and academic disciplines necessary to meet regular Army (RA), Army National Guard (ARNG), and the US Army Reserve (USAR) requirements. Instruction in basic concepts and principles of military arts and sciences, including leadership, professional values and ethics, and an appreciation of national security issues, provide selected students with a sound basis for future professional development and effective performance to serve as commissioned officers in the active and reserve components of the U.S. Army.

Program Description

The ROTC program consists of eight semesters of instruction divided into two courses. The Basic Course, consisting of four semesters, is designed to provide freshman and sophomore students with the conceptual skills required to effectively manage their time, health and fitness, and support effective communication. Course outcomes enable students to understand U.S. Army customs, courtesies, and the Army's Professional Ethic. Participation in the Leadership Laboratory reinforces classroom training and provides an opportunity to master basic military skills such as drill and ceremonies, first aid, field craft, and land navigation. The Leadership Laboratory uses simple tactical scenarios to drive the students' military decision making process. The Advance Course, also consisting of four semesters, is designed to prepare Basic Course graduates, eligible students with prior military service, or students currently serving in the USAR or ARNG with the conceptual skills and professional military education necessary to commission as an officer in the U.S. Army. Advance Course students receive practical experience each week through mandatory participation in the Leadership Laboratory. Advance Course students must also participate in morning physical conditioning at the ROTC Building (Old Council Training Center) on the Alabama A&M University campus.

The SSI/APMS provides Basic Course classroom instruction on the UAH campus. Physical conditioning training and the Leadership Laboratory is conducted at the ROTC Building on the Alabama A&M University campus on Mondays and Wednesdays and on the UAH campus on Fridays.

All Advance Course instruction takes place in the ROTC Building on the Alabama A&M University campus.

Course Registration

Although students may register for Military Science classes using BANNER, the Professor of Military Science or his representative is required to ensure that each student's degree program is properly aligned with ROTC program requirements to ensure completion of pre-commissioning requirements prior to graduation. Therefore, interested students should contact the ROTC Department prior to registration to ensure proper placement in the ROTC program.

Eligibility Requirements

For current eligibility and commissioning requirements, contact the Military Science Instructor at UAH (256) 824-6561 or the Recruiting Operations Officer at Alabama A&M University (256) 372-4023 for details.

Year 1

Fall		Semester Hours
MIL 101	MILITARY SCIENCE I	2
MIL 101L	LABORATORY	0

Term Semester Hours:	2
----------------------	---

Spring

MIL 102	MILITARY SCIENCE I	2
MIL 102L	LABORATORY	0

Term Semester Hours:	2
----------------------	---

Year 2

Fall		Semester Hours
MIL 201	MILITARY SCIENCE II	2
MIL 201L	LABORATORY	0

Term Semester Hours:	2
----------------------	---

Spring

MIL 202	MILITARY SCIENCE II	2
MIL 202L	LABORATORY	0

Term Semester Hours:	2
----------------------	---

Total Semester Hours:	8
-----------------------	---

Year 3

Fall		Semester Hours
MIL 301 & 301L	MILITARY SCIENCE III and LABORATORY	3

Term Semester Hours:	3
----------------------	---

Spring

MIL 302 & 302L	MILITARY SCIENCE III and LABORATORY	3
-------------------	--	---

Term Semester Hours:	3
----------------------	---

Year 4

Fall		Semester Hours
MIL 401 & 401L	MILITARY SCIENCE IV and LABORATORY	3

Term Semester Hours:	3
----------------------	---

Spring

MIL 402 & 402L	MILITARY SCIENCE IV and LABORATORY	3
-------------------	---------------------------------------	---

Term Semester Hours:	3
----------------------	---

Total Semester Hours:	12
-----------------------	----

Progression (Basic + Advance Course)

Students complete 8 credit hours of military science instruction beginning with the fall semester of their freshman year. Students that meet all Army eligibility requirements will attend Basic Camp (BC) during the summer after MIL 102 or MIL 202. After BC, progression students must complete 12 additional credit hours of military science instruction and attend Advance Camp (AC) after MIL 302 (**Preferred**) or after MIL 402, **which requires Professor of Military Science approval prior to enrollment**.

Lateral Entry (Advance Course)

Students that have completed their initial entry training (IET) in any branch of the US Armed Forces and currently serving in the Army Reserve Component or honorably discharged at the expiration of their term of service¹ are required to complete 12 credit hours of military science instruction beginning with the fall semester. Students that meet all Army eligibility requirements will attend AC during the summer after MIL 302 or MIL 402. Graduate students with a minimum of 2 years remaining in their degree programs may enroll after completing BC (or, with the approval of the PMS, may attend BC after completing MIL 302). They must still attend AC during the summer either prior to, or after, graduation. **Requires permission of Professor of Military Science.**

Academic Alignment Option (14 hrs of instruction + MIL 101/MIL 202 or MIL 102/MIL 201 + Advance Course)

Students enrolled in degree programs for engineering and nursing, as well as students identified by the ROTC Department as scholars, athletes, and/or leaders (SAL), complete 14 hours of critical training, followed by 4 credit hours of military science instruction and BC. After BC, students complete the remaining 12 credit hours of the Advance Course and AC prior to graduation. ***Requires Professor of Military Science recommendation and authorization of ROTC Brigade Commander.***

Professional Military Education (PME) Requirements

US Army Cadet Command, which enforces requirements for pre-commissioning training, requires all commissioning candidates to successfully complete the following PME requirements prior to commissioning:

3 credit hours of US Military History (HY 371 US Military History (offered during Fall semester at UAH) or HIS 315 US Military History (offered during Spring semester at Alabama A&M University)).

Army Swim Test (2 Events) - 10 minute swim and 5 minute tread.

Combat Water Survival Test (3 Events) - 15-meter swim with combat equipment, uniform, boots, and rifle; Unexpected Entry; Equipment Ditch.

Advance Camp - Successfully complete Advance Camp (must attain a minimum rating of 'CAPABLE' on Cadet Officer Evaluation Report for performance during training) prior to commissioning.

Completion Cadets

Students that have completed all required military science instruction (based on program requirements explained above), BC (or IET) and AC, but have not completed their degree programs, are classified as completion cadets. Completion cadets are normally eligible to commission after completion of all degree requirements. ***Requires permission of Professor of Military Science.***

Code	Title	Semester Hours
Military Science I		4
MIL 101	MILITARY SCIENCE I	2
MIL 101L	LABORATORY	0
MIL 102	MILITARY SCIENCE I	2
MIL 102L	LABORATORY	0
Military Science II		4
MIL 201	MILITARY SCIENCE II	2
MIL 201L	LABORATORY	0
MIL 202	MILITARY SCIENCE II	2
MIL 202L	LABORATORY	0
Military Science III (Alabama A&M University ROTC Building)		6
MIL 301	MILITARY SCIENCE III	3
MIL 301L	LABORATORY	0
MIL 302	MILITARY SCIENCE III	3
MIL 302L	LABORATORY	0
Military Science IV (Alabama A&M University ROTC Building)		6
MIL 401	MILITARY SCIENCE IV	3
MIL 401L	LABORATORY	0
MIL 402	MILITARY SCIENCE IV	3
MIL 402L	LABORATORY	0
Related Courses Offered by AAMU ROTC Department (Requires Visiting Student Agreement and PMS Permission)		4
MIL 498	MILITARY SCIENCE-VA/A&M	2
MIL 499	MILITARY SCI-SPEC TOPICS/A&M	2

Cooperative Education and Career Development Program

Student Services Building, Room 205

256.824.6741

chargerjobs@uah.edu

www.uah.edu/career-services (<http://www.uah.edu/career-services/>)

Career Center

Career Services

Career Services assists students in all phases of career planning and preparation including resume writing and critique, interview preparation, developing networking skills, career assessments and career coaching through one-on-one appointments as well as workshops and information sessions. Our services provide students with the knowledge and resources to make informed career choices and personal skills to reach their objectives.

Career Services coordinates on and off-campus recruiting opportunities and hosts two comprehensive career fairs each fall and spring semester for students in all majors. Career Fair allows our students the opportunity to speak with multiple employers in one location about cooperative education (co-op), internships and degree positions. Attendees are required to dress professionally and bring copies of their resumes for distribution.

Cooperative Education and Internships

Cooperative Education and Internships provide a unique, structured educational experience that allows students to gain practical, professional work experience while completing degree requirements. Through the integration of classroom theory and professional practices, students increase their understanding of the world of work.

The Cooperative Education program offers alternating and parallel options. Students working on an alternating schedule rotate semesters of full-time study with semesters of full-time work in their majors. Some students may complete continuous parallel (part-time work) assignments concurrently with a reduced class load. Cooperative Education work experiences are progressive in responsibilities, monitored by the University, and directly related to the students' academic and career goals. Students participating in Cooperative Education are required to register their Cooperative Education through the Career Center.

Internships are one semester degree-related employment opportunities where students work one-on-one with professionals to gain practical experience in their field. Several academic programs on campus offer credit for internships; students should check with their academic advisor to learn about any credit-bearing internship opportunities within their program of study.

Charger Path

Charger Path is UAH's exclusive comprehensive career management system and all newly enrolled students receive an account during their first week of classes. In this system, students update their profiles, upload their resumes and apply for positions including co-ops, internships, and professional degree opportunities. Through Charger Path, students receive career announcements, view upcoming workshops and information sessions, have access to on-campus recruiting schedules and make appointments with the Career Center.

Intensive Language and Culture

Mission

The Intensive Language and Culture Program (ILC) is an academically-oriented language and culture program that prepares students for engagement in the classroom, on the campus, and across the community. In the ILC, nonnative speakers of English can develop language skills for study in an English-medium university such as UAH. With a rigorous curriculum and strict attendance requirements, the program supports students as they progress in their acquisition of academic/professional English.

Overview

The ILC includes 18-20 hours of classroom instruction per week. Students develop their skills in both oral and written academic English. Instruction adheres to principles of communicative language teaching.

Students are instructed in the four component skills of listening, speaking, reading, and writing. Additional work in pragmatics, grammar and pronunciation supports progress in both accuracy and fluency, with special attention paid to interaction in a U.S. university context.

The Intensive Language and Culture Program (ILC) serves the needs of non-native speakers of English at UAH. Students in Levels 010-040 (High Beginning - High Intermediate) prepare for study at English-medium universities, such as UAH. Students in Level 050 (Advanced) polish their language skills and transition into undergraduate, graduate, or non-degree programs at UAH.

Additional Information

ILC Program information is also available on the program website (<http://www.uah.edu/ilcp/>). If you are interested in applying to the ILC or receiving additional information, please email the director of the ILC at ilc@uah.edu.

Business Administration Building, Room 126

256.824.2370

ilc@uah.edu

<http://www.uah.edu/ilcp> (<http://www.uah.edu/ilcp/>)

To be considered for admission to the ILC program, you must complete the following four steps:

1. Submit your TOEFL or IELTS scores

You must achieve the following minimum score to be considered for admission:

- TOEFL (iBT): Overall of at least 50 with no sub-score below 12

OR

- IELTS: Overall of at least 4.0 with no sub-score below 3.5

If you do not have a TOEFL or an IELTS score, you may request a pre-assessment to be considered for admission to the ILC. You will then be formally assessed upon arrival at UAH and, if admitted, placed in the appropriate classes in the ILC program.

2. Submit your transcripts

Whether applying for the ILC or a degree program, nonnative speakers of English must submit certified, translated copies of their high school and/or college transcripts.

3. Submit any supporting financial documentation (if applicable)

International students who are on student visas (F1 status) must also complete and submit the UAH Affidavit of Financial Support (https://www.uah.edu/images/colleges/graduate-studies/forms/ilc_affidavit_of_financial_support_2019-2020.pdf).

4. Submit a completed application

To apply online, follow these steps:

- Go to UAH's **Charger Status** page and create an account
- Once your account is created, complete your application
 - Select the Intensive English Program Application

ILC 010 - INT LANG & CULT I

Semester Hours: 4-20

Course designed to improve nonnative speaker's ability in their overall language proficiency at the high beginning level.

ILC 020 - INT LANG & CULT II

Semester Hours: 4-20

Course designed to improve nonnative speaker's ability in their overall language proficiency at the low intermediate level.

ILC 030 - INT LANG & CULT III

Semester Hours: 4-20

Course designed to improve nonnative speaker's ability in their overall language proficiency at the intermediate level.

ILC 040 - INT LANG & CULT IV

Semester Hours: 4-20

Course designed to improve nonnative speaker's ability in their overall language proficiency at the high intermediate level.

ILC 050 - INT LANG & CULT V

Semester Hours: 4-20

Course designed to improve nonnative speaker's ability in their overall language proficiency at the advanced level.

ILC 090 - ILC: SPECIAL TOPICS

Semester Hours: 1-3

JUMP

UAH's Joint Undergraduate Master's Program (JUMP) allows undergraduate students to study at the graduate level. By taking graduate courses in your senior year, you could reduce the time taken to get a graduate (M.S. or M.A.) degree.

Benefits for you:

1. No entrance exam!
2. Double count undergrad classes for grad degree!

3. Pay undergrad tuition for grad classes taken as a JUMP student!
4. No application fee!

How to JUMP!

- Apply any time before your last semester.
- Meet with your college JUMP advisor and submit application.

Official Rules for JUMP!

- For admission to JUMP, student must meet overall GPA requirements¹ of the college. GPA includes all transfer coursework.
- Only courses taken at UAH and listed on JUMP application are eligible.
- Student must receive a B minimum in each JUMP course for it to count towards graduate degree.
- Student must maintain minimum overall GPA throughout JUMP program until graduation.
- All coursework must be completed within six years of taking first JUMP class.
- Students are considered undergraduate students until all requirements for undergraduate degree are met.
- Students cannot hold a GTA, GRA, or graduate scholarship or fellowship until undergraduate degree is completed.
- If a change is made to initial JUMP application both a JUMP change form and a change to student's undergraduate Program of Study (POS) must be submitted for approval.
- If student's GPA upon graduation is less than the required minimum, the student does not receive admission to the graduate degree program automatically. Student must apply to the graduate school with admission test score and graduate application. Courses will be counted as if the student had been a non-degree seeking graduate student.
- Students must begin their graduate program within one year of their undergraduate graduation.
- Students must n (deangrad@uah.edu?subject=JUMP!%20Notification)otify the Graduate School (deangrad@uah.edu?subject=JUMP!%20Notification) when submitting an application for undergraduate graduation.

More information available at <http://uah.edu/jump> (<http://uah.edu/jump/>)

¹

Minimum GPA requirements by college or program

Online Learning

The University of Alabama in Huntsville offers a number of academically challenging online and hybrid-online programs. Please review a listing of available programs here: <http://www.uah.edu/online> (<http://www.uah.edu/online-learning/>)

State Authorization:

The state of Alabama is a member of the SARA compact. The State Authorization Reciprocity Agreement is an agreement among member states, districts and territories that establishes comparable national standards for interstate offering of postsecondary online education courses and programs. It is intended to make it easier for students to take online courses offered by postsecondary institutions based in another state. For more information, including a current list of states in the SARA compact, please visit <http://www.nc-sara.org/>. The University of Alabama in Huntsville is an approved SARA institution.

For further information regarding SARA requirements on the UAH campus please see <http://www.uah.edu/academic-affairs/offices/oira/state-authorizations> (<http://www.uah.edu/academic-affairs/offices/oira/state-authorizations/>)

Topics include: Timeline for approval, International Residents, Territories and Provinces, Military Bases, Additional Resources, Professional Licensure, & Grievance Procedures

Pre-Professional Program

The Office of Pre-Professional Advising at The University of Alabama in Huntsville (UAH) facilitates students in all colleges and all majors. The office assists undergraduate, graduate, alumni, and post-baccalaureate students with their individual process of pursuing a career in health or law related professions by providing support, guidance, and resources.

The office values developing meaningful relationships, a sense of community, personal growth, a sense of support and challenge, and overall wellness with each student.

If an individual has begun considering a health or law career or is in the process of submitting their application to a health or law program, the office assists students with planning, procedures, and providing information. The office assists students in building competitive applications, which involves reviewing personal statements, developing pre-professional resumes, conducting mock interviews, finding and building shadowing and volunteering

opportunities and experiences, discovering and applying for internships and summer programs, conducting research, writing letters of recommendation (must meet requirements), and more.

To receive services and maintain status at UAH as a pre-professional student, all interested students must apply through the Pre-Professional website: [uah.edu/ppa](http://www.uah.edu/ppa/) (<http://www.uah.edu/ppa/>)

Pre-Professional Areas

Careers supported by the Office of Pre-Professional Advising include:

- Law
- Allopathic Medicine
- Osteopathic Medicine
- Nursing Advanced Practice
- Dentistry
- Optometry
- Veterinary Medicine
- Pharmacy
- Physical Therapy
- Occupational Therapy
- Physician Assistant
- Public Health
- Graduate studies in health related areas, including, but not limited to: epidemiology, genetic counseling, health behavior sciences, rehabilitation sciences, audiology, health care organization, and more.

The Office of Pre-Professional Advising offers academic preparatory options, which are flexible and provide a broad background to satisfy a wide variety of career objectives, including the diverse fields in the health professions.

Professional schools review student coursework, recommendation letters (e.g. employers, faculty, PPA committee letter), health related experiences (e.g. volunteering, shadowing, internships), quality interview skills and admissions test scores (e.g. Medical College Admission Test (MCAT), Dental Admission Test (DAT), Law School Admission Test (LSAT), etc.). The Pre-Professional Advisor ensures students gather each element needed for professional schools, apply at the appropriate time of year, understand components needed for their appropriate entrance exam, and feel confident in the application process.

Many students entering professional schools (e.g. medical, law, dental, optometry) do so after earning an undergraduate and/or graduate degree. No particular academic major or minor is preferred to enter a health field (with the exception that a career in nursing will require a nursing degree). It is important to consult with the desired professional school to determine specific admission requirements. Competition for admission to professional schools is intense and minimum admission requirements do not ensure acceptance.

Courses to Consider

Typical courses for admission to many health professional programs include those listed in the following set of courses. Law schools do not have a set of required courses.

It is recommended that students discuss courses with their Pre-Professional Advisor. Specific requirements of health professional programs may be found on the Pre-Professional Advising website (<http://www.uah.edu/ppa/>).

Code	Title	Semester Hours
English Composition and Literature		
	Select 6 semester hours	6
	General Biology (w/ lab) ¹	
	Select 8 semester hours	8
	General Chemistry (w/ lab)	
	Select 8 semester hours	8
	General Physics (w/ lab) ²	
	Select 8 semester hours	8
	Organic Chemistry (w/ lab) ²	
	Select 8 semester hours	8

Mathematics and Statistics³

Select 6 semester hours	6
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General Social and Behavioral Sciences

Select 6 semester hours	6
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Total Semester Hours	50
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- ¹ Additionally recommended: genetics, biochemistry, anatomy and physiology.
- ² Not required for every pre-professional area of interest. Discuss with Pre-Professional Advisor.
- ³ Calculus preferred for Mathematics.

Students are advised to choose programs of study according to individual interests and abilities.

Each professional school of interest may differ in requirements, both in and out of class, and meeting with the Pre-Professional Advisor in the Office of Pre-Professional Advising is important in accomplishing professional goals. Meeting regularly with the Pre-Professional Advisor will assist students' in achieving their maximum potential for admission.

Pre-Professional Advising
 Student Services Building Room 205
www.uah.edu/ppa (<http://www.uah.edu/ppa/>)
 256.824.4714

Pre-Law Program Certificate

The Certificate in Pre-Law Program is designed to provide undergraduate students with skills that are required for law school and the practice of law: analytical reasoning, reading, and writing. It is also intended to provide a background on various perspectives on law from a variety of disciplines not often associated with legal studies, such as sociology, psychology, and history.

A student who chooses to pursue a Certificate in Pre-Law may choose *any major or minor in any college* at UAH. A choice of major and minor is best made in consultation with the Pre-Law Adviser, who can guide a student in choosing courses that will prepare him or her for the academic rigors of a legal education. For many students, the Certificate can be earned without adding additional hours to a degree program. Select courses can be counted toward Charger Foundations.

Code	Title	Semester Hours
Core Courses		9
PHL 102	INTRO TO ETHICS	3
PHL 103	INTRODUCTION TO LOGIC	3
And one of the following two courses:		
PHL/PSC 330	CLASSI POLITI PHILOSOPHY	3
PHL/PSC 332	MODERN POLITICAL PHILOSO	3
Elective Courses ¹		6
CM 418	LEGAL ARGUMENT	
EH 320	PRACTICUM IN WRITING	
PHL 320	SYMBOLIC LOGIC	
Any 100 level WLC course		
PSC 452	AMER CONSTITUTIONAL LAW	
PSC 454	CIVIL LIBERTIES	
PY 434	PSYCHOLOGY AND LAW	
SOC 303	STATISTICS/SOCIAL SCIENCES	
SOC 307	SOCIOLOGY OF LAW	
Total Semester Hours		15

¹ With appropriate justification, the pre-law adviser may allow other elective courses.

If you are interested in the Certificate in Pre-Law Program, please contact Dr. John Harfouch at john.nale@uah.edu or (256) 824-2337.

Study Abroad

The Office of Study Abroad within the Office of International Services serves as the coordinating office for study abroad opportunities at UAH.

Faculty-Led Courses

Each year, UAH offers a number of faculty-led study abroad courses typically ranging from two to four weeks in length and conferring three to six academic credit hours in the course(s) offered.

Summer, Semester and Academic-Year Programs

UAH works with international partners and education abroad organizations to offer students summer, semester, or academic-year study abroad programs at sites in Africa, Asia, Australia, and Europe. You can participate in these programs and earn academic credit toward your degree at UAH. Programs are with affiliate partners or exchange agreement partners.

Internship, Research, and Service Abroad Opportunities

Students may consult with the Office of Study Abroad about interning, researching, and completing service projects abroad. Please note that many of these opportunities have specific application procedures and may be competitive in the selection process.

To learn more about specific countries and programs, please visit our Study Abroad programs page (<https://www.uah.edu/study-abroad/programs/>) for more information or by emailing studyabroad@uah.edu.

The Office of Study Abroad is located in the Student Services Building, Room 218M.

Admissions

Welcome to the Office of Admissions at UAH

The Admissions Staff is here to assist you as you explore your college options. With more than 100 areas of study in our 9 colleges, 185+ student organizations, suite-style living in the residence halls, and the only NCAA Division I ice hockey team in the South, we believe you will find UAH is the right place for you!

As you research UAH, make sure to contact your Admissions Counselor (<http://www.uah.edu/admissions/undergraduate/office/counselors/>) so they can help you along the way. From assisting you with your admission application to providing you with the most up-to-date information about campus to getting you in contact with other campus representatives, we are happy to help!

We know that visiting campus and getting involved is important in making your college decision. That's why we offer daily campus visits (<http://www.uah.edu/admissions/undergraduate/visit-campus/>) which allow you to speak with an Admissions Counselor and go on a student-led campus tour. We hope you'll also join us at one of the many events (<http://www.uah.edu/admissions/undergraduate/upcoming-events/>) we host both here on campus and in your community!

Academic Common Market of the Southern Regional Education Board

The Academic Common Market (ACM) is an association of 15 states (AL, AR, DE, FL, GA, KY, LA, MD, MS, OK, SC, TN, TX, VA, and WV) formed to permit out-of-state students to major in selected programs at participating institutions while paying in-state tuition rates. Each ACM state outside of Alabama typically allows its residents to participate in the University's programs through ACM.

When it has been determined that UAH offers the desired program through the Academic Common Market, applicants should initiate application procedures by contacting his/her home state's Commission on Higher Education (or the equivalent office) and requesting permission to pursue the desired program at UAH. Additional information and a listing of contacts by state may be obtained from the Southern Regional Education Board's website (<http://www.SREB.org>). Under the heading 'Programs and Services' select Academic Common Market.

Course Placement

Course Placement and Placement Testing

All students who are beginning college-level course work in **English, Mathematics, World Languages and Cultures**, and **Chemistry** are placed at the level best suited to their academic preparation and background. Initial placements are determined by a combination of factors depending on the subject area. ACT scores and high school grades determine placement in English. Students who were placed into EH 101S may opt to take the Composition Placement Test for entry into EH 101. Students may call Testing Services at 256.824.6725 to schedule an appointment to take the Composition Placement Test. This test may only be taken once.

ACT scores, AP Calculus exam scores and/or previous college level mathematics courses (which have been accepted by the Math Department for transfer credit) determine placement in Mathematics. Students who have no means of math placement can take the Mathematics Placement Test. See here (<http://www.uah.edu/science/departments/math/undergraduate-students/placement/>) for online test registration. This test may be taken twice.

ACT Math scores determine placement in Chemistry.

Students with prior knowledge of French, German, or Spanish may demonstrate competence at an advanced level in five ways:

1. performance on a computer based placement test,
2. high school coursework,
3. CLEP examination,
4. AP examination, or
5. native language experience.

Students should contact the World Languages and Cultures department at 256.824.6871 or 256.824.1022 to inquire about their placement policies.

Students will be notified at the time of the tests when they can expect to receive the test results. There is no charge for the Chemistry Placement Test, Composition Placement Test, Foreign Language Placement Test or the Mathematics Placement Test. If a student has not received initial course placements before enrollment, he or she should contact the Office of Admissions.

Credit by Examination

UAH recognizes credit by examination and credit for several types of out-of-class experiences. Credit hours earned by examination and/or out-of-class experiences are not considered UAH institutional coursework, and therefore, may not be applied towards fulfillment of:

- the minimum of 50 percent of the coursework required to earn a bachelor's degree that must be earned at a bachelor's degree granting institution (four-year college or university)
- the minimum of 25 percent of the coursework required for the degree that must be earned in residence at The University of Alabama in Huntsville

There are four alternatives by which a student may gain credit through examination at UAH:

1. departmental examinations,
2. the Advanced Placement (AP) Program,
3. the College Level Examination Program (CLEP), or
4. International Baccalaureate (IB).

Credit by examination is not granted in the following cases:

1. if a student has been enrolled in a comparable course for more than three weeks,
2. to remove a failure already recorded for a course, or
3. to satisfy the residency requirement for graduation.

Credit by Department Examination

Departmental examinations for credit in specific courses may be given by a department upon application by the student and with the approval of the Department Chair. Students may apply for such a test if they have taken college-level work in secondary school, in a non-collegiate class or on a tutorial basis, or through private study. Credit, if awarded, will be recorded without grades or quality points and will not, therefore, be included in calculation of the grade point average. The amount of credit allowable through departmental examinations is determined by the appropriate academic dean and the department chair concerned.

Departments offering credit by examination on tests constructed by the department:

Biological Sciences	Contact Department Chair
Civil Engineering	CE 211, CE 284
Computer Science	All 100 and 200 level courses
Electrical and Computer Engineering	CPE 211
Foreign Languages	Contact Department Chair
Mechanical and Aerospace Engineering	MAE 211
Music	MU 100, MU 201, MU 203
Philosophy	PHL 103, PHL 320
Psychology	PY 300, PY 302

Advanced Placement Program

Several UAH departments award credit to students who have earned designated scores on Advanced Placement (AP) Program examinations of the College Entrance Examination Board. AP examinations are usually taken at the end of an AP-designed course of study in high school. If awarded, credit will be recorded without grades or quality points and will not, therefore, be included in calculation of the grade point average. Students should apply for credit through the Office of the Registrar. Official scores may be requested at collegeboard.org. UAH AP code: 1854. Scores presented on transcripts from other institutions cannot be evaluated. To view AP Exam scores and the equivalent credit please visit <https://www.uah.edu/admissions/undergraduate/admitted-students/ap-ib> (<https://www.uah.edu/admissions/undergraduate/admitted-students/ap-ib/>)

Math Placement Table

Math ACT	Math SAT	Placement Test	AP Calculus Test Score	Placement	Equivalent Math Course (dependent on major)
0-19	480 or less	<25%	NA	Level 0	MA 107L, MA 110L, MA 112L
20-24	480-570	>25% and <50%	NA	Level 1	MA 107, MA 110, MA 112
25-26	580-610	>50% and <75%	NA	Level 2	MA 113, MA 115, MA 120
27-36	620-800	>75%	NA	Level 3	MA 171
NA	NA	NA	3 (either AB or BC test)	NA	MA 172 (credit for MA 171)
NA	NA	NA	4 or 5 (only the BC test)	NA	MA 201 (credit for MA 172)

Please note that the equivalent mathematics course is the course that the student must enroll in based upon placement.

College Level Examination Program (CLEP)

The College Level Examination Program (CLEP) is a national program under which a student can receive credit for college level achievement. Anyone who has practical knowledge in an area through independent study, work experience, cultural exposure, or intensive reading, may take these tests. The policy for CLEP credit varies with each institution. The policies listed herein are those of UAH. See www.uah.edu/testing (<http://www.uah.edu/testing/>) for test dates, fees, and registration.

Credit by CLEP examination is allowed if the appropriate academic department has approved the CLEP test for use by the University. Credit awarded for CLEP examinations will be recorded on the student's record without grades or quality points and will not, therefore, be included in calculation of the grade point average. If a student does not pass a CLEP test, no record is placed on his or her transcript. Examinations may be retaken six months after initial testing.

Students should check with their program of study and their academic advisor to determine which, if any, CLEP examinations they may take to satisfy either free elective or degree requirements.

Listed below are UAH courses in which a student may receive CLEP credit, along with specific CLEP test titles and minimum score requirements.

Course Number	CLEP Subject Test Title	Minimum Score Required
Composition and Literature		
EH 101	College Composition Modular	50 and proficient performance on College Composition Modular Essay
EH 102 ¹	College Composition Modular	65 and superior performance on College Composition Modular Essay
Science		
CH 121, CH 123, CH 125, CH 126	General Chemistry	48 (Recommended student take the Chemistry Placement Test first)
World Languages and Cultures		
WLC 101 (French)	College French	48
WLC 101 - WLC 102 (French)	College French	50
WLC 101 (German)	College German	48
WLC 101 - WLC 102 (German)	College German	50
WLC 101 (Spanish)	College Spanish	48

WLC 101 - WLC 102 (Spanish)	College Spanish	50
History and Social Science		
HY 101	Western Civilization I	56 (plus A/B on departmental essay)
HY 102	Western Civilization II	56 (plus A/B on departmental essay)
HY 221	History of the United States, Part I	60 (plus A/B on departmental essay)
HY 222	History of the United States, Part II	60 (plus A/B on departmental essay)
SOC 100	Introductory Sociology	50
PSC 101	American Government	50 (with essay)
PY 101	Introductory Psychology	54
Business		
ACC 211	Financial Accounting	65
ECN 142	Principles of Macroeconomics	50
ECN 143	Principles of Microeconomics	50
MIS 146	Information Systems & Computer Applications	50

¹ Students who have already completed EH 101 or a comparable course are not eligible to take the CLEP test for EH 102. CLEP tests must be taken in a student's first term.

International Baccalaureate (IB)

The University of Alabama in Huntsville recognizes International Baccalaureate (IB) credit with a score of 5, 6, or 7 on the higher-level examinations. IB score reports should be sent to the UAH Office of Admissions for evaluation. Additional credit may be awarded on a course by course basis as approved by the department. Some departments may award credit based on the subsidiary examinations. The academic unit responsible for the student's program of study will determine the application of credits toward specific degree requirements. If awarded, credits will be recorded without grades or quality points, and will not, therefore, be included in the calculation of grade point average.

International Baccalaureate Course	Higher Level Exam Score	Semester Credit	UAH Course Equivalent	Comments
Anthropology	5-7	3	SOC 105	
Art History	5-7	6	ARH 100, ARH 101	
Art Studio	5-7	6	ARS 123 & ARS 140 or ARS 106 & ARS 260	Depending on Portfolio
Biology	5-7	8	BYS 119, BYS 120	
Chemistry	5-6	4	CH 101, CH 105	
	7	8	CH 101/CH 105, CH 201/CH 205	
Computer Science	5-7	3	CS 100	
Economics	5-6	3	ECN 142	
	7	6	ECN 142, ECN 143	
English	5-6	3	EH 101	
	7	6	EH 101, EH 102	
Geography	5-7	3	GY 110	
History, Europe	5-7	3	HY 102	
History, US	5-7	6	HY 221, HY 222	
History, World	5-7	6	HY 103, HY 104	
Languages: French, German, Spanish	5-7	15	WLC 101, WLC 102, WLC 201, WLC 202, WLC 301	
Mathematics	5-6	4	MA 171	
	7	8	MA 171, MA 172	
Music	5-7	3	MU 100	
Philosophy	5-7	3	PHL 101	
Physics	5-7	8	PH 101, PH 102	
Psychology	5-7	6	PY 101, PY 102	
Theater Arts	5-7	3	TH 122	

Instructional and Testing Services

Sandra Wise, Instructional Testing Administrator

225 Wilson Hall

Telephone: 256.824.6725

Email: testing@uah.edu

Website: www.uah.edu/testing (<http://www.uah.edu/testing/>)

This office provides high-quality test administration and assessment services for UAH Faculty and students. It subscribes to and abides by the professional standards and guidelines for post-secondary test centers, as adopted by the National College Testing Association. Testing Services offers a variety of services for the UAH Instructors and UAH students including Online Learning exams, proctoring make-up exams, and deferred finals.

Dual Enrollment Program

Several local school systems have an agreement with UAH permitting high school juniors and seniors to take classes at UAH that may count for both high school credit toward graduation and college credit toward a degree at the University. High school juniors and seniors who meet regular UAH admission requirements and have at least a 2.9 high school academic GPA may, with the approval of their school officials, take classes at UAH and receive credit at both the high school and college level for UAH classes approved by the school system.

Applying for the Dual Enrollment program at UAH requires:

- a completed Dual Enrollment application
- the \$30 non-refundable application fee
- an official transcript of high school work
- official ACT or SAT scores
- written approval from high school officials
- written approval from the student's parent or guardian

Students enrolled in the Dual Enrollment program may register for a maximum of two courses per semester.

Early Start Program

UAH welcomes academically talented high school juniors and seniors who wish to earn college credits while still enrolled in high school. This option may be appropriate for students whose high schools do not participate in the Dual Enrollment program or students who have completed all high school graduation requirements but have not yet graduated from high school.

Applying for the Early Start Program at UAH requires:

- official scores: ACT of 26 or SAT of 1180
- high school GPA of 3.5 or higher
- Early Start application form
- \$30 non-refundable application fee
- official transcripts showing high school and any college-level work
- written approval from high school officials
- written approval from parent or guardian

Students enrolled in the Early Start program may register for a maximum of two courses per semester.

First Year Students

Requirements for High School Graduates

This information pertains to applicants who desire admission as beginning freshman students after graduation from high school and who have not attended an accredited postsecondary institution. International students should refer to the section on International Student Admissions in addition to this section.

Required Documents

Application for Admission

The application for admission and a nonrefundable \$30 fee payable to the University of Alabama in Huntsville should be submitted as soon as possible after the beginning of the senior year. The \$30.00 application fee must be in U.S. currency, drawn on a U.S. bank. This fee may also be paid via MasterCard, Visa, or American Express while applying online.

The preferred time for receipt of applications for the fall semester is the preceding August - December 1st. The fee may be waived for applicants who can document that they have received a fee waiver because of economic need as determined by the College Board (SAT) or the American College Testing Program (ACT). It is the policy of the University not to defer or waive other application fees.

For more information please see the Undergraduate Admissions (<https://www.uah.edu/admissions/undergraduate/>) page.

Admission Requirements

Admission to the University of Alabama in Huntsville requires graduation from regionally accredited high schools or completion of the General Education Diploma (GED), certain high school academic units, a cumulative high school grade point average in those academic units, and test scores as outlined below.

Secondary School Record

An official high school transcript (sent by the high school directly to the Office of Admissions) reflecting work completed from the beginning of the 9th grade through the 12th grade is required.

College Transcripts

Students who have registered for course work at community colleges, four-year colleges, or universities through dual enrollment or non-degree student status must submit official transcripts from each postsecondary institution attended. Transcripts are considered official when they are sent from a college or university directly to the Office of Admissions and contain an official seal and signature. Transcripts bearing the statement, 'Issued to Student,' or transcripts faxed or submitted by applicants are not considered official.

Test Scores

The examination offered by the American College Testing Program (ACT) or the Scholastic Assessment Test (SAT) administered by the College Entrance Examination Board is required of all applicants for freshman admission. Either one or both of these tests should be taken no later than the June testing date after the senior year. Students should feel free to repeat a test since the highest score will be considered for admission.

Suggested High School Course Units

The Office of Admissions suggests that applicants should earn four units of English; three units of mathematics, (suggested courses include Algebra I, Algebra II and Geometry. Trigonometry is also highly suggested by the College of Engineering and recommended by all other colleges); three units of natural science; four units of social studies/social sciences (includes history, civics, political science, economics, sociology, psychology, and geography), and four units of electives that may include courses such as foreign language, computer programming, religion, philosophy as well as higher-level science and math courses. These are suggested courses and questions concerning this information should be directed to the Office of Admissions.

English Language Proficiency Requirements

Applicants must demonstrate proficiency in the English language. Applicants whose first language is other than English should refer to the section (p. 17) on English language requirements for nonnative speakers.

Academic Qualifications

Each applicant is evaluated based on individual merit and demonstrated success in a rigorous academic environment. High school coursework, grade point average and ACT/SAT scores are weighed heavily; however, these criteria do not constitute the entire foundation for an admission decision. An applicant with a grade point average of 2.9 and a composite score of 20 on the ACT or equivalent SAT, for example, is considered a strong candidate for admission.

Home-Schooled Applicants

High school students who are homeschooled are reviewed for admission and for scholarships at UAH following the same criteria used for students from public and private high schools including the required test scores stated above. The official high school record of courses completed should contain the titles of courses in each subject area, beginning with grade nine. This record should contain annotation of the general content in the academic courses and the textbooks used. The teaching credentials of the home school teacher should be included.

General Education Development (GED) Recipients

Persons who have not graduated from high school may be admitted on the basis of a satisfactory score on the GED test. A score of 170 or higher is required for regular admission status. An official ACT or SAT score report may be requested. An official transcript of completed high school courses is

also required. UAH is no longer a testing center for the GED program. Anyone seeking additional information or wishing to take the GED examination should visit GED.com (<https://ged.com/>).

General Information

Conditions of Admission

The Office of Admissions will notify the applicants of the admission decision. Admission to the University is often contingent upon the subsequent receipt of satisfactory and official college, university, or high school transcripts; verification of associate of arts or baccalaureate degrees; and verification of high school graduation. Failure to submit such documents before the end of the second week of class of the initial academic semester may result in the cancellation of admission.

Ownership of Submitted Documents

All credentials and documents submitted become the property of the University of Alabama in Huntsville. The originals or copies of the originals will not be returned to the applicant or forwarded to another institution, agency, or person.

Fraudulent Records

If it is found that an applicant has made a false or fraudulent statement or an omission on the application for admission, the residency statement, or any other accompanying documents or statements, the applicant may be denied admission. If the student is already enrolled when the fraud is discovered, the case will be adjudicated using the procedures specified for violations of the Student Code of Conduct and may result in the student's admission being rescinded and the student being dismissed from the University.

Credentials and Documentation

Credentials and documentation required for admission vary by type of application. Admission to the University does not guarantee admission to a specific degree program. The Colleges of Business, Education, Engineering, and Nursing, and the Music program may have additional requirements. See the appropriate college page, program section, or the Office of Admissions web page (<http://www.uah.edu/admissions/>) for more information. A one-time non-refundable \$30 application fee must accompany the admission application.

International Students

International students are defined as any applicant who is not a U.S. Citizen or Permanent Resident. International applicants must meet all established requirements for admission from secondary schools or from other colleges and universities. International applicants should apply for admission at least six months in advance of desired attendance date in order to facilitate timely admission and enrollment.

An undergraduate international applicant must submit:

1. Completed **undergraduate international application** form.
2. Non-refundable application fee of \$60 USD.
3. Official copies of secondary school and college or university transcripts including English translations forwarded to The University of Alabama in Huntsville directly from the institution(s) attended or the approved accrediting agency. Personal copies are not accepted. English credits earned at international institutions will be evaluated by the Department of English at UAH after an admission decision is made.
4. Certificate of Foreign Credit Evaluation for all high school or college coursework done outside of the U.S. must be performed by an approved service. The evaluation should contain a course-by-course description and a grade point average from each institution attended. Applicants have the responsibility to contact the evaluation agency directly and have the evaluation agency send the official evaluation report to UAH - copies will not be accepted by UAH. Examples of acceptable evaluation services are:

Josef Silny & Associates, Inc.

International Education Consultants

7101 SW 102 Avenue

Miami, FL 33173

Ph: 305.273.1616

Fax: 305.273.1338

Translation Fax: 305.273.1984

www.jsilny.com (<http://www.jsilny.com>)

info@jsilny.com

World Education Services, Inc.

P.O. Box 5087

Bowling Green Station

New York, NY 110274-5087

Ph: 212.966.6311

Fax: 212.739.6120
www.wes.org (<http://www.wes.org>)

Lisano International
P.O. Box 507
Auburn, AL 36831
Ph: 334.745.0425

5. Official American College Test (ACT) scores or SAT scores sent directly to UAH from the testing service headquarters. ACT/SAT is not required of an applicant who has earned more than 24 semester hours of college work with a 2.0 GPA.
6. Proof of English language proficiency. Please refer to the section on English language requirements for nonnative speakers below.
7. Students who will attend UAH in F or J student status are required to submit a certified affidavit of financial support and financial statements/bank records as evidence of sufficient finances to cover university and personal expenses while attending UAH.

Transferring From Another U.S. Institution

Individuals in the U.S. in F or J status who intend to transfer to UAH from a U.S. high school or college will receive, upon admission, a *transfer clearance* form that must be completed by the previous institution's designated official (international student advisor) and sent to the UAH Office of Admissions in order to be eligible for enrollment. It is also the responsibility of the admitted F or J student to communicate with the previous school's international student advisor to ensure that the SEVIS I-20 or DS-2019 record is transferred from the previous school to UAH prior to the start of the semester of enrollment.

English Language Requirements for Nonnative Speakers

SAT/ACT score is not required for undergraduate international applicants. Applicants may submit scores, if available, for consideration in admission or scholarship eligibility determination.

All applicants whose native language is other than English must demonstrate the linguistic proficiency necessary to function in degree programs at UAH.

1. Unconditional admission to degree programs.*
 - a. In order to be considered for admission to degree programs with no additional English language training required, applicants must meet the following minimums on the TOEFL or IELTS.
TOEFL (iBT): all sub-scores greater than or equal to 18 OR
IELTS: all sub-scores greater than or equal to 6.0
 - b. Students with two or more sub-scores below these minimum qualifications must enroll in the UAH Intensive Language and Culture (ILC) Program before they can enroll in graduate course work.
*Language proficiency is only one factor in admission decisions. To confirm the full admission requirements for specific degree programs, please contact the department directly.
2. Admission to the ILC Program.
 - a. Applicants who do not currently meet the requirements for admission to a degree program at the university are encouraged to apply for admission to the UAH Intensive Language and Culture (ILC) Program. Successful completion of the UAH ILC meets the language proficiency standard for admission to degree programs at the university.
 - b. To be considered for admission to the UAH Intensive Language and Culture Program, applicants must have the following minimums on the TOEFL or IELTS.*
TOEFL (iBT): Overall of at least 50 with no sub-score below 12 OR
IELTS: Overall of at least 4.0 with no sub-score below 3.5
*NOTE: If an applicant does not have a TOEFL or an IELTS score, he/she may request a pre-assessment and be considered for admission to the ILC. He/she will then be formally assessed upon arrival at UAH and will be placed in appropriate classes in the ILC program.

NOTE THAT OFFICIAL TEST SCORES SHOULD BE SENT DIRECTLY TO UAH FROM THE TOEFL OR IELTS TESTING SERVICE.

*iBT = internet-based TOEFL; IELTS = International English Language Testing System

English Language Placement Test

The UAH English Language Placement Test (ELPT) is required of all students whose native language is not English, regardless of nationality or prior English study. A student must complete any intensive English coursework that the test indicates is required.

Health and Immunization Policies

Student Health Insurance

International students are required to purchase the UAH student health insurance and will be assessed the insurance premium each semester upon enrollment in classes. Requests for a waiver from the mandatory policy must be made to the Student Health Center within 10 days of the start of class.

Immunizations

If you were born after 1956, proof of two (2) measles containing vaccinations. One of these vaccines must be an MMR vaccination after 1980.

Acceptable proof of tuberculosis screening that is no more than twelve months old.

All first time freshmen and students living in on campus housing must also show proof of a meningitis vaccine.

Tuberculosis Screening and Testing Policy

All new international students must complete tuberculosis screening through the Student Health Center. This screening process will be scheduled as a part of the orientation program and will be provided upon arrival on campus at the UAH Student Health Center.

Residency

UAH Resident/Non-Resident Tuition Fee Guidelines

Introduction

All students registering at The University of Alabama in Huntsville (UAH) who do not demonstrate, by presenting satisfactory evidence, that they are 'resident students' will pay a 'non-resident student' tuition. 'Non-resident student' tuition will be at least twice the amount of 'resident student' tuition. The residency classification of students will be made at the time of their initial registration and will continue unchanged through all subsequent registrations until satisfactory evidence to the contrary is submitted at the time of any subsequent registration. An Application for Reclassification of Residence must be submitted to the Office of the Associate Vice President for Student Affairs no later than the last day of registration for the appropriate semester.

Demonstrating Alabama Residency

A resident student, for the purposes of this policy, is one who has established residency in Alabama and has maintained that status for at least one year immediately prior to the date of registration at any institution of higher education in the state. The policy of the Board of Trustees of The University of Alabama on non-resident tuition states that 'residence' refers to that 'single location at which a person resides with the intent of remaining there indefinitely as evidenced by more substantial connections with that place than with any other place.' Students seeking to demonstrate that they are Alabama residents must certify to three facts:

1. that an address or location within Alabama is their residence,
2. that they intend to remain there indefinitely, and
3. that they have 'more substantial connections' with Alabama than with any other state.

Though satisfying the location and statement of intent requirements are essential, demonstrating residency will depend upon the University's evaluation of the student's connections with the state. No single connection or combination will automatically result in a finding of residency. Moreover, even if one or more connections with Alabama exist, a person who is in Alabama primarily for the purpose of obtaining an education will be considered a non-resident. The Board policy lists the following as connections that may be considered:

1. Payment of Alabama state income taxes as a resident
2. Ownership of a residence or other real property in the state and payment of state ad valorem taxes thereon
3. Full-time employment (not temporary) in the state
4. Residence in the state of a spouse, parents, or children
5. Previous periods of residency in the state continuing for one year or more
6. Voter registration and voting in the state, especially registration occurring more than one year prior to the student's initial registration
7. Possession of state or local licenses to do business or practice a profession in the state
8. Ownership of personal property (e.g., automobile, boat, etc.) in the state and payment of state taxes thereon; possession of state license plates
9. Continuous physical presence in the state for a purpose other than attending school and except for temporary absences for travel, military service, temporary employment, etc.
10. Membership in religious, professional, business, civic, or social organizations in the state
11. Maintenance in the state of checking and savings accounts, safe deposit boxes, investment accounts, etc.
12. In-state address shown on selective service registration, driver's license, automobile title registration, hunting and fishing licenses, insurance policies, stock and bond registrations, last will and testament, annuities, retirement plans, etc.
13. Location within the state of the high school from which the student graduated

As stated above, a student will be classified as an Alabama resident only if the student is able to show that he/she became a resident one year or more prior to the date of registration at any institution of higher education in the state by identifying then existing, sufficient connections with Alabama.

Demonstrating Alabama Residency - Alternative Approach

A student who does not qualify for classification as a resident student under the foregoing requirements may possibly qualify if he/she (or his/her supporting person in the case of a minor) meets any one of the following requirements at the time of registration:

1. Is a full-time, non-temporary employee at UAH or is the spouse of such an employee
2. Is employed by UAH as a graduate student or fellow on at least a 0.5 FTE (half-time) basis
3. Is a full-time, non-temporary employee of some other employer within the state of Alabama, or can verify such employment beginning not more than 90 days after registration, or is the spouse of such employee
4. Is a resident of Bedford, Coffee, Franklin, Giles, Lawrence, Lincoln, Marion, Marshall, or Moore County in Tennessee and has been a resident of that County for at least one year preceding the date of registration. The requirements for a student to demonstrate that he/she is a 'resident' of one of the foregoing counties shall be the same as set forth above with regard to demonstrating Alabama residency.

As used in these Guidelines, a 'minor' refers to an individual who, because of age, lacks the capacity to contract under Alabama law. This means a single individual under age 19 and a married individual under age 18. A 'supporting person' refers to either or both of the parents of a student, if they are living together, or, if the parents are divorced or living separately, then the parent providing the greater amount of financial support of the two (normally, the parent having legal custody). **'Non-temporary' employment means employment that is on-going and not seasonal or for a specific period of time or for the express purpose of financing the student's college education.**

Rules for Veterans and U.S. Service Members of the Uniformed Services (Army, Navy, Air Force, Marine Corps and Coast Guard) and commissioned officers of NOAA and the PHS

The following individuals shall be charged a rate of tuition not to exceed the in-state rate for tuition and fees purposes:

- A Veteran using educational assistance under either chapter 30 (Montgomery G.I. Bill – Active Duty Program) or chapter 33 (Post-9/11 G.I. Bill), of title 38, United States Code, who lives in Alabama while attending a school located in Alabama (regardless of his/her formal State of residence) and enrolls in the school within three years of discharge or release from a period of active duty service of 90 days or more.
- Anyone using transferred Post-9/11 GI Bill benefits (38 U.S.C. § 3319) who lives in Alabama while attending a school located in Alabama (regardless of his/her formal State of residence) and enrolls in the school within three years of the transferor's discharge or release from a period of active duty service of 90 days or more.
- Anyone described above while he or she remains continuously enrolled (other than during regularly scheduled breaks between courses, semesters, or terms) at the same school. The person so described must have enrolled in the school prior to the expiration of the three-year period following discharge or release as described above and must be using educational benefits under either chapter 30 or chapter 33, of title 38, United States Code.
- Anyone using benefits under the Marine Gunnery Sergeant John David Fry Scholarship (38 U.S.C. § 3311(b)(9)) who lives in Alabama while attending a school located in Alabama (regardless of his/her formal State of residence).
- Anyone using transferred Post-9/11 G.I. Bill benefits (38 U.S.C. § 3319) who lives in Alabama while attending a school located in Alabama (regardless of his/her formal state of residence) and the transferor is a member of the uniformed service who is serving on active duty.
- Anyone using educational assistance under chapter 31, Vocational Rehabilitation/Employment (VR&E), also be charged the resident rate. Effective for courses and terms beginning **after March 1, 2019**, a public institution of higher learning must charge the resident rate to chapter 31 participants, as well as the other categories of individuals described above. When an institution charges these individuals more than the rate for resident students, VA is required to disapprove programs of education sponsored by VA.
- The policy shall be read to be amended as necessary to be compliant with the requirements of 38 U.S.C. 3679(c) as amended.

Special Student Status

Non-degree Students

Eligibility

A general Non-Degree seeking student is one who is not currently enrolled in or pursuing a degree at another institution and who desires to enroll at UAH for one or more terms to take certain advanced coursework for personal or professional growth. Any adult who has completed high school or completed the GED with a minimum score of 170 at least two calendar years prior to the application term may apply for admission as a non-degree student. Credits earned or courses audited as a non-degree student are recorded on the student's permanent record. As appropriate, credit courses will be applied toward a regular undergraduate degree program when the individual qualifies for admission as a regular student. A student enrolled as a non-degree student must satisfy course prerequisites for each course taken and may be required to submit official transcripts from any prior collegiate

institutions attended to show satisfactory completion of prerequisites. International students attending UAH on a student visa are not eligible for non-degree status. A student whose first language is other than English must demonstrate English language proficiency. See the section (p. 17) on English language requirements for nonnative speakers.

Exceptions

Several factors are considered when determining eligibility as a Non-Degree Student. Students may be more appropriately classified in other admission categories as outlined below:

- Students who have not yet graduated from high school must apply for admission via Dual Enrollment (p. 26) or Early Start (p. 26).
- A student who has completed high school or earned at least a 170 on the GED, but has not yet enrolled in college coursework must apply as a degree seeking first year/freshman student, or has graduated from high school or earned a GED at least two calendar years prior to term of application for non-degree admission.
- Students currently enrolled at another institution who wish to take classes as a visiting student with the intention of returning to the primary institution should apply as a Transient student.
- Students who have earned a bachelor's degree previously should apply as a Post-Baccalaureate student, which is a special category of Non-degree seeking students.

Enrollment

Non-Degree seeking students who have attended another college or university must have an official transcript from the last school attended sent to the Office of Admissions. The student must be in good academic standing at the last institution attended, if the application is submitted within one year of last enrollment. Applicants who have not attended another college or university must submit an official high school transcript, including graduation date, or an official GED test report to the Office of Admissions.

Once admitted as a non-degree student, the student may only register for a maximum of 12 semester hours per term. Only 12 semester hours earned as a Non-Degree seeking student can be used toward an undergraduate degree at UAH. Please note that admission as a Non-Degree seeking student does not imply admission to an undergraduate or graduate degree program.

Non-Degree seeking students are generally considered casual course takers and as such have the lowest priority in class registration. Enrollment in courses will be on a space-available basis, and degree-seeking students shall have priority should there be a wait-list. If a course has prerequisites that the student has not met, permission must be granted by the instructor before enrollment in the course. Non-degree students may provide evidence of meeting course prerequisites by providing an unofficial transcript to the appropriate academic advisor or Registrar staff.

A student enrolled in this category is subject to the same periodic review of his or her record as a regular student and is subject to the University's regulations regarding scholastic probation, dismissal, and reinstatement. (See Academic Policies and Procedures (p. 810).)

Non-Degree students cannot become candidates for a degree, be eligible for honors or hold officer positions in student organizations unless and until they reapply and are admitted as regular degree seeking students. At such time, the student shall submit official transcripts from all institutions previously attended and meet regular admission standards.

Non-Degree students generally are not eligible for financial aid. It is recommended that applicants contact the Office of Financial Aid at 256.824.6650 for more information and to verify eligibility.

Transient Students

Students who are currently enrolled at other colleges may apply for admission to take credit classes that will count toward a degree at their home institution. A completed application, a non-refundable \$30 application fee, and an Official Transcript from the current college are required. This verifies eligibility to return to the student's home institution and verifies the home college will accept the UAH courses for degree requirements. Transient students should satisfy UAH course prerequisites for each course taken and may be required to submit other official transcripts showing satisfactory completion of prerequisites.

Post-Baccalaureate

Eligibility

A Post-Baccalaureate student is one who has already earned a bachelor's degree and who desires to enroll at UAH for one or more terms to take certain advanced coursework for personal or professional growth. In addition to the application and non-refundable application fee, applicants must submit to the Office of Admissions an official transcript from the college or university from which the baccalaureate degree was earned.

Exceptions

Students who have already earned a bachelor's degree and wish to enroll as a degree seeking student should apply as Second Bachelor's applicant. These applicants must have a minimum cumulative grade point average of 2.0 and have all official transcripts of coursework attempted sent to UAH Office of Admissions.

Please note that admission as a Post-Baccalaureate student does not imply admission to an undergraduate or graduate degree program.

Enrollment

As with all Non-Degree seeking students, Post-Baccalaureate students are generally considered casual course takers and as such have the lowest priority in class registration. Enrollment in courses will be on a space-available basis, and degree-seeking students shall have priority should there be a wait-list. If a course has prerequisites that the student has not met, permission must be granted by the instructor before enrollment in the course. Non-Degree students may provide evidence of meeting course prerequisites by providing an unofficial transcript to the appropriate academic advisor or Registrar staff.

Post-Baccalaureate students are limited to 12 semester hours each term. Additionally, a maximum of 24 semester hours earned as a Post-Baccalaureate student can be applied toward a second bachelor's degree should a student decide to apply as a degree seeking student.

A student enrolled in this category is subject to the same periodic review of his or her record as a regular student and is subject to the University's regulations regarding scholastic probation, dismissal, and reinstatement. (See Academic Policies and Procedures (p. 810)).

Post-Baccalaureate students cannot become candidates for a degree, be eligible for honors or hold officer positions in student organizations unless and until they reapply and are admitted as regular degree seeking students under the Second Bachelor's application category. At such time, the student shall submit official transcripts from all institutions previously attended and meet regular admission standards, which includes a minimum cumulative 2.0 in all attempted coursework.

Post-Baccalaureate students generally are not eligible for financial aid. It is recommended that applicants contact the Office of Financial Aid at 256.824.6650 for more information and to verify eligibility.

Re-Admit Students

A student who has not attended UAH for one or more semesters and who wishes to return should apply for admission through the Undergraduate Admissions Department. Returning students are held to the same requirements and universities policies as newly admitted students. The Office of Admissions encourages Readmit students to contact their academic advisor to determine whether curriculum or degree requirements have changed since their last enrollment. Readmit students are required to submit official transcripts from any college/university attended since leaving UAH. Applicants must hold a cumulative 2.0 GPA in coursework completed since attending UAH. Applicants must also be in good standing at all previously attended colleges/universities.

Transfer Students

Individuals who have completed 24 semester hours of transferable **academic** credit from regionally accredited colleges or universities with a 2.0 or better GPA may be admitted to UAH as transfer students without having to submit high school transcripts, ACT or SAT scores. Transfer students must submit official transcripts from all colleges previously attended. Transfer admissions decisions will be based on a full evaluation of transcripts from all colleges and universities attended with emphasis given to those courses in which the subject matter is acceptable and relevant to the desired UAH degree program. Applicants must be in good standing at their previous institutions and have a minimum overall 2.0 GPA as well as a minimum 2.0 GPA in all courses transferable to UAH to be considered for admission.

Applicants must demonstrate proficiency in the English language. Applicants whose first language is other than English should refer the section (p. 17) on English language requirements for nonnative speakers.

Students who have already completed a bachelor's degree and wish to earn a Second Bachelor's degree at UAH must meet regular transfer admission requirements. A student who is currently on suspension or dismissal from another college or university is not eligible for admission until his or her suspension period has ended or until the student is otherwise eligible to return to the prior institution.

Admission to the upper division of the College of Nursing is an action independent from admission to the University. Students interested in pursuing the BSN should refer to the academic college section of this catalog for more information.

Evaluation of Transfer Credit

The University of Alabama in Huntsville follows the practices specified in Transfer Credit Practices of Designated Educational Institutions, published by the American Association of Collegiate Registrars and Admissions Officers, in evaluating college level courses from other recognized colleges and universities for the purpose of transfer of credit to UAH. Transfer credit evaluations will be completed as early as possible, but no later than the first semester of enrollment.

Credits from an institution that is not yet accredited but has acquired candidate status from a regional accrediting agency are provisionally eligible for transfer to UAH. In order to obtain full credit for courses accepted as provisional credits, students must complete 30 semester hours at UAH and earn a 'C' or better in each course attempted. Transfer credit will not be posted until this requirement has been met. Students with provisional credits should contact the Registrar upon completion of 30 semester hours at UAH.

Courses completed at unaccredited and non-candidate institutions are not accepted for credit at UAH. Credits for education completed in non-collegiate settings that have been evaluated and recommended for credit by the American Council on Education are accepted as transfer credit at UAH. As

a member of Service Members Opportunity Colleges, UAH is committed to easing transfer of relevant course credits and crediting learning from appropriate military training and work experiences.

The completion of the Freshman Writing/Composition requirement at another regionally-accredited college or university will satisfy UAH's Freshman Composition 6 credit-semester hour requirement (Freshman Composition I and II). For situations where this requirement was satisfied by less common approaches such as CLEP or credit by examination, please contact the chair of the English department.

Acceptance of transfer credit by the Admissions Office and application of credits to a specific degree program by the academic department are two separate and distinct processes. Consult an academic advisor for degree applicability within the desired degree program.

Credits earned in quarter hours will be converted to semester hours on the basis of two-thirds of one semester hour for each quarter hour.

An individual who enrolls as a non-degree student and later decides to work toward a degree must apply for admission as a degree-seeking student and request an evaluation of transfer credits. The application of such accepted credits to a particular program of study will be made and approved at the time of admission to the desired degree program.

Transfer Students from Alabama Junior/Community Colleges

A student transferring from an Alabama junior/community college may choose to fulfill the degree requirements of the UAH catalog which was in effect at the time of the student's initial enrollment at the Alabama junior/community college, provided that the date does not exceed the seven year limit. (See time limits section of the catalog.) This policy enables students enrolled at Alabama junior/community colleges to plan degree programs effectively and to be assured that degree requirements specified for UAH students will be equally applicable, within specified limits, to transfer students.

UAH participates in the Alabama Articulation Agreement. Students intending to transfer to UAH from Alabama junior or community colleges are encouraged to consult with their advisors, the UAH Office of Admissions, and obtain a STARS guide. This guide is also available via the Internet at <http://stars.troy.edu>. When planning their programs of study, this guide will identify courses for their major and will show equivalencies for community college courses.

A maximum of 50% of a degree program may be earned from a junior, community or two-year college. Requests for exceptions must be in writing and approved by dean of the college in which the student is enrolled.

Visiting Student Program

A cooperative arrangement exists with Alabama A&M University, Calhoun Community College, Oakwood University and The University of Alabama in Huntsville. Under this arrangement, a student at any of the participating institutions may request permission to attend a course at one of the other schools. Conditions governing the granting of permission include the following:

1. The student must be a full-time student or a full-time University employee who is a part-time student. The semester hours to be taken at the host institution shall be counted in determining the full time or part-time status of the student.
2. The course desired must be unavailable at the student's home institution.
3. Visiting students are normally limited to one undergraduate course a semester at the host institution except where the second course is a laboratory required to accompany the first course or the second course is a one-semester-hour course in basic military science.
4. The student must have an overall C average, and meet all prerequisites of the host institution.
5. The student's request must be approved by his or her advisor and other appropriate personnel.
6. Students will be admitted by the host institution to a course based upon availability of space for the visitor, to be determined by the class enrollment on the last day of regular registration.

Any student interested in participating in the Visiting Student Program should contact the Registrar's Office for information regarding the procedures to be followed.

Charger Foundations

Welcome to Charger Foundations, a set of courses dedicated to helping you engage with new ideas, complex situations, and diverse perspectives. Encompassing almost one-third of your undergraduate curriculum, the courses of Charger Foundations will enhance your skills, expand your horizons, and encourage you to build on the core values of the Charger Nation: integrity, respect, diligence, excellence, inclusiveness, and diversity.

The development of competencies associated with these values begins with Charger Foundations coursework. Below, you will see a matrix providing an overview of the competencies central to your Foundations work and aligned with the Alabama General Studies Commission (AGSC) Area Requirements.

Core Competencies

The University of Alabama in Huntsville is committed to four core competencies that serve as the foundation for undergraduate general education. These four core competencies follow.

1. Effective communication (Area I)
2. Engagement with questions of values, ethics, and aesthetics as represented in literature, the humanities, and the arts (Area II)
3. Understanding of the scientific method and application of quantitative or inductive reasoning (Area III)
4. Understanding of human behavior and economic, social, and political structures as represented in the disciplines of history and the social and behavioral sciences (Area IV)

These core competencies are consistent with those of the State of Alabama mandated articulation agreement under ACT 94-303, which ensures the transferability of credits from the State's two-year institutions to its four-year institutions.

Requirements by College

Colleges of Arts, Humanities, and Social Sciences, Business, Nursing, Professional and Continuing Studies, and Science (41 hours)

AGSC Area	Categories	Required Hours
I	Freshman Composition	3-6 hours
II ¹	Fine Arts	3 hours
	Humanities (literature)	3 hours
	Humanities (non-literature)	3 hours
	Humanities/Fine Arts	3 hours
III	Mathematics	3-4 hours
	Natural Sciences (lab)	8 hours
IV ¹	History	3 hours
	Social & Behavioral Sciences (non-history)	6 hours
	History/SBS	3 hours

¹ Take either 1 EH (Literature) + 2 HY (History) or 2 EH (Literature) + 1 HY (History). Take **no more than six hours** in a single discipline in Area II or Area IV.

College of Engineering (35 hours)

AGSC Area	Categories	Required Hours
I	Freshman Composition	3-6 hours
II ¹	Fine Arts	3 hours
	Humanities (literature)	3 hours
	Humanities	3 hours
III	Mathematics	3-4 hours
	Natural Sciences (lab)	8 hours
IV ¹	History	3 hours
	History/SBS	6 hours

¹ Take either 1 EH (Literature) + 2 HY (History) or 2 EH (Literature) + 1 HY (History). Take **no more than six hours** in a single discipline in Area II or Area IV.

College of Education (35 hours)

AGSC Area	Categories	Required Hours
I	Freshman Composition	3-6 hours
II ¹	Fine Arts	3 hours
	Humanities (literature)	3 hours
	Humanities (non-literature)	3 hours
	Humanities elective (CM 113)	3 hours
III	Mathematics	3-4 hours
	Science	8 hours

IV ¹	History	3-6 hours
	PY 101	3 hours
	PY 201	3 hours

¹ Take either 1 EH (Literature) + 2 HY (History) or 2 EH (Literature) + 1 HY (History). Take **no more than six hours** in a single discipline in Area II or Area IV.

Pathways through Charger Foundations will vary by college and major. Confer with your academic advisor to select appropriate Foundations courses each semester.

Code	Title	Semester Hours
Area I: Freshman Composition		
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		
Fine Arts		
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
AMS 229	ANCIENT & MEDIEVAL WORLDS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3
CM 113	Intro to Rhetorical Communication	
WLC 101S or WLC 101A or WLC 101F or WLC 101G or WLC 101J or WLC 101R	INTRO FOREIGN LANG I: SPANISH INTRO FOREIGN LANG I: ARABIC INTRO FOREIGN LANG I:FRENCH INTRO FOREIGN LANG I:GERMAN INTRO FOREIGN LANG I:JAPANESE INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S or WLC 102A or WLC 102F or WLC 102G or WLC 102J or WLC 102R	INTRO FOREIGN LANG II:SPANISH INTRO FOREIGN LANG II: ARABIC INTRO FOREIGN LANG II:FRENCH INTRO FOREIGN LANG II:GERMAN INTRO FOREIGN LANG II:JAPANESE INTRO FOREIGN LANG II:RUSSIAN	
WLC 201S or WLC 201A or WLC 201F or WLC 201G or WLC 201J or WLC 201R	INTERM FOREIGN LANG:SPANISH INTERM FOREIGN LANG I: ARABIC INTERM FOREIGN LANG:FRENCH INTERM FOREIGN LANG:GERMAN INTERM FOREIGN LANG: JAPANESE INTERM FOREIGN LANG:RUSSIAN	

WLC 202S	INTERM FOREIGN LANG II:SPANISH
or WLC 202A	INTERM FOREIGN LANG II: ARABIC
or WLC 202F	INTERM FOREIGN LANG II:FRENCH
or WLC 202G	INTERM FOREIGN LANG II:GERMAN
or WLC 202J	INTERM FORGN LANG II:JAPANESE
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN
WLC 204	INTERNATIONAL CINEMA
PHL 101	INTRODUCTION TO PHILOSOPHY
PHL 102	INTRO TO ETHICS
PHL 103	INTRODUCTION TO LOGIC
PHL 150	TECH, SCIENCE & HUMAN VALUES
WGS 200	INTRO WOMEN'S & GENDER STUDIES
ARH 100	ARH SURV:ANCIENT-MEDIEVAL
ARH 101	ARH SURV:RENAISSANCE-MODERN
ARH 103	ARH SUR:NON-WESTERN TRADITIONS
ARS 160	DRAWING: FOUNDATIONS
TH 122	THEATRE APPRECIATION
TH 123	INTRO TO FILM STUDIES
MU 100	INTRO TO MUSIC LITERATURE

Area III: Mathematics and Sciences

Mathematics

MA 105	NATURE OF MATHEMATICS
MA 107	ALGEBRA WITH APPLICATIONS
MA 110	FINITE MATHEMATICS
MA 112	PRECALCULUS ALGEBRA
MA 113	PRECALCULUS TRIGONOMETRY
MA 115	PRECALCULUS ALGEBRA & TRIG
MA 120	MATH PROFESSIONAL APPLICATIONS
MA 171	CALCULUS A

Natural Sciences (Lab)

AST 100	SURVEY OF ASTRONOMY
AST 106	EXPLORING THE COSMOS I
AST 107	EXPLORING THE COSMOS II
BYS 109	FUNDAMENTALS OF BIOLOGY
BYS 119	PRINCIPLES OF BIOLOGY
BYS 120	ORGANISMAL BIOLOGY
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB
ESS 103	ENVIRONMENTAL EARTH SCIENCE
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG
PH 100	CONCEPTUAL PHYSICS
PH 101	GENERAL PHYSICS I
PH 102	GENERAL PHYSICS II
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II

PH 113 GEN PHYSICS W/CALC III
& PH 116 and GENERAL PHYSICS LAB III

Area IV: History and Social and Behavioral Sciences*

History

HY 103	WORLD HISTORY TO 1500
HY 104	WORLD HISTORY SINCE 1500
HY 221	UNITED STATES TO 1877
HY 222	UNITED STATES SINCE 1877

Social and Behavioral Sciences

ECN 142	PRINC OF MACROECONOMICS
ECN 143	PRINC OF MICROECONOMICS
GS 200	GLOBAL SYSTEMS AND CULTURES
ESS 105	WORLD REGIONAL GEOGRAPHY
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY
PSC 101	INTRO TO AMERICAN GOVERNMENT
PSC 102	INTRO TO COMPARATIVE POLITICS
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS
PY 101	GENERAL PSYCHOLOGY I
PY 201	LIFE-SPAN DEVELOPMENT
SOC 100	INTRO TO SOCIOLOGY
SOC 102	ANALYSIS OF SOCIAL PROBLEMS
SOC 103	INTRO TO CRIMINOLOGY
SOC 105	INTRO CULTURAL ANTHROPOLOGY

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Take **no more than six hours** in a single discipline in Area II or Area IV.

Colleges and Departments

- College of Arts, Humanities, and Social Sciences (p. 43)
 - Ancient and Medieval Studies Minor (p. 44)
 - Art, Art History & Design (p. 45)
 - Art History Minor (p. 83)
 - Art Studio Minor (p. 84)
 - Art, BA - Art Education Concentration (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/art-art-history/art-education/>)
 - Art, BA - Art History Concentration (p. 54)
 - Art, BA - Art Studio Concentration (p. 59)
 - Art, BFA - Digital Animation Concentration (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/art-art-history/animation-bfa/>)
 - Art, BFA - Graphic Design Concentration (p. 65)
 - Art, BFA - Painting/Drawing Concentration (p. 68)
 - Art, BFA - Photography Concentration (p. 72)
 - Art, BFA - Printmaking Concentration (p. 76)
 - Art, BFA - Sculpture Concentration (p. 79)
 - Game Design and Development Minor (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/art-art-history/game-design-and-development/>)
 - Web Communications Minor (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/art-art-history/web-communications-minor/>)
 - Communication Arts (p. 84)
 - Communication Arts Minor (p. 92)
 - Communication Arts, BA (p. 88)
 - Theatre Minor (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/communication-arts/theatre-minor/>)
 - Theatre, BA (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/communication-arts/theatre/>)
 - English (p. 92)

- Creative Writing Minor (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/english/creative-writing/>)
- English Minor (p. 108)
- English, BA (p. 99)
- English, BA - Language Arts (For Students Seeking Teacher Certification) (p. 104)
- Technical Writing Minor (p. 108)
- User Experience Minor (p. 200)
- Writing Minor (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/english/writing-minor/>)
- Writing, BA (p. 224)
- Global Studies (p. 109)
- History (p. 111)
 - History and Social Science Secondary Education, BA (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/history/ed/>)
 - History Major with Public History Track* (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/history/history-public-history/>)
 - History Minor (p. 122)
 - History, BA (p. 117)
 - History, BA Secondary Education (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/history/history-education/>)
 - Public History Minor (p. 122)
- Music (p. 123)
 - Film and Media Arts Minor (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/music/film-and-media-arts-minor/>)
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 - Music, BA - Church Music Emphasis (p. 128)
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 - Music, BA - Music Education Emphasis (p. 143)
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 - Music, BA - Performance Emphasis (p. 152)
 - Music, BA - Piano Pedagogy Emphasis (p. 155)
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- Political Science (p. 166)
 - Political Science Minor (p. 174)
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- Psychology (p. 174)
 - Psychological Science Track (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/psychology/psychology-ba-psychological-science-track/>)
 - Psychology Minor (p. 186)
 - Psychology, BA (p. 179)
 - Psychology, BA - Psychological Services Track (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/psychology/psychology-ba-psychological-services-track/>)
- Sociology (p. 186)
 - Social Data Analysis Certificate (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/sociology/social-data-analysis/>)
 - Sociology Minor (p. 194)
 - Sociology, BA (p. 190)
 - Women's and Gender Studies Minor (p. 194)
- Theatre (p. 196)
- World Languages and Cultures (p. 203)

- Foreign Language and Global Engagement Certificate (p. 223)
- Foreign Language Minor (p. 222)
- Foreign Language, BA (p. 210)
- Foreign Languages, BA - Foreign Language and International Trade Concentration (p. 215)
- Global Professional Pathways Certificate (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/foreign-languages-literatures/global-professional-pathways/>)
- Latin American Studies (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/foreign-languages-literatures/latin-american-studies-minor/>)
- College of Business (p. 229)
 - Accounting (<http://catalog.uah.edu/undergrad/colleges-departments/business/accounting/>)
 - Accounting Minor (<http://catalog.uah.edu/undergrad/colleges-departments/business/accounting/accounting-minor/>)
 - Accounting, BSBA - Federal Contract Accounting Concentration (<http://catalog.uah.edu/undergrad/colleges-departments/business/accounting/accounting-bsba-federal-contract-accounting-concentration/>)
 - Accounting, BSBA - General Accounting Concentration (<http://catalog.uah.edu/undergrad/colleges-departments/business/accounting/accounting-bsba-general-accounting-concentration/>)
 - Economics (<http://catalog.uah.edu/undergrad/colleges-departments/business/economics/>)
 - Economics and Computational Analysis, BS (<http://catalog.uah.edu/undergrad/colleges-departments/business/economics/economics-computational-analysis-bachelor-of-science/>)
 - Economics Minor (<http://catalog.uah.edu/undergrad/colleges-departments/business/economics/economics-minor/>)
 - Finance (<http://catalog.uah.edu/undergrad/colleges-departments/business/finance/>)
 - Finance Minor (<http://catalog.uah.edu/undergrad/colleges-departments/business/finance/finance-minor/>)
 - Finance, BSBA (<http://catalog.uah.edu/undergrad/colleges-departments/business/finance/finance-bsba/>)
 - Information Systems (<http://catalog.uah.edu/undergrad/colleges-departments/business/information-systems/>)
 - Information Systems, BSBA (<http://catalog.uah.edu/undergrad/colleges-departments/business/information-systems/information-systems-bsba-business-analytics-supply-chains-concentration/>)
 - Information Systems, BSBA - Cybersecurity and Information Assurance Concentration (<http://catalog.uah.edu/undergrad/colleges-departments/business/information-systems/information-systems-bsba-cyber-security-information-assurance-concentration/>)
 - Management (<http://catalog.uah.edu/undergrad/colleges-departments/business/management/>)
 - Business Minor (<http://catalog.uah.edu/undergrad/colleges-departments/business/management/business-minor/>)
 - Entrepreneurship Minor (<http://catalog.uah.edu/undergrad/colleges-departments/business/management/entrepreneurship-minor/>)
 - General Business, BSBA (<http://catalog.uah.edu/undergrad/colleges-departments/business/management/general-business/>)
 - Human Resource Management Minor (<http://catalog.uah.edu/undergrad/colleges-departments/business/management/human-resource-management-minor/>)
 - Management and Leadership Minor (<http://catalog.uah.edu/undergrad/colleges-departments/business/management/management-leadership-minor/>)
 - Management, BSBA - Acquisition Management Concentration (<http://catalog.uah.edu/undergrad/colleges-departments/business/management/management-bsba-acquisition-management-concentration/>)
 - Management, BSBA - General Management Concentration (<http://catalog.uah.edu/undergrad/colleges-departments/business/management/management-bsba-general-management-concentration/>)
 - Management, BSBA - Human Resource Management Concentration (<http://catalog.uah.edu/undergrad/colleges-departments/business/management/management-bsba-human-resource-management-concentration/>)
 - Management, BSBA - Supply Chain Management Concentration (<http://catalog.uah.edu/undergrad/colleges-departments/business/management/management-bsba-supply-chain-management-concentration/>)
 - Marketing (<http://catalog.uah.edu/undergrad/colleges-departments/business/marketing/>)
 - Marketing Minor (<http://catalog.uah.edu/undergrad/colleges-departments/business/marketing/marketing-minor/>)
 - Marketing, BSBA - Digital Marketing Concentration (<http://catalog.uah.edu/undergrad/colleges-departments/business/marketing/marketing-bsba-digital-marketing-concentration/>)
 - Marketing, BSBA - General Marketing Concentration (<http://catalog.uah.edu/undergrad/colleges-departments/business/marketing/marketing-bsba-general-marketing-concentration/>)
 - Marketing, BSBA - Supply Chain in Marketing Concentration (<http://catalog.uah.edu/undergrad/colleges-departments/business/marketing/marketing-bsba-supply-chain-management-concentration/>)
- College of Education (p. 230)
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- Biological Sciences, BS - Microbiology Concentration (p. 448)
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 - Chemistry Minor for Physics and Mathematics Majors (p. 537)
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 - Chemistry, BS (p. 475)
 - Chemistry, BS - Basic Chemistry Concentration (p. 477)
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 - Chemistry, BS - Environmental Chemistry Concentration (p. 509)
 - Chemistry, BS - Forensics Chemistry Concentration (p. 515)
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- Computer Science (p. 538)
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 - Computer Science Minor (p. 551)
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 - Computer Science, BS - Entertainment Computing (<http://catalog.uah.edu/undergrad/colleges-departments/science/computer-science/computer-science-computing/>)
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- Earth System Science (p. 552)
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- Individualized Bachelor of Science (IND) Degree (<http://catalog.uah.edu/undergrad/colleges-departments/science/individualized-bachelor-of-science-ibs-degree/>)
- Mathematical Sciences (p. 579)
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 - Mathematical Sciences, Secondary Education, BS (p. 591)
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 - Physics, BS - Astronomy & Astrophysics Concentration (p. 620)
 - Physics, BS - Engineering Physics Concentration (p. 626)
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- Honors College (p. 376)

College of Arts, Humanities, and Social Sciences

Morton Hall 116

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Dean: Sean Lane, Ph.D.

Mission

The College of Arts, Humanities, and Social Sciences is committed to excellence in teaching, research, and service in the following disciplines: fine arts, humanities, social and behavioral sciences, and teacher education. For its own majors, as for those in the professional schools, the College strives to provide superior liberal arts education characterized by close interaction between teachers and learners. Its goals are to impart to each student a spirit of intellectual curiosity, critical thinking, abilities in writing and oral communication, aesthetic awareness and creativity, familiarity with human history and behavior, knowledge of languages and cultures, and an understanding of the bases of ethical behavior and the duties of citizenship. Believing in the centrality of liberal learning to the mission of a university, the College is committed to maintaining a diverse community of teacher-scholars of the highest quality and to providing an environment that encourages personal and professional growth. It considers teaching and research mutually enriching activities and strives to make its knowledge and expertise available to professional programs on campus and to the educational needs of society. Through its graduates and programs, the College contributes to the cultural, intellectual, and economic growth of the state and nation.

Undergraduate Degrees and Programs

The College of Arts, Humanities, and Social Sciences awards the Bachelor of Arts degree as well as a Bachelor of Fine Arts degree in various studio art disciplines. A student's Program of Study must total at least 120 semester hours of coursework and is comprised of four components: 1) general education requirements, 2) a major, 3) either a second major, minor, or supporting cognate studies and 4) electives. The minimum requirement for a major is 30 semester hours of coursework with at least 21 semester hours at the 300 level or above. The minimum requirement for a minor is 18 semester hours of coursework with at least 12 semester hours at the 300-level or above. The cognate studies option must be formed from two or more closely aligned disciplines and must be comprised of at least 21 semester hours with at least 12 semester hours at the 300-level or above. Specific requirements of each major and minor are provided in the appropriate departmental section of the catalog. At least 36 semester hours of a student's Program of Study must be at the 300-level or above. Please note that at least 25% of a student's major and minor must be earned at UAH.

The College of Arts, Humanities, and Social Sciences offers programs in the following disciplines:

- Ancient and Medieval Studies (p. 44)
- Art, Art History, and Design (p. 45)
- Communication Arts (p. 84)
- English (p. 93)
- Global Studies (p. 109)
- History (p. 112)
- Music (p. 124)
- Philosophy (p. 160)
- Political Science (p. 167)
- Psychology (p. 175)
- Sociology (p. 187)
- Theatre (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/communication-arts/theatre/>)
- Women's and Gender Studies (p. 194)
- World Languages and Cultures (p. 205)
- Writing (p. 224)

Academic Advising in the College of Arts, Humanities, and Social Sciences

Jana Savanapridi, Academic Advisor

Joshua Riddle, Academic Advisor

The College provides academic advising for its students through the various academic departments and through the office of the Academic Advisor. All students are strongly encouraged to seek advising assistance at the beginning of their academic careers and to continue working with their advisors throughout their academic experience. All freshmen and most sophomores with an expressed interest in liberal arts are advised by the Academic Advisors for the College of Arts, Humanities, and Social Sciences, who are located in Room 131 in Morton Hall phone 256.824.2867; email: jms0014@uah.edu (amy.smeal@uah.edu) or jnr0004@uah.edu. In addition, a Prelaw Certificate Advisor is available to assist those who plan to apply for admission to law school. Contact John Harfouch at jen0005@uah.edu.

The goals of academic advising include:

1. assisting students in planning academic and life goals
2. assisting students in their personal adjustment to the UAH campus
3. aiding students in the assessment of academic needs and in developing appropriate educational plans
4. explaining and clarifying graduation requirements as well as academic policies and
5. facilitating student success

The College of Arts, Humanities, and Social Sciences Academic Advisors assist students in fulfilling the General Education Requirements and, in concert with faculty advisors, provide information about possible major fields. An official declaration of major should be filed at the end of the sophomore year or at the completion of 42 semester hours. When a student decides on a specific major and minor, the student will then initiate a Program of Study with a College of Arts, Humanities, and Social Sciences Academic Advisor. Subsequent to completion of a Program of Study, the student is advised by faculty within the declared major(s). These faculty members are specialists in their fields of interest.

Ancient and Medieval Studies Minor

The Ancient and Medieval Studies Minor allows students to appreciate ancient and medieval civilizations both as accomplishments worthy of study in their own right and for a better understanding of the modern world. This program provides an interdisciplinary framework for exploring topics that range from history of ideas and institutions to that of material culture and archaeology, literature, philosophy and languages.

Code	Title	Semester Hours
Requirements		
AMS 229	ANCIENT & MEDIEVAL WORLDS	3
Additional 18 hours from the courses below or courses approved by Director; 12 of these hours must be at the 300-level or above.		18
ARH 301	ANCIENT GREEK ART	
ARH 302	MEDIEVAL ART	
ARH 303	RENAISSANCE ART	
ARH 305	ANCIENT ROMAN ART	
CM 408	CLASSICAL RHET THEORY	
EH 207	READINGS LITERATURE/CULTURE I	
EH 242	MYTHOLOGY	
EH 448	THE BIBLE AS LITERATURE	
EH 450	CHAUCE	
EH 451	ARTHURIAN ROMANCE	
EH 550	CHAUCE	
EH 551	ARTHURIAN ROMANCE	
HY 311	HISTORIC ARCHAEOLOGY	
HY 329	IMPERIAL ROME	
HY 331	WORLD OF MIDDLE AGES	
HY 384	ISLAMIC WORLD TO 1800	
HY 401	DAILY LIFE IN ANCIENT ROME	
HY 480	ROMANS&BARBARIANS LATE ANTIQTY	
HY 498	STUDIES IN HISTORY	
PSC 330	CLASSI POLITI PHILOSOPHY	
PHL 301	ANCIENT PHILOSOPHY	
WLC 101A	INTRO FOREIGN LANG I: ARABIC	

WLC 102A

INTRO FOREIGN LANG II: ARABIC

Total Semester Hours

21

Art, Art History & Design

160-B Wilson Hall

Telephone: 256.824.6114

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Mission

The Department of Art, Art History & Design is an accredited institutional member of the National Association of Schools of Art and Design (NASAD). Our programs are dedicated to preparing students with the knowledge and skills necessary for pursuing lives as artists, designers, art historians and other professionals. Graduates will be creative, inquisitive, and well-rounded individuals, conscious of the important roles that artistic endeavor and intellectual pursuit play within their lives and throughout our culture. The department is an integral part of the interdisciplinary experience within the university and by virtue of its commitment to the highest standards in teaching, research, and service, is dedicated to supporting and strengthening the mission of the College of Arts, Humanities, and Social Sciences.

The department of Art, Art History & Design offers the following degree programs:

- BA in Art - Art Education Concentration (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/art-art-history/art-education/>)
- BA in Art - Art History Concentration (p. 54)
- BA in Art - Art Studio Concentration (p. 59)
- BFA in Art - Digital Animation Concentration (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/art-art-history/animation-bfa/>)
- BFA in Art - Graphic Design Concentration (p. 65)
- BFA in Art - Painting/Drawing Concentration (p. 68)
- BFA in Art - Photography Concentration (p. 72)
- BFA in Art - Printmaking Concentration (p. 76)
- BFA in Art - Sculpture Concentration (p. 79)

Program

The Department of Art, Art History & Design offers courses in art studio and art history leading to a Bachelor of Arts (BA) in Art or a Bachelor of Fine Arts (BFA) degree in a particular art studio concentration (Digital Animation, Graphic Design, Painting/Drawing, Photography, Printmaking, or Sculpture).

For the BA, students can concentrate in Art Studio, Art History, or Art Education. The 51 semester hour Art Studio concentration allows a student to focus his or her upper-division studies on any of six areas: digital animation, graphic design, painting/drawing, photography, printmaking, or sculpture. In the 42 semester hour Art History concentration, students take a variety of courses exploring the visual culture of different regions and eras and complete their degree by writing a senior thesis. The Art Education concentration prepares students through coursework and an internship to become accredited teachers of art. It includes 54 hours of art and art history plus 27 hours of education credits and student teaching. The BA provides students with a solid foundation to pursue a career in the arts or a related field.

The BFA is the primary professional degree in Art Studio. In a BFA program, the goals are to develop the skills, concepts, and professional practices to pursue a career as an artist. It is also the preferred degree for students who plan to go on for a Master of Fine Arts (MFA) degree. This 78 semester hour major requires more studio courses than the BA and does not require a minor.

Students must apply for acceptance to the BFA program. The application, which is available in the department office, involves submission of a transcript (3.0 GPA required in Art History and Art Studio classes), two essays, and a portfolio of five pieces (one drawing, one 3-D piece, one work using color, and two additional pieces in the area of concentration). The review is typically done as a rising junior, but students should consult with their faculty mentors. The BFA Review is conducted at the end of the fall and spring terms and may be repeated.

All BFA students must complete an exit requirement specific to their concentration. Students who are candidates for a BFA in fine arts concentrations (Painting/Drawing, Photography, Printmaking, and Sculpture) will mount a solo exit show. Those in Digital Animation and Graphic Design will complete a comprehensive portfolio review. See your faculty mentors for guidelines.

Transfer credit for equivalent coursework in Art Studio and Art History classes will be determined by the department chair. Art majors transferring to UAH must complete at least 12 semester hours of art courses at the 300-level or above at UAH. Art Studio or Art History minors transferring in must take at least six (6) semester hours of art courses at the 300 level or above.

Majors in Art, Art History, and Design

- BA in Art - Art Education Concentration (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/art-art-history/art-education/>)
- BA in Art - Art History Concentration (p. 54)
- BA in Art - Art Studio Concentration (p. 59)
- BFA in Art - Digital Animation Concentration (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/art-art-history/animation-bfa/>)
- BFA in Art - Graphic Design Concentration (p. 65)
- BFA in Art - Painting/Drawing Concentration (p. 68)
- BFA in Art - Photography Concentration (p. 72)
- BFA in Art - Printmaking Concentration (p. 76)
- BFA in Art - Sculpture Concentration (p. 79)

Minors in Art, Art History & Design

- Art History (p. 83)
- Game Design and Development (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/art-art-history/game-design-and-development/>)
- Art Studio (p. 84)
- Web Communication (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/art-art-history/web-communications-minor/>)

ARH 100 - ARH SURV:ANCIENT-MEDIEVAL

Semester Hours: 3

Survey of Pre-historic to Medieval art. Course emphasizes study of cultural contexts that fostered art and introduces students to basic analytic tools and theories of art history. Very little in art is completely new. Learn about the visual traditions that shaped the culture we live in today.

ARH 101 - ARH SURV:RENAISSANCE-MODERN

Semester Hours: 3

Survey of the Major Western works of art produced since the Renaissance. Relates stylistic change to changes in historical and cultural contexts. Introduces students to basic analytic tools and theories of art history.

ARH 103 - ARH SUR:NON-WESTERN TRADITIONS

Semester Hours: 3

Survey of visual culture in India, the Far East, the Americas, the Pacific, and Africa. Focuses on relationships among art, religious beliefs, politics, and cultural practices. Studying the visual traditions of other cultures fosters greater understanding as our world becomes more global. Use the analytical tools and theories of art history to foster understandings of global cultures.

ARH 120 - ARH SURV: SPECIAL TOPICS

Semester Hours: 3

Course allows for survey-style exploration of special topics in art history and related fields such as archaeology.

ARH 301 - ANCIENT GREEK ART

Semester Hours: 3

Art of ancient Greece from the Bronze Age to the death of Cleopatra. Focuses on relationships of art to philosophy, politics, religion, literature, and drama. Greek art and culture heavily influenced our education system as well as the appearance of cities from Washington, DC to Huntsville, AL.

Prerequisites: ARH 100 and ARH 101.

ARH 302 - MEDIEVAL ART

Semester Hours: 3

Examines architecture, sculpture, manuscripts, metalwork, textiles, and stained glass from the fall of Rome to the Gothic era. In addition to a chronological study of the period, engage in case studies on courtship, warfare, religion, and cultural interactions that influenced practices today.

Prerequisites: ARH 100 and ARH 101.

ARH 303 - RENAISSANCE ART

Semester Hours: 3

The Renaissance supposedly ushered in advances in arts, humanities, and sciences. Rather than focusing on great masters, this course looks at regional trends in Italy as well as the rest of Europe to see what is innovative about this era considered a high point in Western culture. Prerequisites: ARH 100 and ARH 101.

ARH 304 - TWENTIETH CENTURY ART

Semester Hours: 3

Developments in European and American art from 1890 to World War II will be examined through historical, literary, philosophical, political, and social contexts and theories.. This course guides the student in critical reading of selected art historical and interdisciplinary scholarship. Prerequisites: ARH 100 and ARH 101.

ARH 305 - ANCIENT ROMAN ART

Semester Hours: 3

Roman visual culture from the foundation of the city to its fall. Explore case studies such as the age of Augustus, Pompeii, Roman engineering, the Provinces, games and spectacle. Learn about the Roman legacy and consider its impact on modern Western Culture. Prerequisites: ARH 100 and ARH 101.

ARH 306 - COLLAPSE OF CIVILIZATIONS

Semester Hours: 3

Course investigates why some cultures succeed and others fail. Examine factors that lead to collapse to address a question relevant to the contemporary world: How severe do internal stresses have to become before relatively minor climate shifts can trigger a widespread cultural collapse? Prerequisites: ARH 103 and ART major.

ARH 307 - IMPRESSIONISM & POST-IMP

Semester Hours: 3

European and American art from 1860 to 1900 examined through historical, political, social, philosophical, theoretical and literary perspective. This course guides the students in critical reading of selected art historical and interdisciplinary scholarship. Prerequisites: ARH 100 and ARH 101.

ARH 309 - CONTEMPORARY ART & ISSUES

Semester Hours: 3

Major movements since World War II examined through historical, political, social, philosophical, and literary perspectives. Contemporary art theories will also be explored. Course guides students in critical reading of selected art historical and interdisciplinary scholarship. Prerequisites: ARH 100 and ARH 101.

ARH 310 - NINETEENTH CENTURY ART

Semester Hours: 3

European and American art from 1780 to 1860 examined through historical, political, social, philosophical, theoretical and literary perspectives. Course guides students in critical reading of selected art historical and interdisciplinary scholarship. Prerequisites: ARH 100 and ARH 101.

ARH 311 - PHILOSOPHY OF ART

Semester Hours: 3

What is Art? This course explores and interrogates a wide range of contrasting aesthetic theories within the western tradition, with particular emphasis on the relation between artistic expression and philosophical frameworks. Prerequisites: ARH 100 and ARH 101. OR ARH 100 and ARH 103. OR ARH 101 and ARH 103. ART Major.

ARH 320 - SPECIAL TOPICS IN ART HY

Semester Hours: 3

Developed based on student and faculty interest, special topics courses explore content and issues not currently emphasized in the curriculum. Courses may focus on a particular issue like Women in Antiquity or a particular genre such as Modern Architecture. Prerequisites: ARH 100, ARH 101, and ARH 309.

ARH 395 - INDEPENDENT STUDY

Semester Hours: 3

Directed, independent study on a topic pre-arranged with instructor, normally as an outgrowth of a 300-level art history course. Weekly mentoring meetings with instructor help student develop a workable thesis, conduct research, and manage a project that results in a well-argued paper.

ARH 400 - SENIOR THESIS

Semester Hours: 3

Culminating experience for students with an Art History concentration. With the help of a faculty mentor, student will choose a topic, conduct research, and construct a well-argued paper. Student will present this research to the faculty, displaying skills valuable in most careers.

ARS 123 - TWO-DIMENSIONAL DES/COLOR TH

Semester Hours: 3

Introduction to the principles and elements of design and color theory. Assignments explore design concepts and an understanding of color. Course stresses the development of visual and manual skills, problem solving, critical thinking, and the tools and materials used in the making of art.

ARS 140 - THREE-DIMENSIONAL DESIGN

Semester Hours: 3

Course introduces students to fundamental principles pertaining to the creation of three-dimensional art and prepares them for more advanced processes. Processes include, but are not limited to, drawing for sculpture, model making, woodworking, and sewing.

ARS 160 - DRAWING: FOUNDATIONS

Semester Hours: 3

Introduction to principles, materials, and techniques of drawing. Observational drawing and exercises teach students visual skills and introduce aesthetics and artistic expression. Class covers visual and manual skills, problem solving, critical thinking, and the tools and materials artists use.

ARS 210 - GAME DESIGN: INTRODUCTION

Semester Hours: 3

This course is an introduction to the principles and processes of game design. Students will play, research, design, modify, and prototype tabletop games throughout the semester to gain a better understanding of game design. Prerequisite: ARS 160 or permission of instructor.

ARS 220 - ANIMATION: INTRODUCTION

Semester Hours: 3

Course is an introduction to the principles of 3D computer generated imaging including modeling, texturing, rigging, animating, lighting, and rendering, as well as production processes such as storyboarding, sound design, and editing that together provide a basic working knowledge of 3D CGI.

Prerequisites: ARS 160 and ARS 123.

ARS 230 - GRAPHIC DESIGN: INTRODUCTION

Semester Hours: 3

Introduction to graphic design theories, principles, and software. Instruction in the basics of graphic design through practical understanding of visual communication and logistics of advertising, conceptual thinking, and creative exploration. Course is a primer for the Macintosh platform. Prerequisites: ARS 123 and ARS 160.

ARS 240 - SCULPTURE: INTRODUCTION

Semester Hours: 3

Students will develop and explore their ideas using a variety of traditional and non-traditional tools, materials and processes. Assemblage, subtraction, modeling, 3D modeling/printing and casting processes will be addressed, preparing students for entrance into advanced coursework. Prerequisite: ARS 140.

ARS 250 - PHOTOGRAPHY: INTRODUCTION

Semester Hours: 3

Fundamentals and techniques of the digital camera, image capture, digital scanning, and image manipulation with Adobe PhotoShop software. Basic printing and image preparation for the web and other media will also be explored. Basic Mac OS and/or Windows skills, and digital camera required. Prerequisites: ARS 123 and ARS 160.

ARS 260 - DRAWING: INTRODUCTION

Semester Hours: 3

Course further develops drawing skills through study and practice. Materials, design, and creative ideas are explored. Critical thinking and visual analysis are used in critique. Students continue to develop visual and manual skills, problem solving abilities, and the use of tools and materials.

Prerequisites: ARS 123 and ARS 160.

ARS 270 - PAINTING: INTRODUCTION

Semester Hours: 3

Students learn basic painting techniques, materials, and mediums. Problem solving assignments use two-dimensional design and color theory concepts and practices. Students are required to observe and think critically for critique and discussion. Prerequisites: ARS 123 and ARS 160.

ARS 280 - PRINTMAKING: INTRODUCTION

Semester Hours: 3

Introduction to basic areas of printmaking, including planographic, intaglio, and relief processes. Expands 2-D design concepts, color theory, and drawing skills. Develops proficiency with printmaking tools and materials as well as critical thinking and problem solving skills. Prerequisites: ARS 123 and ARS 160.

ARS 311 - GAME DESIGN: SCRIPTING & DES I

Semester Hours: 3

This course introduces students with limited programming experience to video game scripting using a visual programming language. Students will learn tools and techniques to design & script their own video games. Prerequisites: ARS 210, and one of the following: CS 102, CS 103, CS 121. Or permission of instructor.

ARS 321 - ANIMATION: ORGANIC MODELING

Semester Hours: 3

This course will focus on organic mesh design and production as well as surface and lighting properties for creating portfolio quality, real-time and pre-rendered, 3D organic models.

ARS 322 - ANIMATION: 3D ANIMATION

Semester Hours: 3

Course explores fundamental animation principles (timing/spacing, overlap, squash/stretch, anticipation, etc) along with digital animation tools (rigging, inverse kinematics, keyframing, etc) to help students gain experience and a better understanding of the role of CG animators. Prerequisite: ARS 220.

ARS 324 - ANIMATION: TECHNICAL ARTS

Semester Hours: 3

Course will concentrate on areas of production that require both technical and art skill, often called technical art. Topics include in-depth rigging, automating workflows, simulations, writing custom tools, writing shaders, etc. Students will gain experience in a sought-after production role. Prerequisite: ARS 220.

ARS 325 - ANIMATION: HARD SURF MODELING

Semester Hours: 3

This course will focus on hard surface mesh design and production as well as material and lighting properties for creating portfolio quality, real-time and pre-rendered, 3D hard surface models. Prerequisite: ARS 220.

ARS 327 - ANIMATION; VISUAL STORY DEV

Semester Hours: 3

This course focuses on developing visual storytelling as a graphic language for storyboarding films & animations, as well as creating comics and graphic novels. The principles of sequential art will be examined and applied to projects throughout the semester. This is a 2D course and is digital drawing intensive. Prerequisite with Concurrency: ARS 220.

ARS 328 - ANIMATION: CONCEPT ART

Semester Hours: 3

This class will cover the basics of concept art for the entertainment industry and related fields. Games, characters, and stories start out as ideas and concept art is how those ideas are visually developed, iterated, and refined before going into production. This course is digital drawing intensive. Prerequisite with Concurrency: ARS 322.

ARS 329 - ANIMATION: 2D ANIMATION

Semester Hours: 3

This course focuses on creating traditional and tweened 2D animations using current digital tools and techniques. The principles of animation will be examined through a variety of exercises and applied to main projects. This course is digital drawing intensive. Prerequisite with Concurrency: ARS 220.

ARS 330 - GRAPHIC DESIGN: PRINT MEDIA I

Semester Hours: 3

Course emphasizes creative exploration in design and layout. Students will learn intermediate methods of graphic design. Focus for this course is additional study in design, creative thinking, and industry software. Prerequisite: ARS 230.

ARS 332 - GRAPHIC DESIGN: WEB DESIGN

Semester Hours: 3

Beginning course in web design using HTML and CSS to build effective and creative websites with strong user-centric design. Understanding HTML and current best web design practices is essential to web design and development. Prerequisite: ARS 230.

ARS 333 - GRAPH DES: WATERCOLOR & DIG I

Semester Hours: 3

Graphic design from an illustration and fine arts perspective. Course explores different creative directions using current software in combination with traditional watercolor media. Students will learn how to handle watercolor, develop creative concepts, and use software to support their design. Prerequisite: ARS 230.

ARS 334 - GRAPH DES: WEB USER EXPER I

Semester Hours: 3

Course places emphasis on user experience, web animation, and application for the purpose of media development. This course focuses on the understanding of user experience and user interface design through the study of how consumers interact with media. Prerequisite: ARS 230.

ARS 335 - GRAPHIC DESIGN: TYPOGRAPHY I

Semester Hours: 3

Course studies type design and the usage of basic letterforms, typographic contrast, and hierarchy of information, major type families and characteristics, the history of typography design, creativity, and grid layout. Prerequisite: ARS 230.

ARS 340 - SCULP: FABRICATION I

Semester Hours: 3

Exploration of a variety of assemblage processes including wood, metal, and fabric construction. Emphasis is placed on idea development and investigating a wide range of forms and materials. Course instruction includes welding, CNC plasma cutting, advanced wood joinery, and wood bending. Prerequisite: ARS 240.

ARS 341 - SCULP: CARVING I

Semester Hours: 3

Carving stone, wood, and other materials is investigated with emphasis placed on developing the ability to see and release forms and on the unique relationship evolving between maker and material. Instruction also includes CNC routing, wood turning, and sharpening techniques. Prerequisite: ARS 240.

ARS 342 - SCULP: CASTING I

Semester Hours: 3

Course instruction focuses on mold-making processes and materials involved in casting objects using both traditional and non-traditional methods. Metal casting is the principle focus of this course with investigation surrounding how digital practices continue to affect this age-old practice. Prerequisite: ARS 240.

ARS 346 - SCULP: FIGURE MODELING I

Semester Hours: 3

Study of the human form through direct clay modeling from life, including anatomical studies, armature construction, mold making, and casting. Nude models will be used. Prerequisite: ARS 240.

ARS 347 - SCULP: SPACE AND PLACE I

Semester Hours: 3

Investigation of installation and environmental art practices including site-specific work, public art and interactive environments. Students will explore works that relate to the experience of place and develop the potential to use sculptural objects to transform space. Prerequisite: ARS 240.

ARS 350 - PHOTO: DIGITAL I

Semester Hours: 3

Digital image creation and editing techniques using postproduction software, digital printing, and image presentation. Course addresses contemporary fine art issues and an introduction to studio lighting. Students are required to provide their own digital camera with RAW settings. Prerequisite: ARS 250.

ARS 352 - PHOTO: DARKROOM I

Semester Hours: 3

Black and white film and darkroom techniques explored as a means of expression. Course discusses artistic styles and the history of twentieth-century black and white photography. Students will produce a final fine art portfolio. 35mm camera required (available through department if necessary). Prerequisite: ARS 250.

ARS 353 - PHOTO: EXPER & HIST I

Semester Hours: 3

Introduction to alternative ways of working in the darkroom with an emphasis on historical photographic techniques. Experimentation with analog and digital materials are encouraged to produce a final portfolio. Students need a film camera (available through the department if necessary). Prerequisite: ARS 352.

ARS 355 - PHOTO: DOCUMENTARY I

Semester Hours: 3

Students study 'truth' in the image using the documentary style of photography. Emphasis on the history of the genre and how to work in the field with attention to ethical issues. Students are required to provide their own digital camera with RAW settings. Prerequisite: ARS 350.

ARS 360 - DRAWING: FIGURE

Semester Hours: 3

Drawing with an emphasis on life drawing utilizing both traditional and contemporary methods and materials. Figure drawing is the traditional cornerstone of art training, and includes anatomy, observation, and advanced technical skills. Nude models will be used. Prerequisite: ARS 260.

ARS 375 - PAINTING: TRADITIONAL I

Semester Hours: 3

Investigation of figure painting, focusing on technical and philosophical approaches to using the human form as subject matter. Nude models will be used. Students are guided in the development of artistic facility and vocabulary. Prerequisite: ARS 270.

ARS 376 - PAINTING: CONTEMPORARY I

Semester Hours: 3

Contemporary approaches toward painting are explored through technical and conceptual exercises based on contemporary painting practices. Students are guided in the development of artistic facility and personal expression. Prerequisite: ARS 270.

ARS 377 - PAINTING: MIXED MEDIA I

Semester Hours: 3

Exploration of painting with mixed and non-traditional media, including the use of assemblage and collage processes, shaped or contoured canvases, and related media. Students are guided in the development of artistic facility and a vocabulary of visual symbols for personal expression. Prerequisite: ARS 270.

ARS 381 - PRINT: ETCHING & RELIEF I

Semester Hours: 3

Etching and relief print processes are explored through woodblock, linoleum cut, aquatint and line etching. Through demonstrations, critical analysis, and making prints, students develop skills with tools, techniques and concepts associated with etching and relief printmaking. Prerequisite: ARS 280.

ARS 383 - PRINT: SCREENPRINT I

Semester Hours: 3

Studio practices in screenprint methods are used to synthesize technical skills and develop sophisticated aesthetic modes of printmaking. Through demonstrations, critical analysis, and making prints, students will consider complex ways in which printmaking becomes a tool for artistic expression. Prerequisite: ARS 280.

ARS 385 - PRINT: BOOK ARTS I

Semester Hours: 3

Students develop skills and aesthetic modes of narrative work through book arts. Emphasis on gaining skills in cutting, folding, measuring, gluing, sewing, printing, and binding. Students develop form and content through the exploration of structural mock ups and personal work. Prerequisite: ARS 280.

ARS 387 - PRINT: MONOPRINT & LITHOGRAPHY I

Semester Hours: 3

Monoprint and lithography are explored through planographic print processes. Through demonstrations, critical analysis, and making prints, student develop skills with tools techniques and concepts associated with monoprint and lithography printmaking. Prerequisite: ARS 280.

ARS 390 - PORTFOLIO DEVELOPMENT I

Semester Hours: 3

This course is focused on helping students create high quality portfolio work that demonstrates their skills and creative capabilities as artists. Multidisciplinary and discipline specific sections are offered - please see your advisor for details.

ARS 393 - MULTIMEDIA I

Semester Hours: 3

Study and practice of time-based and other artistic approaches that combine elements of various art forms, usually developed along strong conceptual or thematic lines. Readings, written assignments, and presentations foster an understanding of the wide varieties of contemporary art practice. Prerequisites: ARS 123, ARS 140, ARS 160 and ARS 260.

ARS 395 - SP TOPICS IN STUDIO ART

Semester Hours: 3

Special topics on particular media or conceptual approaches to art. This course allows the student to explore new media and/or critical theoretical approaches to contemporary art. Prerequisite: Instructor Approval.

ARS 415 - ANIMATION: TEAM GAME DESN I

Semester Hours: 3

Students in this collaborative game design and development course will work in teams to conceptualize and create working video games in one semester. Students will gain an understanding of industry standard tools and practices, as well as get valuable experience working in teams.

Prerequisite: Choose one: ARS 321, ARS 322, ARS 324, ARS 325, ARS 329, ARS 311, CS 221.

ARS 416 - ANIMATION: TEAM GAME DESN II

Semester Hours: 3

In this advanced collaborative game design and development course, students take on leadership production roles on their game teams and help mentor junior members. Students will gain experience as team leads and learn to coordinate multidisciplinary projects. Prerequisite: ARS 415.

ARS 425 - ANIMATION: SHORT FILM I

Semester Hours: 3

In this course students will conceptualize and fully produce 3D animated short films. The story, characters, and world will be built from the ground up, and the production pipeline will mirror common industry practices. Experience with 3D is essential, but expertise in a particular discipline is not as critical as being driven to learn and create. Prerequisites: ARS 321 or 322 or 324 or 325 or 329.

ARS 426 - ANIMATION: SHORT FILM II

Semester Hours: 3

In this advanced short film production course students will take on leadership roles within their discipline and help guide the conceptualization and production of 3D animated short films. Advanced understanding of an aspect of production and short film pipelines is expected. Prerequisite: ARS 425.

ARS 430 - GRAPHIC DESIGN: PRINT MEDIA II

Semester Hours: 3

Course emphasizes print production, special applications of print design, environmental graphics, and advertising campaigns. Focus is on mastering print media methods and creating portfolio enhancement projects. Prerequisite: ARS 330.

ARS 432 - GRAPH DES: SENIOR PROJ MGMT

Semester Hours: 3

Students develop and/or manage one or more major web projects for clients as well as a professional site for students themselves. Course is the practical application of current best web design practices including user-centric design, HTML, CSS, Content Management Systems and current web standards. Prerequisite: ARS 332.

ARS 433 - GRAPH DES: WATERCOLOR & DIG II

Semester Hours: 3

Course extends a student's knowledge of digital and traditional watercolor media. The purpose of this course is to further explore creative techniques, develop a direction, and apply new techniques combining media. Prerequisite: ARS 333.

ARS 434 - GRAPH DES: WEB USER EXPER II

Semester Hours: 3

Course focuses on advanced methods of user experience and user interface design. With faculty mentoring, students learn how to develop complex designs using these methods in user experience for the purpose of advanced media usage. Prerequisite: ARS 334.

ARS 435 - GRAPHIC DESIGN: TYPOGRAPHY II

Semester Hours: 3

Course explores professional methods in type design and type application. Course teaches students how to develop advertising series and text design using illustrative approaches to hand lettering. Curriculum includes expressive methods in developing type for the purpose of environmental graphics. Prerequisite: ARS 335.

ARS 440 - SCULP: FABRICATION II

Semester Hours: 3

Course continues investigation of fabrication processes exploring the specific nature of each area of specialization with emphasis on integrating multiple processes into singular sculptural works. Emphasis is placed on ideation, discussion, and presentation of personal artistic interests. Prerequisite: ARS 340.

ARS 441 - SCULP: CARVING II

Semester Hours: 3

Continued exploration of subtractive processes with a focus on specific material, process, or context. Discussion of ideation, historical/contemporary contexts, and presentation specific to personal artistic interests. Prerequisite: ARS 341.

ARS 442 - SCULP: CASTING II

Semester Hours: 3

Continued exploration of mold-making, patination, casting, and foundry processes as well as investigation of contemporary methods and materials. Students develop further technical knowledge and conceptual motivation related to casting with an emphasis on individual exploration. Prerequisite: ARS 342.

ARS 447 - SCULP: SPACE AND PLACE II

Semester Hours: 3

Exploration of installation and environmental art practices with an emphasis on creating work at off-campus sites. Students will engage in rigorous ideation through site research and public presentation. Students will have the opportunity to create public artworks on campus and in the City of Huntsville. Prerequisite: ARS 347.

ARS 450 - PHOTO: DIGITAL II

Semester Hours: 3

Advanced digital image creation and image presentation. Class is open to experimentation with analog materials to produce digital media. There is an emphasis on personal style to produce a cohesive final project. Students are required to provide their own digital camera with RAW settings. Prerequisite: ARS 350.

ARS 452 - PHOTO: DARKROOM II

Semester Hours: 3

Advanced class in black and white darkroom photography. Students will explore the techniques of medium and large format photography to produce a final fine art print portfolio. 120 and/or 4x5 view camera required (available through department if necessary). Prerequisite: ARS 352.

ARS 453 - PHOTO: EXPER & HIST II

Semester Hours: 3

Advanced alternative and historical techniques in photography with an emphasis on personal style. Individual projects will be assigned to produce a cohesive portfolio. Prerequisite: ARS 353.

ARS 455 - PHOTO: DOCUMENTARY II

Semester Hours: 3

Advanced study of the documentary genre of photography throughout the history of the medium from the first portraits and travel photographs to the photojournalism and ethical issues of the modern world. Students are required to present a final portfolio of photographs. Prerequisite: ARS 355.

ARS 460 - DRAWING: CONCEPTUAL

Semester Hours: 3

Practice and theory focusing on drawing as a major medium, utilizing both traditional and contemporary methods and materials. Assignments are concept based. Nude models may be used. Prerequisite: ARS 360.

ARS 475 - PAINTING: TRADITIONAL II

Semester Hours: 3

Continued exploration of figurative painting processes with an emphasis on portfolio development and professional practices. Students are guided in the development of artistic facility and personal expression using paint as a medium. Prerequisite: ARS 375.

ARS 476 - PAINTING: CONTEMPORARY II

Semester Hours: 3

Continued exploration of contemporary painting approaches with an emphasis on portfolio development and professional practices. Students are guided in their development of artistic facility and a vocabulary of visual symbols for personal expression. Prerequisite: ARS 376.

ARS 477 - PAINTING: MIXED MEDIA II

Semester Hours: 3

Continued exploration of mixed and non-traditional media with an emphasis on portfolio development and professional practices. Students are guided in the development of artistic facility and a vocabulary of visual symbols for personal expression through the use of a variety of media. Prerequisite: ARS 377.

ARS 481 - PRINT: ETCHING & RELIEF II

Semester Hours: 3

This is an advanced course, where etching and relief are used to make an independent body of work. Students demonstrate how printmaking is a tool for conceptual exploration and expression. Through visual and written research students consider the hand-printed image within our culture. Prerequisite: ARS 381.

ARS 483 - PRINT: SCREENPRINT II

Semester Hours: 3

Studio practices in advanced screenprint methods are used to create an independent body of work. Students investigate how screenprinting is a tool for developing prints in an expanded way and explore the multiple through the concerns of analogue and digital possibilities. Prerequisite: ARS 383.

ARS 485 - PRINT: BOOK ARTS II

Semester Hours: 3

Students develop an advanced body of work in the book arts, by exploring structure and content. Content is developed through the student's independent investigation of text and image. Structure developed through the making of mockups. Honing technical skills in printing and binding is emphasized. Prerequisite: ARS 385.

ARS 487 - PRINT: MONOPRINT & LITHOGRAPHY II

Semester Hours: 3

Monoprint and lithography print processes are used to create an independent body of work in this advanced course. Students demonstrate how unique and multiple prints are tools for conceptual exploration and expression. Through research students consider the roll printed image within visual culture. Prerequisite: ARS 387.

ARS 490 - PORTFOLIO DEVELOPMENT II

Semester Hours: 3

This advanced portfolio development course allows students to work with and gain feedback from studio professors and students from different studio disciplines. Students will create a fully developed body of work that is aesthetically and/or conceptually linked. Prerequisite: ARS 390.

ARS 492 - ART INTERNSHIP

Semester Hours: 3

Student applies principles, theories, and skills learned in Art Studio and/or Art History courses to on-the-job experience in a professional environment. Internship host may be suggested by the student or assigned by advisor. 150 work hours required to complete 15-week internship. Prerequisite: Instructor Approval.

ARS 493 - MULTIMEDIA II

Semester Hours: 3

Continued exploration of multi-media art works with emphasis on increasing sophistication and portfolio development. Readings, written assignments, and presentations foster an understanding of the wide varieties of contemporary art practice. Prerequisite: ARS 393.

ARS 494 - PROFESSIONAL PRACTICES

Semester Hours: 3

Course is a requirement for students in the BFA program, and is open to BA students. Includes preparation for the senior exit show or design portfolio, developing written materials for careers in the visual arts, and learning how to install and manage an art exhibition. Prerequisites: ARS 123, ARS 140, ARS 160 ARS 260, plus a minimum of four 300- or 400- level studio courses.

ARS 495 - INDEPENDENT PROJECTS

Semester Hours: 3

Available for an advanced major when an appropriate course is not offered to facilitate progress to graduation. May be taken only one time. Prerequisite: Instructor Approval.

ARS 496 - PRINCIPLES FOR TEACHING ART

Semester Hours: 3

Focus on methods, materials and processes suitable for comprehensive art education content implementation. The course is a hands-on methods course in which students are required to design and implement art lessons to be taught to students in educational settings. Prerequisites: ED 410 and at least 4 300-level ARS courses, minimum gpa 2.75 or higher.

Art, BA - Art History Concentration

The Art History Discipline

- Art, BA requires 120 credit hours.
- 36 of 120 credit hours must be taken at 300 level or higher.
- Must have a 2.0 GPA in major, minor, and overall.
- No more than 6 credit hours of HPE may count in degree requirements.
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.

- No more than 60 credit hours from a two-year school can be applied toward a UAH degree.
- All double counting of classes must be approved through the AHSS Advising Office.
- For graduation application instructions, see here (p. 812).

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101	COLLEGE WRITING I	
or EH 101S	COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S	INTRO FOREIGN LANG I: SPANISH	
or WLC 101A	INTRO FOREIGN LANG I: ARABIC	
or WLC 101F	INTRO FOREIGN LANG I:FRENCH	
or WLC 101G	INTRO FOREIGN LANG I:GERMAN	
or WLC 101J	INTRO FOREIGN LANG I:JAPANESE	
or WLC 101R	INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S	INTRO FOREIGN LANG II:SPANISH	
or WLC 102A	INTRO FOREIGN LANG II: ARABIC	
or WLC 102F	INTRO FOREIGN LANG II:FRENCH	
or WLC 102G	INTRO FOREIGN LANG II:GERMAN	
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE	
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN	
WLC 201S	INTERM FOREIGN LANG:SPANISH	
or WLC 201A	INTERM FOREIGN LANG I: ARABIC	
or WLC 201F	INTERM FOREIGN LANG:FRENCH	
or WLC 201G	INTERM FOREIGN LANG:GERMAN	
or WLC 201J	INTERM FOREIGN LANG: JAPANESE	
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN	
WLC 202S	INTERM FOREIGN LANG II:SPANISH	
or WLC 202A	INTERM FOREIGN LANG II: ARABIC	
or WLC 202F	INTERM FOREIGN LANG II:FRENCH	
or WLC 202G	INTERM FOREIGN LANG II:GERMAN	
or WLC 202J	INTERM FORGN LANG II:JAPANESE	
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN	

WLC 204	INTERNATIONAL CINEMA	
PHL 101	INTRODUCTION TO PHILOSOPHY	
PHL 102	INTRO TO ETHICS	
PHL 103	INTRODUCTION TO LOGIC	
PHL 150	TECH, SCIENCE & HUMAN VALUES	
WGS 200	INTRO WOMEN'S & GENDER STUDIES	
AMS 229	ANCIENT & MEDIEVAL WORLDS	
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Area III: Mathematics and Sciences		11-12
Mathematics		3-4
MA 105	NATURE OF MATHEMATICS	
MA 107	ALGEBRA WITH APPLICATIONS	
MA 110	FINITE MATHEMATICS	
MA 112	PRECALCULUS ALGEBRA	
MA 113	PRECALCULUS TRIGONOMETRY	
MA 115	PRECALCULUS ALGEBRA & TRIG	
MA 120	MATH PROFESSIONAL APPLICATIONS	
MA 171	CALCULUS A	
Natural Sciences (Lab)		8
AST 100	SURVEY OF ASTRONOMY	
AST 106	EXPLORING THE COSMOS I	
AST 107	EXPLORING THE COSMOS II	
BYS 109	FUNDAMENTALS OF BIOLOGY	
BYS 119	PRINCIPLES OF BIOLOGY	
BYS 120	ORGANISMAL BIOLOGY	
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I	
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB	
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB	
ESS 103	ENVIRONMENTAL EARTH SCIENCE	
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG	
PH 100	CONCEPTUAL PHYSICS	
PH 101	GENERAL PHYSICS I	
PH 102	GENERAL PHYSICS II	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	
Area IV: History and Social and Behavioral Sciences*		12
History		3-6

HY 103	WORLD HISTORY TO 1500
HY 104	WORLD HISTORY SINCE 1500
HY 221	UNITED STATES TO 1877
HY 222	UNITED STATES SINCE 1877

Social and Behavioral Sciences 6-9

ECN 142	PRINC OF MACROECONOMICS
ECN 143	PRINC OF MICROECONOMICS
GS 200	GLOBAL SYSTEMS AND CULTURES
ESS 105	WORLD REGIONAL GEOGRAPHY
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY
PSC 101	INTRO TO AMERICAN GOVERNMENT
PSC 102	INTRO TO COMPARATIVE POLITICS
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS
PY 101	GENERAL PSYCHOLOGY I
PY 201	LIFE-SPAN DEVELOPMENT
SOC 100	INTRO TO SOCIOLOGY
SOC 102	ANALYSIS OF SOCIAL PROBLEMS
SOC 103	INTRO TO CRIMINOLOGY
SOC 105	INTRO CULTURAL ANTHROPOLOGY

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). In Area V, take no more than six hours in a single discipline from Areas II, III, or IV. Area V should cover a breadth of disciplinary study.

Code	Title	Semester Hours
Pre-Professional Courses		19
9 hours will be courses shared with the ARH major and may not also be used in Area II of the GER		
Any WLC 101, 102, 201 or 202		
7 hours pre-professional electives which can be chosen from the above categories of Humanities, History, Literature, and Fine Arts. These are additional courses that were not taken to fulfill the categories above.		
Art History Lower Division Requirements		24
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
Any two 100-level ARS courses		
One 200-level ARS course		
Art History Upper Division Requirements		24
Art History Courses:		3
ARH 309	CONTEMPORARY ART & ISSUES	
Select five additional ARH courses at the 300+ level or above from the following:		15
ARH 301	ANCIENT GREEK ART	
ARH 302	MEDIEVAL ART	
ARH 303	RENAISSANCE ART	
ARH 304	TWENTIETH CENTURY ART	
ARH 305	ANCIENT ROMAN ART	
ARH 306	COLLAPSE OF CIVILIZATIONS	
ARH 307	IMPRESSIONISM & POST-IMP	
ARH 310	NINETEENTH CENTURY ART	
ARH 311	PHILOSOPHY OF ART	
ARH 320	SPECIAL TOPICS IN ART HY	
ARH 395	INDEPENDENT STUDY	
HY 310	INTRODUCTION TO PUBLIC HISTORY	
Senior Thesis:		3

ARH 400	SENIOR THESIS	
Art Studio Courses:		3
One 300-level ARS course, corresponding to 200-level taken above ^{1,2}		
Minor		18+
Elective Courses		
Elective hours vary by student, please see advisor.		
Total Semester Hours		120

¹ An additional 3 hr. upper-level studio, art history, or approved related discipline is required for art history majors with a studio minor. Please consult with advisor or chair.

² For example, if a student opts to take ARS 280, he or she may select among the 300-level Printmaking options: ARS 381, ARS 383, ARS 385, or ARS 387.

Year 1

Fall		Semester Hours
EH 101	COLLEGE WRITING I	3
MA 1XX		3
ARH 101	ARH SURV:RENAISSANCE-MODERN	3
ARS 160	DRAWING: FOUNDATIONS	3
FYE 101	CHARGER SUCCESS	1
Term Semester Hours:		13
Spring		
EH 102	COLLEGE WRITING II	3
Science w/Lab		4
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	3
ARS 123 or ARS 140	TWO-DIMENSIONAL DES/COLOR TH or THREE-DIMENSIONAL DESIGN	3
Area II GER Class		3
Term Semester Hours:		16

Year 2

Fall		
Foreign Language Class		3
Science w/Lab		4
HY 103	WORLD HISTORY TO 1500	3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	3
ARH 309	CONTEMPORARY ART ISSUES	3
Term Semester Hours:		16
Spring		
EH 2XX		3
ARS 2XX		3
HY 104	WORLD HISTORY SINCE 1500	3
ARH 3XX		3
Minor Class		3
Term Semester Hours:		15

Year 3

Fall		
TH 122	THEATRE APPRECIATION	3
ARH 3XX		3
ARS 3XX		3
Minor Class		3
Minor Class		3
Term Semester Hours:		15

Spring

Area IV GER		3
ARH 3XX		3
ARH 3XX		3
Minor Class		3
Minor Class		3
Term Semester Hours:		15
Year 4		
Fall		
Area II GER		3
ARH 3XX		3
Area V GER		3
Minor Class		3
Minor Class		3
Term Semester Hours:		15
Spring		
Area IV GER		3
ARH 400	SENIOR THESIS	3
Area V GER		3
Area V GER		3
Elective		3
Term Semester Hours:		15
Total Semester Hours:		120

Art, BA - Art Studio Concentration

The Art Studio Discipline

- Art, BA Art Studio requires at least 120 credit hours.
- 36 of 120 credit hours must be taken at 300 level or higher.
- No more than 6 credit hours of HPE may count in degree requirements.
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- No more than 60 credit hours from a two-year school can be applied toward a UAH degree.
- Any double counting of classes must be approved through the CAHS Academic Advising Office.
- For graduation application instructions, see here (p. 812).

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	

EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S	INTRO FOREIGN LANG I: SPANISH	
or WLC 101A	INTRO FOREIGN LANG I: ARABIC	
or WLC 101F	INTRO FOREIGN LANG I:FRENCH	
or WLC 101G	INTRO FOREIGN LANG I:GERMAN	
or WLC 101J	INTRO FOREIGN LANG I:JAPANESE	
or WLC 101R	INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S	INTRO FOREIGN LANG II:SPANISH	
or WLC 102A	INTRO FOREIGN LANG II: ARABIC	
or WLC 102F	INTRO FOREIGN LANG II:FRENCH	
or WLC 102G	INTRO FOREIGN LANG II:GERMAN	
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE	
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN	
WLC 201S	INTERM FOREIGN LANG:SPANISH	
or WLC 201A	INTERM FOREIGN LANG I: ARABIC	
or WLC 201F	INTERM FOREIGN LANG:FRENCH	
or WLC 201G	INTERM FOREIGN LANG:GERMAN	
or WLC 201J	INTERM FOREIGN LANG: JAPANESE	
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN	
WLC 202S	INTERM FOREIGN LANG II:SPANISH	
or WLC 202A	INTERM FOREIGN LANG II: ARABIC	
or WLC 202F	INTERM FOREIGN LANG II:FRENCH	
or WLC 202G	INTERM FOREIGN LANG II:GERMAN	
or WLC 202J	INTERM FORGN LANG II:JAPANESE	
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN	
WLC 204	INTERNATIONAL CINEMA	
PHL 101	INTRODUCTION TO PHILOSOPHY	
PHL 102	INTRO TO ETHICS	
PHL 103	INTRODUCTION TO LOGIC	
PHL 150	TECH, SCIENCE & HUMAN VALUES	
WGS 200	INTRO WOMEN'S & GENDER STUDIES	
AMS 229	ANCIENT & MEDIEVAL WORLDS	
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Area III: Mathematics and Sciences		11-12
Mathematics		3-4
MA 105	NATURE OF MATHEMATICS	
MA 107	ALGEBRA WITH APPLICATIONS	
MA 110	FINITE MATHEMATICS	
MA 112	PRECALCULUS ALGEBRA	
MA 113	PRECALCULUS TRIGONOMETRY	
MA 115	PRECALCULUS ALGEBRA & TRIG	

MA 120	MATH PROFESSIONAL APPLICATIONS	
MA 171	CALCULUS A	
Natural Sciences (Lab)		8
AST 100	SURVEY OF ASTRONOMY	
AST 106	EXPLORING THE COSMOS I	
AST 107	EXPLORING THE COSMOS II	
BYS 109	FUNDAMENTALS OF BIOLOGY	
BYS 119	PRINCIPLES OF BIOLOGY	
BYS 120	ORGANISMAL BIOLOGY	
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I	
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB	
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB	
ESS 103	ENVIRONMENTAL EARTH SCIENCE	
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG	
PH 100	CONCEPTUAL PHYSICS	
PH 101	GENERAL PHYSICS I	
PH 102	GENERAL PHYSICS II	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	
Area IV: History and Social and Behavioral Sciences*		12
History		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Sciences		6-9
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
ESS 105	WORLD REGIONAL GEOGRAPHY	
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS	
PY 101	GENERAL PSYCHOLOGY I	
PY 201	LIFE-SPAN DEVELOPMENT	
SOC 100	INTRO TO SOCIOLOGY	
SOC 102	ANALYSIS OF SOCIAL PROBLEMS	
SOC 103	INTRO TO CRIMINOLOGY	
SOC 105	INTRO CULTURAL ANTHROPOLOGY	

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV).

Code	Title	Semester Hours
Pre-Professional Courses		19
WLC 101, 102, 201, or 202		3
ARS 123, ARS 160, ARS 140, ARS 260, ARH 1xx, and ARH 1xx will share with the Art Studio major and the Pre-professional area. These classes may not also count in Area II of the GER.		
Art Studio Requirements:		51
ARS 123	TWO-DIMENSIONAL DES/COLOR TH	
ARS 140	THREE-DIMENSIONAL DESIGN	
ARS 160	DRAWING: FOUNDATIONS	
ARS 260	DRAWING: INTRODUCTION	
Select three additional 200-level ARS courses		9
Art History Requirements. Select two of the following:		6
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
Upper Division Requirements ^{1,2}		
ARS 309	CONTEMPORARY ART & ISSUES	
Select five ARS courses at the 300+ level from the lists below		
Select two ARS courses at the 400+ level from the lists below		
From the 300+ and 400+ classes, no more than four courses may be taken from any one area		21
Digital Animation:		
ARS 311	GAME DESIGN: SCRIPTING & DES I	
ARS 321	ANIMATION: ORGANIC MODELING	
ARS 325	ANIMATION: HARD SURF MODELING	
ARS 328	ANIMATION: CONCEPT ART	
ARS 327	ANIMATION; VISUAL STORY DEV	
ARS 329	ANIMATION: 2D ANIMATION	
ARS 322	ANIMATION: 3D ANIMATION	
ARS 324	ANIMATION: TECHNICAL ARTS	
ARS 415	ANIMATION: TEAM GAME DESN I	
ARS 416	ANIMATION: TEAM GAME DESN II	
ARS 425	ANIMATION: SHORT FILM I	
ARS 426	ANIMATION: SHORT FILM II	
Graphic Design:		
ARS 330	GRAPHIC DESIGN: PRINT MEDIA I	
ARS 332	GRAPHIC DESIGN: WEB DESIGN	
ARS 333	GRAPH DES: WATERCOLOR & DIG I	
ARS 334	GRAPH DES: WEB USER EXPER I	
ARS 335	GRAPHIC DESIGN: TYPOGRAPHY I	
ARS 430	GRAPHIC DESIGN: PRINT MEDIA II	
ARS 432	GRAPH DES: SENIOR PROJ MGMT	
ARS 433	GRAPH DES: WATERCOLOR & DIG II	
ARS 434	GRAPH DES: WEB USER EXPER II	
ARS 435	GRAPHIC DESIGN: TYPOGRAPHY II	
Painting/Drawing:		
ARS 360	DRAWING: FIGURE	
ARS 375	PAINTING: TRADITIONAL I	
ARS 376	PAINTING: CONTEMPORARY I	
ARS 377	PAINTING: MIXED MEDIA I	
ARS 460	DRAWING: CONCEPTUAL	
ARS 475	PAINTING: TRADITIONAL II	

ARS 476	PAINTING: CONTEMPORARY II
ARS 477	PAINTING: MIXED MEDIA II
Printmaking:	
ARS 381	PRINT: ETCHING & RELIEF I
ARS 383	PRINT: SCREENPRINT I
ARS 385	PRINT: BOOK ARTS I
ARS 387	PRINT: MONOPRINT & LITHOGRAPHY I
ARS 481	PRINT: ETCHING & RELIEF II
ARS 483	PRINT: SCREENPRINT II
ARS 485	PRINT: BOOK ARTS II
ARS 487	PRINT: MONOPRINT & LITHOGRAPHY II
Photography:	
ARS 350	PHOTO: DIGITAL I
ARS 352	PHOTO: DARKROOM I
ARS 353	PHOTO: EXPER & HIST I
ARS 355	PHOTO: DOCUMENTARY I
ARS 450	PHOTO: DIGITAL II
ARS 452	PHOTO: DARKROOM II
ARS 453	PHOTO: EXPER & HIST II
ARS 455	PHOTO: DOCUMENTARY II
Sculpture:	
ARS 340	SCULP: FABRICATION I
ARS 341	SCULP: CARVING I
ARS 342	SCULP: CASTING I
ARS 347	SCULP: SPACE AND PLACE I
ARS 440	SCULP: FABRICATION II
ARS 441	SCULP: CARVING II
ARS 442	SCULP: CASTING II
ARS 447	SCULP: SPACE AND PLACE II
Other:	
ARS 346	SCULP: FIGURE MODELING I
ARS 390	PORTFOLIO DEVELOPMENT I
ARS 393	MULTIMEDIA I
ARS 395	SP TOPICS IN STUDIO ART
ARS 490	PORTFOLIO DEVELOPMENT II
ARS 492	ART INTERNSHIP
ARS 493	MULTIMEDIA II
ARS 494	PROFESSIONAL PRACTICES
ARS 495	INDEPENDENT PROJECTS

Courses at Alabama A&M ³

Minor Courses 18+

Elective Courses

Elective hours vary by student, see advisor.

Total Semester Hours 120

¹ These are tracks are based on a student's interest, but they are not recognized concentrations or majors. Students will receive a Bachelor of Arts; Major: Art; Concentration: Art Studio.

² Majors with an Art Studio focus have the option to complete a group exhibition (fine arts areas) or portfolio review (digital animation and graphic design) requirement. Students emphasizing digital animation and graphic design may present a comprehensive portfolio as part of the coursework for their final 400-level course. All other art majors with an Art Studio focus may mount a senior group exhibition of their work. Contact the Department for details.

³ To fulfill upper-division elective studio requirements, a student may take two art studio courses at Alabama A&M. These courses must be selected from ARH 305, ARH 306, and ARH 307.

Year 1

		Semester Hours
Fall		
EH 101	COLLEGE WRITING I	3
MATH 1XX		3
ARS 123	TWO-DIMENSIONAL DES/COLOR TH	3
ARS 160	DRAWING: FOUNDATIONS	3
FYE 101	CHARGER SUCCESS	1
Term Semester Hours:		13

Spring

EH 102	COLLEGE WRITING II	3
ARS 140	THREE-DIMENSIONAL DESIGN	3
ARS 260	DRAWING: INTRODUCTION	3
Science w/Lab		4
ARH 1XX		3
Term Semester Hours:		16

Year 2

Fall		
FL 1XX		3
Science w/Lab		4
HY 103	WORLD HISTORY TO 1500	3
ARS 2XX		3
ARS 2XX		3
Term Semester Hours:		16

Spring

EH 2XX		3
HY 104	WORLD HISTORY SINCE 1500	3
ARH 1XX		3
ARS 2XX		3
ARS 3XX		3
Term Semester Hours:		15

Year 3

Fall		
TH 122	THEATRE APPRECIATION	3
ARH 309	CONTEMPORARY ART ISSUES	3
ARS 3XX		3
Minor Courses		6
Term Semester Hours:		15

Spring

GER Area II		3
GER Area IV		3
ARS 3XX		3
Minor Courses		6
Term Semester Hours:		15

Year 4

Fall		
GER Area II		3
GER Area IV		3
Minor Courses		6
ARS 3XX		3
Term Semester Hours:		15

Spring

ARS 3XX		3
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ARS 4XX	3
ARS 4XX	3
Minor Course	3
Elective	3
Term Semester Hours:	15
Total Semester Hours:	120

Art, BFA - Graphic Design Concentration

Graphic Design Concentration

- Art, BFA Graphic Design requires at least 120 credit hours.
- 36 of 120 credit hours must be taken at 300 level or higher.
- No more than 6 credit hours of HPE may count in degree requirements.
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- No more than 60 credit hours from a two-year school can be applied toward a UAH degree.
- All sharing of classes must be approved through the AHSS Advising Office.
- For graduation application instructions, see here (p. 812).

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S or WLC 101A or WLC 101F or WLC 101G or WLC 101J or WLC 101R	INTRO FOREIGN LANG I: SPANISH INTRO FOREIGN LANG I: ARABIC INTRO FOREIGN LANG I:FRENCH INTRO FOREIGN LANG I:GERMAN INTRO FOREIGN LANG I:JAPANESE INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S or WLC 102A or WLC 102F or WLC 102G	INTRO FOREIGN LANG II:SPANISH INTRO FOREIGN LANG II: ARABIC INTRO FOREIGN LANG II:FRENCH INTRO FOREIGN LANG II:GERMAN	

or WLC 102J	INTRO FOREIGN LANG II:JAPANESE
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN
WLC 201S	INTERM FOREIGN LANG:SPANISH
or WLC 201A	INTERM FOREIGN LANG I: ARABIC
or WLC 201F	INTERM FOREIGN LANG:FRENCH
or WLC 201G	INTERM FOREIGN LANG:GERMAN
or WLC 201J	INTERM FOREIGN LANG: JAPANESE
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN
WLC 202S	INTERM FOREIGN LANG II:SPANISH
or WLC 202A	INTERM FOREIGN LANG II: ARABIC
or WLC 202F	INTERM FOREIGN LANG II:FRENCH
or WLC 202G	INTERM FOREIGN LANG II:GERMAN
or WLC 202J	INTERM FORGN LANG II:JAPANESE
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN
WLC 204	INTERNATIONAL CINEMA
PHL 101	INTRODUCTION TO PHILOSOPHY
PHL 102	INTRO TO ETHICS
PHL 103	INTRODUCTION TO LOGIC
PHL 150	TECH, SCIENCE & HUMAN VALUES
WGS 200	INTRO WOMEN'S & GENDER STUDIES
AMS 229	ANCIENT & MEDIEVAL WORLDS
ARH 100	ARH SURV:ANCIENT-MEDIEVAL
ARH 101	ARH SURV:RENAISSANCE-MODERN
ARH 103	ARH SUR:NON-WESTERN TRADITIONS
ARS 160	DRAWING: FOUNDATIONS
TH 122	THEATRE APPRECIATION
TH 123	INTRO TO FILM STUDIES
MU 100	INTRO TO MUSIC LITERATURE

Area III: Mathematics and Sciences**11-12****Mathematics****3-4**

MA 105	NATURE OF MATHEMATICS
MA 107	ALGEBRA WITH APPLICATIONS
MA 110	FINITE MATHEMATICS
MA 112	PRECALCULUS ALGEBRA
MA 113	PRECALCULUS TRIGONOMETRY
MA 115	PRECALCULUS ALGEBRA & TRIG
MA 120	MATH PROFESSIONAL APPLICATIONS
MA 171	CALCULUS A

Natural Sciences (Lab)**8**

AST 100	SURVEY OF ASTRONOMY
AST 106	EXPLORING THE COSMOS I
AST 107	EXPLORING THE COSMOS II
BYS 109	FUNDAMENTALS OF BIOLOGY
BYS 119	PRINCIPLES OF BIOLOGY
BYS 120	ORGANISMAL BIOLOGY
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II

CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB
ESS 103	ENVIRONMENTAL EARTH SCIENCE
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG
PH 100	CONCEPTUAL PHYSICS
PH 101	GENERAL PHYSICS I
PH 102	GENERAL PHYSICS II
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III

Area IV: History and Social and Behavioral Sciences* **12**

History **3-6**

HY 103	WORLD HISTORY TO 1500
HY 104	WORLD HISTORY SINCE 1500
HY 221	UNITED STATES TO 1877
HY 222	UNITED STATES SINCE 1877

Social and Behavioral Sciences **6-9**

ECN 142	PRINC OF MACROECONOMICS
ECN 143	PRINC OF MICROECONOMICS
GS 200	GLOBAL SYSTEMS AND CULTURES
ESS 105	WORLD REGIONAL GEOGRAPHY
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY
PSC 101	INTRO TO AMERICAN GOVERNMENT
PSC 102	INTRO TO COMPARATIVE POLITICS
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS
PY 101	GENERAL PSYCHOLOGY I
PY 201	LIFE-SPAN DEVELOPMENT
SOC 100	INTRO TO SOCIOLOGY
SOC 102	ANALYSIS OF SOCIAL PROBLEMS
SOC 103	INTRO TO CRIMINOLOGY
SOC 105	INTRO CULTURAL ANTHROPOLOGY

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV).

Code	Title	Semester Hours
Pre-professional		19
These classes will share between the Pre-Professional Area and Major: ARS 160, ARS 123, ARS 140, ARS 260, ARH 100, ARH 101, and ARH 103		
The classes counting in the Pre-Professional area will not also be allowed to count in Area II of the GER		
Major Requirements:		78
Foundations:		12
ARS 123	TWO-DIMENSIONAL DES/COLOR TH	
ARS 140	THREE-DIMENSIONAL DESIGN	
ARS 160	DRAWING: FOUNDATIONS	
ARS 260	DRAWING: INTRODUCTION	
Select four:		12
ARS 220	ANIMATION: INTRODUCTION	
ARS 230	GRAPHIC DESIGN: INTRODUCTION	
ARS 240	SCULPTURE: INTRODUCTION	

ARS 250	PHOTOGRAPHY: INTRODUCTION	
ARS 270	PAINTING: INTRODUCTION	
ARS 280	PRINTMAKING: INTRODUCTION	
Upper Division Requirements		6
ARS 390	PORTFOLIO DEVELOPMENT I	
ARS 494	PROFESSIONAL PRACTICES	
Select 4 ARS courses at the 300-level in the field of concentration		12
Select 2 ARS courses at the 400-level in the field of concentration		6
ARS 330	GRAPHIC DESIGN: PRINT MEDIA I	
ARS 332	GRAPHIC DESIGN: WEB DESIGN	
ARS 333	GRAPH DES: WATERCOLOR & DIG I	
ARS 334	GRAPH DES: WEB USER EXPER I	
ARS 335	GRAPHIC DESIGN: TYPOGRAPHY I	
ARS 430	GRAPHIC DESIGN: PRINT MEDIA II	
ARS 432	GRAPH DES: SENIOR PROJ MGMT	
ARS 433	GRAPH DES: WATERCOLOR & DIG II	
ARS 434	GRAPH DES: WEB USER EXPER II	
ARS 435	GRAPHIC DESIGN: TYPOGRAPHY II	
Art History Requirements:		12
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARH 309	CONTEMPORARY ART & ISSUES	
Select one of the following 300-level Art History courses before 1800:		3
ARH 301	ANCIENT GREEK ART	
ARH 302	MEDIEVAL ART	
ARH 303	RENAISSANCE ART	
ARH 305	ANCIENT ROMAN ART	
ARH 306	COLLAPSE OF CIVILIZATIONS	
ARH 320	SPECIAL TOPICS IN ART HY ¹	
Select one of the following 300-level Art History courses after 1800:		3
ARH 304	TWENTIETH CENTURY ART	
ARH 307	IMPRESSIONISM & POST-IMP	
ARH 310	NINETEENTH CENTURY ART	
ARH 311	PHILOSOPHY OF ART	
HY 310	INTRODUCTION TO PUBLIC HISTORY	
ARH 320	SPECIAL TOPICS IN ART HY ¹	
Major Electives		12
Select 4 courses ARH/ARS 300-level or above		
Electives		
Elective hours vary by program, please see advisor.		
Total Semester Hours		120

¹ Depending on the topic of this course, it may satisfy either the Pre- or Post-1800 requirement, or function as an elective.

Art, BFA - Painting/Drawing Concentration

Painting/Drawing Concentration

- Art, BFA Painting/Drawing requires at least 120 credit hours.
- 36 of 120 credit hours must be taken at 300 level or higher.
- No more than 6 credit hours of HPE may count in degree requirements.
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- No more than 60 credit hours from a two-year school can be applied toward a UAH degree.

- All double counting of classes must be approved through the AHSS Advising Office.
- For graduation application instructions, see here (p. 812).

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S or WLC 101A or WLC 101F or WLC 101G or WLC 101J or WLC 101R	INTRO FOREIGN LANG I: SPANISH INTRO FOREIGN LANG I: ARABIC INTRO FOREIGN LANG I:FRENCH INTRO FOREIGN LANG I:GERMAN INTRO FOREIGN LANG I:JAPANESE INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S or WLC 102A or WLC 102F or WLC 102G or WLC 102J or WLC 102R	INTRO FOREIGN LANG II:SPANISH INTRO FOREIGN LANG II: ARABIC INTRO FOREIGN LANG II:FRENCH INTRO FOREIGN LANG II:GERMAN INTRO FOREIGN LANG II:JAPANESE INTRO FOREIGN LANG II:RUSSIAN	
WLC 201S or WLC 201A or WLC 201F or WLC 201G or WLC 201J or WLC 201R	INTERM FOREIGN LANG:SPANISH INTERM FOREIGN LANG I: ARABIC INTERM FOREIGN LANG:FRENCH INTERM FOREIGN LANG:GERMAN INTERM FOREIGN LANG: JAPANESE INTERM FOREIGN LANG:RUSSIAN	
WLC 202S or WLC 202A or WLC 202F or WLC 202G or WLC 202J or WLC 202R	INTERM FOREIGN LANG II:SPANISH INTERM FOREIGN LANG II: ARABIC INTERM FOREIGN LANG II:FRENCH INTERM FOREIGN LANG II:GERMAN INTERM FORGN LANG II:JAPANESE INTERM FOREIGN LANG II:RUSSIAN	
WLC 204	INTERNATIONAL CINEMA	

PHL 101	INTRODUCTION TO PHILOSOPHY
PHL 102	INTRO TO ETHICS
PHL 103	INTRODUCTION TO LOGIC
PHL 150	TECH, SCIENCE & HUMAN VALUES
WGS 200	INTRO WOMEN'S & GENDER STUDIES
AMS 229	ANCIENT & MEDIEVAL WORLDS
ARH 100	ARH SURV:ANCIENT-MEDIEVAL
ARH 101	ARH SURV:RENAISSANCE-MODERN
ARH 103	ARH SUR:NON-WESTERN TRADITIONS
ARS 160	DRAWING: FOUNDATIONS
TH 122	THEATRE APPRECIATION
TH 123	INTRO TO FILM STUDIES
MU 100	INTRO TO MUSIC LITERATURE

Area III: Mathematics and Sciences**11-12****Mathematics** **3-4**

MA 105	NATURE OF MATHEMATICS
MA 107	ALGEBRA WITH APPLICATIONS
MA 110	FINITE MATHEMATICS
MA 112	PRECALCULUS ALGEBRA
MA 113	PRECALCULUS TRIGONOMETRY
MA 115	PRECALCULUS ALGEBRA & TRIG
MA 120	MATH PROFESSIONAL APPLICATIONS
MA 171	CALCULUS A

Natural Sciences (Lab)**8**

AST 100	SURVEY OF ASTRONOMY
AST 106	EXPLORING THE COSMOS I
AST 107	EXPLORING THE COSMOS II
BYS 109	FUNDAMENTALS OF BIOLOGY
BYS 119	PRINCIPLES OF BIOLOGY
BYS 120	ORGANISMAL BIOLOGY
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB
ESS 103	ENVIRONMENTAL EARTH SCIENCE
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG
PH 100	CONCEPTUAL PHYSICS
PH 101	GENERAL PHYSICS I
PH 102	GENERAL PHYSICS II
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III

Area IV: History and Social and Behavioral Sciences***12****History** **3-6**

HY 103	WORLD HISTORY TO 1500
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HY 104	WORLD HISTORY SINCE 1500
HY 221	UNITED STATES TO 1877
HY 222	UNITED STATES SINCE 1877
Social and Behavioral Sciences	
ECN 142	PRINC OF MACROECONOMICS
ECN 143	PRINC OF MICROECONOMICS
GS 200	GLOBAL SYSTEMS AND CULTURES
ESS 105	WORLD REGIONAL GEOGRAPHY
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY
PSC 101	INTRO TO AMERICAN GOVERNMENT
PSC 102	INTRO TO COMPARATIVE POLITICS
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS
PY 101	GENERAL PSYCHOLOGY I
PY 201	LIFE-SPAN DEVELOPMENT
SOC 100	INTRO TO SOCIOLOGY
SOC 102	ANALYSIS OF SOCIAL PROBLEMS
SOC 103	INTRO TO CRIMINOLOGY
SOC 105	INTRO CULTURAL ANTHROPOLOGY

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV).

Code	Title	Semester Hours
Pre-professional		19
These major classes will be shared between the Pre-Professional Area and major: ARS 160, ARS 123, ARS 140, ARS 260, ARH 100, ARH 101, and ARH 103.		
The classes counting in the Pre-Professional area will not also be allowed to count in Area II of the GER		
Major Requirements:		78
Foundations:		12
ARS 123	TWO-DIMENSIONAL DES/COLOR TH	
ARS 140	THREE-DIMENSIONAL DESIGN	
ARS 160	DRAWING: FOUNDATIONS	
ARS 260	DRAWING: INTRODUCTION	
Select four:		12
ARS 220	ANIMATION: INTRODUCTION	
ARS 230	GRAPHIC DESIGN: INTRODUCTION	
ARS 240	SCULPTURE: INTRODUCTION	
ARS 250	PHOTOGRAPHY: INTRODUCTION	
ARS 270	PAINTING: INTRODUCTION	
ARS 280	PRINTMAKING: INTRODUCTION	
Upper Division Requirements		6
ARS 390	PORTFOLIO DEVELOPMENT I	
ARS 494	PROFESSIONAL PRACTICES	
Select 4 ARS courses at the 300-level in the field of concentration		12
Select 2 ARS courses at the 400-level in the field of concentration		6
ARS 360	DRAWING: FIGURE	
ARS 375	PAINTING: TRADITIONAL I	
ARS 376	PAINTING: CONTEMPORARY I	
ARS 377	PAINTING: MIXED MEDIA I	
ARS 460	DRAWING: CONCEPTUAL	
ARS 475	PAINTING: TRADITIONAL II	
ARS 476	PAINTING: CONTEMPORARY II	
ARS 477	PAINTING: MIXED MEDIA II	

Art History Requirements:		12
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARH 309	CONTEMPORARY ART & ISSUES	
Select one of the following 300-level Art History courses before 1800:		3
ARH 301	ANCIENT GREEK ART	
ARH 302	MEDIEVAL ART	
ARH 303	RENAISSANCE ART	
ARH 305	ANCIENT ROMAN ART	
ARH 306	COLLAPSE OF CIVILIZATIONS	
ARH 320	SPECIAL TOPICS IN ART HY ¹	
Select one of the following 300-level Art History courses after 1800:		3
ARH 304	TWENTIETH CENTURY ART	
ARH 307	IMPRESSIONISM & POST-IMP	
ARH 310	NINETEENTH CENTURY ART	
ARH 311	PHILOSOPHY OF ART	
HY 310	INTRODUCTION TO PUBLIC HISTORY	
ARH 320	SPECIAL TOPICS IN ART HY ¹	
Major Electives		12
Select 4 courses ARH/ARS 300-level or above		12
Electives		
Elective hours vary by program, please see advisor.		
Total Semester Hours		120

¹ Depending on the topic of this course, it may satisfy either the Pre- or Post-1800 requirement, or function as an elective.

Art, BFA - Photography Concentration

Photography Concentration

- Art, BFA Photography requires at least 120 credit hours.
- 36 of 120 credit hours must be taken at 300 level or higher.
- No more than 6 credit hours of HPE may count in degree requirements.
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- No more than 60 credit hours from a two-year school can be applied toward a UAH degree.
- All double counting of classes must be approved through the AHSS Advising Office.
- For graduation application instructions, see here (p. 812).

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	

TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S	INTRO FOREIGN LANG I: SPANISH	
or WLC 101A	INTRO FOREIGN LANG I: ARABIC	
or WLC 101F	INTRO FOREIGN LANG I:FRENCH	
or WLC 101G	INTRO FOREIGN LANG I:GERMAN	
or WLC 101J	INTRO FOREIGN LANG I:JAPANESE	
or WLC 101R	INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S	INTRO FOREIGN LANG II:SPANISH	
or WLC 102A	INTRO FOREIGN LANG II: ARABIC	
or WLC 102F	INTRO FOREIGN LANG II:FRENCH	
or WLC 102G	INTRO FOREIGN LANG II:GERMAN	
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE	
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN	
WLC 201S	INTERM FOREIGN LANG:SPANISH	
or WLC 201A	INTERM FOREIGN LANG I: ARABIC	
or WLC 201F	INTERM FOREIGN LANG:FRENCH	
or WLC 201G	INTERM FOREIGN LANG:GERMAN	
or WLC 201J	INTERM FOREIGN LANG: JAPANESE	
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN	
WLC 202S	INTERM FOREIGN LANG II:SPANISH	
or WLC 202A	INTERM FOREIGN LANG II: ARABIC	
or WLC 202F	INTERM FOREIGN LANG II:FRENCH	
or WLC 202G	INTERM FOREIGN LANG II:GERMAN	
or WLC 202J	INTERM FORGN LANG II:JAPANESE	
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN	
WLC 204	INTERNATIONAL CINEMA	
PHL 101	INTRODUCTION TO PHILOSOPHY	
PHL 102	INTRO TO ETHICS	
PHL 103	INTRODUCTION TO LOGIC	
PHL 150	TECH, SCIENCE & HUMAN VALUES	
WGS 200	INTRO WOMEN'S & GENDER STUDIES	
AMS 229	ANCIENT & MEDIEVAL WORLDS	
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Area III: Mathematics and Sciences		11-12
Mathematics		3-4
MA 105	NATURE OF MATHEMATICS	
MA 107	ALGEBRA WITH APPLICATIONS	

MA 110	FINITE MATHEMATICS	
MA 112	PRECALCULUS ALGEBRA	
MA 113	PRECALCULUS TRIGONOMETRY	
MA 115	PRECALCULUS ALGEBRA & TRIG	
MA 120	MATH PROFESSIONAL APPLICATIONS	
MA 171	CALCULUS A	
Natural Sciences (Lab)		8
AST 100	SURVEY OF ASTRONOMY	
AST 106	EXPLORING THE COSMOS I	
AST 107	EXPLORING THE COSMOS II	
BYS 109	FUNDAMENTALS OF BIOLOGY	
BYS 119	PRINCIPLES OF BIOLOGY	
BYS 120	ORGANISMAL BIOLOGY	
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I	
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB	
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB	
ESS 103	ENVIRONMENTAL EARTH SCIENCE	
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG	
PH 100	CONCEPTUAL PHYSICS	
PH 101	GENERAL PHYSICS I	
PH 102	GENERAL PHYSICS II	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	
Area IV: History and Social and Behavioral Sciences*		12
History		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Sciences		6-9
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
ESS 105	WORLD REGIONAL GEOGRAPHY	
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS	
PY 101	GENERAL PSYCHOLOGY I	
PY 201	LIFE-SPAN DEVELOPMENT	
SOC 100	INTRO TO SOCIOLOGY	
SOC 102	ANALYSIS OF SOCIAL PROBLEMS	

SOC 103	INTRO TO CRIMINOLOGY
SOC 105	INTRO CULTURAL ANTHROPOLOGY

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV).

Code	Title	Semester Hours
Pre-professional		19
The following classes will be shared between the major and the Pre-Professional area: ARS 160, ARS 123, ARS 140, ARS 260, ARH 100, ARH 101, and ARH 103.		
The classes counting in the Pre-Professional area will not also be allowed to count in Area II of the GER		
Major Requirements:		78
Foundations:		12
ARS 123	TWO-DIMENSIONAL DES/COLOR TH	
ARS 140	THREE-DIMENSIONAL DESIGN	
ARS 160	DRAWING: FOUNDATIONS	
ARS 260	DRAWING: INTRODUCTION	
Select four:		12
ARS 220	ANIMATION: INTRODUCTION	
ARS 230	GRAPHIC DESIGN: INTRODUCTION	
ARS 240	SCULPTURE: INTRODUCTION	
ARS 250	PHOTOGRAPHY: INTRODUCTION	
ARS 270	PAINTING: INTRODUCTION	
ARS 280	PRINTMAKING: INTRODUCTION	
Upper Division Requirements		6
ARS 390	PORTFOLIO DEVELOPMENT I	
ARS 494	PROFESSIONAL PRACTICES	
Select 4 ARS courses at the 300-level in the field of concentration		12
Select 2 ARS courses at the 400-level in the field of concentration		6
ARS 350	PHOTO: DIGITAL I	
ARS 352	PHOTO: DARKROOM I	
ARS 353	PHOTO: EXPER & HIST I	
ARS 355	PHOTO: DOCUMENTARY I	
ARS 450	PHOTO: DIGITAL II	
ARS 452	PHOTO: DARKROOM II	
ARS 453	PHOTO: EXPER & HIST II	
ARS 455	PHOTO: DOCUMENTARY II	
Art History Requirements:		12
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARH 309	CONTEMPORARY ART & ISSUES	
Select one of the following 300-level Art History courses before 1800:		3
ARH 301	ANCIENT GREEK ART	
ARH 302	MEDIEVAL ART	
ARH 303	RENAISSANCE ART	
ARH 305	ANCIENT ROMAN ART	
ARH 306	COLLAPSE OF CIVILIZATIONS	
ARH 320	SPECIAL TOPICS IN ART HY ¹	
Select one of the following 300-level Art History courses after 1800:		3
ARH 304	TWENTIETH CENTURY ART	
ARH 307	IMPRESSIONISM & POST-IMP	
ARH 310	NINETEENTH CENTURY ART	

ARH 311	PHILOSOPHY OF ART	
HY 310	INTRODUCTION TO PUBLIC HISTORY	
ARH 320	SPECIAL TOPICS IN ART HY ¹	
Major Electives		12
Select 4 courses ARH/ARS 300-level or above		
Electives		
Elective hours vary by program, please see advisor.		
Total Semester Hours		120

¹ Depending on the topic of this course, it may satisfy either the Pre- or Post-1800 requirement, or function as an elective.

Art, BFA - Printmaking Concentration

Printmaking Concentration

- Art, BFA Printmaking requires at least 120 credit hours.
- 36 of 120 credit hours must be taken at 300 level or higher.
- No more than 6 credit hours of HPE may count in degree requirements.
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- No more than 60 credit hours from a two-year school can be applied toward a UAH degree.
- All double counting of classes must be approved through the AHSS Advising Office.
- For graduation application instructions, see here (p. 812).

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S or WLC 101A or WLC 101F or WLC 101G or WLC 101J or WLC 101R	INTRO FOREIGN LANG I: SPANISH INTRO FOREIGN LANG I: ARABIC INTRO FOREIGN LANG I:FRENCH INTRO FOREIGN LANG I:GERMAN INTRO FOREIGN LANG I:JAPANESE INTRO FOREIGN LANG I:RUSSIAN	

WLC 102S	INTRO FOREIGN LANG II:SPANISH
or WLC 102A	INTRO FOREIGN LANG II: ARABIC
or WLC 102F	INTRO FOREIGN LANG II:FRENCH
or WLC 102G	INTRO FOREIGN LANG II:GERMAN
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN
WLC 201S	INTERM FOREIGN LANG:SPANISH
or WLC 201A	INTERM FOREIGN LANG I: ARABIC
or WLC 201F	INTERM FOREIGN LANG:FRENCH
or WLC 201G	INTERM FOREIGN LANG:GERMAN
or WLC 201J	INTERM FOREIGN LANG: JAPANESE
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN
WLC 202S	INTERM FOREIGN LANG II:SPANISH
or WLC 202A	INTERM FOREIGN LANG II: ARABIC
or WLC 202F	INTERM FOREIGN LANG II:FRENCH
or WLC 202G	INTERM FOREIGN LANG II:GERMAN
or WLC 202J	INTERM FORGN LANG II:JAPANESE
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN
WLC 204	INTERNATIONAL CINEMA
PHL 101	INTRODUCTION TO PHILOSOPHY
PHL 102	INTRO TO ETHICS
PHL 103	INTRODUCTION TO LOGIC
PHL 150	TECH, SCIENCE & HUMAN VALUES
WGS 200	INTRO WOMEN'S & GENDER STUDIES
AMS 229	ANCIENT & MEDIEVAL WORLDS
ARH 100	ARH SURV:ANCIENT-MEDIEVAL
ARH 101	ARH SURV:RENAISSANCE-MODERN
ARH 103	ARH SUR:NON-WESTERN TRADITIONS
ARS 160	DRAWING: FOUNDATIONS
TH 122	THEATRE APPRECIATION
TH 123	INTRO TO FILM STUDIES
MU 100	INTRO TO MUSIC LITERATURE
Area III: Mathematics and Sciences	
Mathematics	
MA 105	NATURE OF MATHEMATICS
MA 107	ALGEBRA WITH APPLICATIONS
MA 110	FINITE MATHEMATICS
MA 112	PRECALCULUS ALGEBRA
MA 113	PRECALCULUS TRIGONOMETRY
MA 115	PRECALCULUS ALGEBRA & TRIG
MA 120	MATH PROFESSIONAL APPLICATIONS
MA 171	CALCULUS A
Natural Sciences (Lab)	
AST 100	SURVEY OF ASTRONOMY
AST 106	EXPLORING THE COSMOS I
AST 107	EXPLORING THE COSMOS II
BYS 109	FUNDAMENTALS OF BIOLOGY
BYS 119	PRINCIPLES OF BIOLOGY
BYS 120	ORGANISMAL BIOLOGY
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB

11-12

3-4

8

CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB	
ESS 103	ENVIRONMENTAL EARTH SCIENCE	
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG	
PH 100	CONCEPTUAL PHYSICS	
PH 101	GENERAL PHYSICS I	
PH 102	GENERAL PHYSICS II	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	
Area IV: History and Social and Behavioral Sciences*		12
History		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Sciences		6-9
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
ESS 105	WORLD REGIONAL GEOGRAPHY	
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS	
PY 101	GENERAL PSYCHOLOGY I	
PY 201	LIFE-SPAN DEVELOPMENT	
SOC 100	INTRO TO SOCIOLOGY	
SOC 102	ANALYSIS OF SOCIAL PROBLEMS	
SOC 103	INTRO TO CRIMINOLOGY	
SOC 105	INTRO CULTURAL ANTHROPOLOGY	

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV).

Code	Title	Semester Hours
Pre-professional		19
The following classes will share between the major and Pre-Professional area: ARS 160, ARS 123, ARS 140, ARS 260, ARH 100, ARH 101, and ARH 103.		
The classes counting in the Pre-Professional area will not also be allowed to count in Area II of the GER		
Major Requirements:		78
Foundations:		12
ARS 123	TWO-DIMENSIONAL DES/COLOR TH	
ARS 140	THREE-DIMENSIONAL DESIGN	
ARS 160	DRAWING: FOUNDATIONS	
ARS 260	DRAWING: INTRODUCTION	
Select four:		12

ARS 220	ANIMATION: INTRODUCTION	
ARS 230	GRAPHIC DESIGN: INTRODUCTION	
ARS 240	SCULPTURE: INTRODUCTION	
ARS 250	PHOTOGRAPHY: INTRODUCTION	
ARS 270	PAINTING: INTRODUCTION	
ARS 280	PRINTMAKING: INTRODUCTION	
Upper Division Requirements		6
ARS 390	PORTFOLIO DEVELOPMENT I	
ARS 494	PROFESSIONAL PRACTICES	
Select 4 ARS courses at the 300-level in the field of concentration		12
Select 2 ARS courses at the 400-level in the field of concentration		6
ARS 381	PRINT: ETCHING & RELIEF I	
ARS 383	PRINT: SCREENPRINT I	
ARS 385	PRINT: BOOK ARTS I	
ARS 387	PRINT: MONOPRINT & LITHOGRAPHY I	
ARS 481	PRINT: ETCHING & RELIEF II	
ARS 483	PRINT: SCREENPRINT II	
ARS 485	PRINT: BOOK ARTS II	
ARS 487	PRINT: MONOPRINT & LITHOGRAPHY II	
Art History Requirements:		12
ARH 100	ARH SURV: ANCIENT-MEDIEVAL	
ARH 101	ARH SURV: RENAISSANCE-MODERN	
ARH 103	ARH SUR: NON-WESTERN TRADITIONS	
ARH 309	CONTEMPORARY ART & ISSUES	
Select one of the following 300-level Art History courses before 1800:		3
ARH 301	ANCIENT GREEK ART	
ARH 302	MEDIEVAL ART	
ARH 303	RENAISSANCE ART	
ARH 305	ANCIENT ROMAN ART	
ARH 306	COLLAPSE OF CIVILIZATIONS	
ARH 320	SPECIAL TOPICS IN ART HY ¹	
Select one of the following 300-level Art History courses after 1800:		3
ARH 304	TWENTIETH CENTURY ART	
ARH 307	IMPRESSIONISM & POST-IMP	
ARH 310	NINETEENTH CENTURY ART	
ARH 311	PHILOSOPHY OF ART	
HY 310	INTRODUCTION TO PUBLIC HISTORY	
ARH 320	SPECIAL TOPICS IN ART HY ¹	
Major Electives		12
Select 4 courses ARH/ARS 300-level or above		12
Electives		
Elective hours vary by program, please see advisor.		
Total Semester Hours		120

¹ Depending on the topic of this course, it may satisfy either the Pre- or Post-1800 requirement, or function as an elective.

Art, BFA - Sculpture Concentration

Sculpture Concentration

- Art, BFA Sculpture requires at least 120 credit hours.
- 36 of 120 credit hours must be taken at 300 level or higher.
- No more than 6 credit hours of HPE may count in degree requirements.

- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- No more than 60 credit hours from a two-year school can be applied toward a UAH degree.
- All double counting of classes must be approved through the AHSS Advising Office.
- For graduation application instructions, see here (p. 812).

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S or WLC 101A or WLC 101F or WLC 101G or WLC 101J or WLC 101R	INTRO FOREIGN LANG I: SPANISH INTRO FOREIGN LANG I: ARABIC INTRO FOREIGN LANG I:FRENCH INTRO FOREIGN LANG I:GERMAN INTRO FOREIGN LANG I:JAPANESE INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S or WLC 102A or WLC 102F or WLC 102G or WLC 102J or WLC 102R	INTRO FOREIGN LANG II:SPANISH INTRO FOREIGN LANG II: ARABIC INTRO FOREIGN LANG II:FRENCH INTRO FOREIGN LANG II:GERMAN INTRO FOREIGN LANG II:JAPANESE INTRO FOREIGN LANG II:RUSSIAN	
WLC 201S or WLC 201A or WLC 201F or WLC 201G or WLC 201J or WLC 201R	INTERM FOREIGN LANG:SPANISH INTERM FOREIGN LANG I: ARABIC INTERM FOREIGN LANG:FRENCH INTERM FOREIGN LANG:GERMAN INTERM FOREIGN LANG: JAPANESE INTERM FOREIGN LANG:RUSSIAN	
WLC 202S or WLC 202A or WLC 202F or WLC 202G or WLC 202J	INTERM FOREIGN LANG II:SPANISH INTERM FOREIGN LANG II: ARABIC INTERM FOREIGN LANG II:FRENCH INTERM FOREIGN LANG II:GERMAN INTERM FORGN LANG II:JAPANESE	

or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN
WLC 204	INTERNATIONAL CINEMA
PHL 101	INTRODUCTION TO PHILOSOPHY
PHL 102	INTRO TO ETHICS
PHL 103	INTRODUCTION TO LOGIC
PHL 150	TECH, SCIENCE & HUMAN VALUES
WGS 200	INTRO WOMEN'S & GENDER STUDIES
AMS 229	ANCIENT & MEDIEVAL WORLDS
ARH 100	ARH SURV:ANCIENT-MEDIEVAL
ARH 101	ARH SURV:RENAISSANCE-MODERN
ARH 103	ARH SUR:NON-WESTERN TRADITIONS
ARS 160	DRAWING: FOUNDATIONS
TH 122	THEATRE APPRECIATION
TH 123	INTRO TO FILM STUDIES
MU 100	INTRO TO MUSIC LITERATURE

Area III: Mathematics and Sciences**11-12****Mathematics** 3-4

MA 105	NATURE OF MATHEMATICS
MA 107	ALGEBRA WITH APPLICATIONS
MA 110	FINITE MATHEMATICS
MA 112	PRECALCULUS ALGEBRA
MA 113	PRECALCULUS TRIGONOMETRY
MA 115	PRECALCULUS ALGEBRA & TRIG
MA 120	MATH PROFESSIONAL APPLICATIONS
MA 171	CALCULUS A

Natural Sciences (Lab)**8**

AST 100	SURVEY OF ASTRONOMY
AST 106	EXPLORING THE COSMOS I
AST 107	EXPLORING THE COSMOS II
BYS 109	FUNDAMENTALS OF BIOLOGY
BYS 119	PRINCIPLES OF BIOLOGY
BYS 120	ORGANISMAL BIOLOGY
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB
ESS 103	ENVIRONMENTAL EARTH SCIENCE
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG
PH 100	CONCEPTUAL PHYSICS
PH 101	GENERAL PHYSICS I
PH 102	GENERAL PHYSICS II
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III

Area IV: History and Social and Behavioral Sciences***12**

History		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Sciences		6-9
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
ESS 105	WORLD REGIONAL GEOGRAPHY	
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS	
PY 101	GENERAL PSYCHOLOGY I	
PY 201	LIFE-SPAN DEVELOPMENT	
SOC 100	INTRO TO SOCIOLOGY	
SOC 102	ANALYSIS OF SOCIAL PROBLEMS	
SOC 103	INTRO TO CRIMINOLOGY	
SOC 105	INTRO CULTURAL ANTHROPOLOGY	

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV).

Code	Title	Semester Hours
Pre-professional		19
The following classes will share between the major and Pre-Professional area: ARS 160, ARS 123, ARS 140, ARS 260, ARH 100, ARH 101, and ARH 103.		
The classes counting in the Pre-Professional area will not also be allowed to count in Area II of the GER		
Major Requirements:		78
Foundations:		12
ARS 123	TWO-DIMENSIONAL DES/COLOR TH	
ARS 140	THREE-DIMENSIONAL DESIGN	
ARS 160	DRAWING: FOUNDATIONS	
ARS 260	DRAWING: INTRODUCTION	
Select four:		12
ARS 220	ANIMATION: INTRODUCTION	
ARS 230	GRAPHIC DESIGN: INTRODUCTION	
ARS 240	SCULPTURE: INTRODUCTION	
ARS 250	PHOTOGRAPHY: INTRODUCTION	
ARS 270	PAINTING: INTRODUCTION	
ARS 280	PRINTMAKING: INTRODUCTION	
Upper Division Requirements		6
ARS 390	PORTFOLIO DEVELOPMENT I	
ARS 494	PROFESSIONAL PRACTICES	
Select 4 ARS courses at the 300-level in the field of concentration		12
Select 2 ARS courses at the 400-level in the field of concentration		6
ARS 340	SCULP: FABRICATION I	
ARS 341	SCULP: CARVING I	
ARS 342	SCULP: CASTING I	
ARS 347	SCULP: SPACE AND PLACE I	
ARS 440	SCULP: FABRICATION II	
ARS 441	SCULP: CARVING II	

ARS 442	SCULP: CASTING II	
ARS 447	SCULP: SPACE AND PLACE II	
Art History Requirements:		12
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARH 309	CONTEMPORARY ART & ISSUES	
Select one of the following 300-level Art History courses before 1800:		3
ARH 301	ANCIENT GREEK ART	
ARH 302	MEDIEVAL ART	
ARH 303	RENAISSANCE ART	
ARH 305	ANCIENT ROMAN ART	
ARH 306	COLLAPSE OF CIVILIZATIONS	
ARH 320	SPECIAL TOPICS IN ART HY ¹	
Select one of the following 300-level Art History courses after 1800:		3
ARH 304	TWENTIETH CENTURY ART	
ARH 307	IMPRESSIONISM & POST-IMP	
ARH 310	NINETEENTH CENTURY ART	
ARH 311	PHILOSOPHY OF ART	
HY 310	INTRODUCTION TO PUBLIC HISTORY	
ARH 320	SPECIAL TOPICS IN ART HY ¹	
Major Electives		12
Select 4 courses ARH/ARS 300-level or above		12
Electives		
Elective hours vary by program, please see advisor.		
Total Semester Hours		120

¹ Depending on the topic of this course, it may satisfy either the Pre- or Post-1800 requirement, or function as an elective.

Art History Minor

Students focusing on the studio discipline are strongly encouraged to pursue a minor in Art History which will give them a better understanding of the visual arts tradition.

Code	Title	Semester Hours
Required Courses		12
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	3
ARH 101	ARH SURV:RENAISSANCE-MODERN	3
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	3
ARH 309	CONTEMPORARY ART & ISSUES	3
Pre-1800 (Select one of the following):		3
ARH 301	ANCIENT GREEK ART	
ARH 302	MEDIEVAL ART	
ARH 303	RENAISSANCE ART	
ARH 305	ANCIENT ROMAN ART	
ARH 306	COLLAPSE OF CIVILIZATIONS	
ARH 320	SPECIAL TOPICS IN ART HY	
Post-1800 (Select one of the following):		3
ARH 304	TWENTIETH CENTURY ART	
ARH 307	IMPRESSIONISM & POST-IMP	
ARH 310	NINETEENTH CENTURY ART	
ARH 311	PHILOSOPHY OF ART	

ARH 320	SPECIAL TOPICS IN ART HY	
HY 310	INTRODUCTION TO PUBLIC HISTORY	
300+ Elective Course (Choose from above)		3
Total Semester Hours		21

Art Studio Minor

21 semester hours within the Department of Art and Art History:

Code	Title	Semester Hours
ARS 160	DRAWING: FOUNDATIONS	3
Select two ARS 200-level studio courses ¹		6
Select four ARS 300-level studio courses ²		12
Total Semester Hours		21

¹ Although all 200-level studio courses with the exception of ARS 240 require ARS 123 and ARS 160 as pre-requisites, Art Studio minors may take these courses without the required pre-requisites. Please contact department chair or academic advising office for prerequisite override when registering,

² May include 400-level courses if the corresponding 300-level courses are successfully completed. For example, a student passing ARS 330 may take ARS 430 to count within the 12 semester hour total at the upper division.

Communication Arts

Morton Hall, Room 278
 Telephone: 256.824.6871
 Email: commarts@uah.edu (comm@uah.edu)

UAH's Communication Arts program provides students with practical, critical, historical, and theoretical perspectives on human communication, preparing them for work, for social life, and for further academic studies. In addition to the sphere of the public speaker, we discuss areas of one-on-one (interpersonal) communication, small-group communication, communication in organizations, and mass communication. Gaining an understanding of the influence of media on communication, the various functions served by communication, and how people are persuaded are just a few of the many theoretical principles our students learn. Our program is designed for students who can write, speak, think, analyze, and imagine, and our classes enhance all of those skills.

The Department offers a Masters of Arts in Professional Communication and a Bachelor of Arts with majors in Communication Arts and Writing.

Major in Communication Arts

- Communication Arts, BA (p. 88)
- Writing, BA (p. 224)

Minors in Communication Arts

- Communication Arts (p. 92)
- Writing (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/english/writing-minor/>)
- UX Minor (<https://www.uah.edu/ahs/departments/ux-program/undergraduate-minor/>)

CM 113 - Intro to Rhetorical Communication
 Semester Hours: 3

Develops public speaking skills through an examination of rhetorical theory, training, and practice. Includes informative, persuasive, and other forms of speeches to prepare students for oral presentations in college and post-college ('real world') settings.

CM 205 - INTRO TO JOURNALISM
 Semester Hours: 3

Focuses on basic news writing skills specific to print journalism. Students will learn to identify new based on news values, develop leads, organize information, write stories in the inverted pyramid style, revise drafts, and copy-edit articles, all while working under simulated deadline pressure.

CM 220 - INTRO PUBLIC RELATIONS

Semester Hours: 3

This course is designed to introduce students to the public relations profession. Through study of rhetorical and communication strategies, individual and group projects, as well as speaking and writing experiences, students gain the knowledge necessary to actively participate as effective public relation professionals.

CM 231 - FOUNDATIONS OF HUMAN COMMUNICA

Semester Hours: 3

Examines how human communication shapes and adapts to a variety of practical settings public, interpersonal, organizational, mass, and technical. It prepares students for effective work in various communication contexts.

CM 251 - DECISION-MAKING IN SMALL GROUP

Semester Hours: 3

Provides working knowledge of how small groups communicate in the decision-making process. Students put theory into practice by functioning as group participants, observers, and consultants. Emphasis is placed on leadership, theoretical application, group participation, and oral presentation.

CM 310 - PERSUASION

Semester Hours: 3

Provides foundation in the theories, principles, and strategies of social influence through theory and application. Students explore persuasive communication, social influence, and compliance-gaining from a social-scientific level and examine the production and consumption of persuasive messages.

CM 313 - BUSINESS & PROFESSIONAL COMM

Semester Hours: 3

Examines communication theories and practices relevant to the business context with a focus on oral presentations, interviewing, group leadership, and face-to-face communication. Develops knowledge and skills necessary for effective communication within business environments. (Prepare business administration students to meet the oral communication requirement in upper division and graduate business courses).

CM 320 - PRACTICUM IN WRITING

Semester Hours: 1-3

Writing and editing under the supervision of professionals. May be repeated up to 3 times for no more than 3 hours total credit. Enrollment requires advance planning. Prerequisites: CM 301, CM 302, enrollment in the Technical Writing Track, and a successful interview with the participating technical supervisor.

CM 330 - NONVERBAL COMMUNICATION

Semester Hours: 3

Examines the diversity of human nonverbal behavior and its influences on everyday communication experiences. Same as PY 330.

CM 331 - COMMUNICATION THEORY

Semester Hours: 3

Examines significant theoretical frameworks for the study of human communication and mass communication. Develops knowledge of communication processes and social influence. Provides preparation for senior seminar in communication theory and research. Prerequisite: CM 231.

CM 333 - INTERPERSONAL COMMUNICATION

Semester Hours: 3

Examines the process of communication between individuals. Prerequisite: CM 231 or permission of instructor.

CM 340 - SPEC TOPICS IN COMM ARTS

Semester Hours: 3

Topics announced in advance. Representative topics include rhetoric and war, technical theatre, and culture and communication. May be repeated twice for credit.

CM 370 - COMM RESEARCH METHODS

Semester Hours: 3

Examines social scientific concepts, theories and designs commonly used interpersonal communication research. Develops knowledge and skills necessary for employment in fields involving the study of communication behavior and perception. Provides preparation for senior seminar in communication theory and research. Prerequisite: MA 107 or 110 or 112 or 113 or 115 or 120 or 171.

CM 375 - RHETORICAL CRITICISM

Semester Hours: 3

This course is an introduction to the critical analysis of public discourse. Specifically, it focuses on understanding how the variables of situation, audience, and rhetoric influence the production and reception of public messages. Teaching students to understand the persuasive potential of messages prepares them as critical consumers, analysts, and potential creators of such messages. Prerequisite: CM 113 or approval of instructor.

CM 400 - INTERNSHIP

Semester Hours: 1-6

Practical experience in the workplace allows the student to apply principles, theories, and skills learned in communication arts courses. Arranged by the student with consent of the chair, the student meets regularly with a faculty advisor, keeps a log of activities, and submits a report on the internship. Prerequisite: Senior Standing with CM major, and permission of instructor.

CM 405 - ADVANCED MEDIA WRITING

Semester Hours: 3

An upper level course that offers an overview of various media writing genres, including Broadcast, Advertising and Public Relations. Students complete a mix of timed assignments within each context to acquire a more complete survey of media writing and prepare for a career within the mass media. Prerequisite: CM 205.

CM 408 - CLASSICAL RHET THEORY

Semester Hours: 3

This course surveys the early development of rhetorical theory in the Western world, from its sophistic origins in the 5th century BCE, through the Greek philosophers and educators, to the Romans and early Christians. Prerequisites: CM 113.

CM 409 - CONTEMPORARY RHETORICAL THEORY

Semester Hours: 3

This course surveys contemporary rhetorical thought, including modern and postmodern theories. The course requires rigorous academic analysis and critique as students explore historical and current rhetorical concepts. Prerequisite: CM 113.

CM 414 - CREATIVE NONFICTION WRITING

Semester Hours: 3

This course introduces students to the genre of creative non-fiction. Undergraduate students will write five essays and revise toward a final writing portfolio.

CM 416 - WOMEN ORATORS

Semester Hours: 3

Critical examination of women's public address as it has developed through women's participation in movements for abolition, temperance, women's suffrage, and equal rights.

CM 418 - LEGAL ARGUMENT

Semester Hours: 3

Examines argumentation in legal communities, that is, the way lawyers and judges provide reasoned support for the positions they defend concerning what the law requires in a given case. It considers common forms of legal argument, sources and forms of evidence, and legal values that underlie legal argument. It provides students with a critical perspective from which to judge legal arguments and a basic set of tools for developing legal arguments.

CM 420 - PUBLIC RELATIONS WRITING

Semester Hours: 3

This course provides students with professionalization in their writing and editorial skills in public relations. By emphasizing different audiences and various media, students will find and hone their public relations voice. Students will gain experience with instant responses, making ethical and legal decisions, and practicing a wide range of PR writing and design including the development of media kits, pitches, backgrounders, press releases, memos, newsletters, radio announcements, and brochures. Prerequisite: CM 220 (C or better).

CM 426 - BURKEIAN THEORY & CRITICISM

Semester Hours: 3

This course surveys key concepts in the theory of Kenneth Burke and their discussion and application by rhetorical scholars. Through readings, lectures, and class discussions students will gain insight into this, the most important rhetorical theorist of the 20th century. Prerequisite: Junior standing.

CM 430 - MASS MEDIA IN AMERICA

Semester Hours: 3

This course provides an overview of major forms of mass media communication. It focuses on both print and electronic media, its history and structure as well as on theories of mass communication. Students will become familiar with the current role and influence of media in society.

CM 431 - SENIOR SEMINAR

Semester Hours: 3

Senior capstone course involving either a scholarly project or an approved communication-intensive internship. Prerequisites: CM 370 and CM 375, and senior standing.

CM 433 - DARK SIDE INTERPERSONAL COMM

Semester Hours: 3

Traditional Interpersonal Communication pedagogy focuses on more of the positive aspects of relationship formation and maintenance. This course offers a more complete view of human relationships by exploring a variety of topics related to the 'darker' side of relationships situated in the contexts of friendships, family members, and intimates. By exploring issues such as deception, fatal attraction, jealousy and envy, conflict, stalking, abuse, and many others, students acquire a more complete view of human relationships. Prerequisite: CM 231.

CM 435 - SOCIAL MEDIA

Semester Hours: 3

This course focuses on uses and effects of social media in interpersonal, organizational, mass mediated, health, and political settings. Social media technologies take on many different forms including social networking sites, micro-blogging, wikis, online videos, and blogs. Following questions are discussed in class: Who uses social media? How do people use social media to develop relationships, get social support, and evoke political change? Is privacy dead? How do employers use social media to check on employees?.

CM 440 - PUBLIC RELATIONS CAMPAIGN

Semester Hours: 3

This course provides professionalization and team work experience for students in the public relations track. Students practice the research, planning, implementation, and evaluation of strategic communication plans for various public relations contexts. Prerequisite: CM 220 (C-or better).

CM 444 - ADVERTISING

Semester Hours: 3

This course will examine the emergence of advertising as a form of communication, its influence upon other forms of mediated communications and its impact upon culture and society. Students will learn how to develop and present an advertising strategy for an actual brand. Prerequisite: Junior standing.

CM 451 - ORGANIZATIONAL TRNG & DEVELOP

Semester Hours: 3

Provides upper-level undergraduates with the opportunity to learn how to design organizational training programs beginning with the needs assessment and continuing through the evaluation and implementation phases. Prerequisite: Junior standing.

CM 452 - USER CENTERED DESIGN

Semester Hours: 3

Introduces students to user-centered design principles that inform the practice of user experience design. Students will use visual thinking as they complete contextual inquiries and mapping exercises.

CM 454 - NEW MEDIA WRITING & RHETORIC

Semester Hours: 3

This course teaches students to apply rhetorical principles across a variety of media and includes an examination of communication strategies used widely in academic and industry settings. The course focuses on new media through an exploration of digital technologies and the way digital culture and new media have dramatically impacted reading, writing, and research practices. Prerequisites: EH 101 and EH 102.

CM 455 - COMMUNICATION & CULTURE

Semester Hours: 3

This course focuses on the application of theory and research to intercultural communication. Topics and activities assist the students in developing communication skills that improve their competence in intercultural situations. By addressing the different world views that shape our perceptions, values, attitudes, and beliefs of different people, the Culture and Communication course challenges students to become aware of cultural differences, avoid ethnocentrism, and work toward effective communication with unlike others. Prerequisite: Junior standing.

CM 460 - CRISIS COMMUNICATION

Semester Hours: 3

During a time where companies face instant and intense scrutiny. It is imperative to know how to use effective crisis management. This course focuses on the steps of crisis and issue management. It also includes in-depth analysis of current crisis situations.

CM 499 - INDEPENDENT STUDY

Semester Hours: 3

Directed, independent study allows a student to explore an approved scholarly inquiry within Communication Arts, and under the direction of a CM faculty member, resulting in a research paper or project. Student must present a project prospectus, or detailed syllabus, for approval of the faculty member and the department chair. JR or SR standing required.

Communication Arts, BA

Students wishing to major in communication arts should make that declaration at or before the beginning of the sophomore year. Students need to work closely with a faculty advisor to plan a program of study. A major in communication arts consists of 36 semester hours of coursework in the major, at least 21 semester hours of which must be at or above the 300-level.

- Communication Arts, BA requires 120 credit hours.
- 36 of 120 credit hours must be taken at 300 level or higher.
- Must have a 2.0 GPA in major, minor, and overall.
- No more than 6 credit hours of HPE may count in degree requirements.
- 12 of the last 18 credit hours must be taken at UAH, with 25% of coursework in the major, minor, and overall taken at UAH.
- No more than 60 credit hours from a two-year school can be applied toward a UAH degree.
- Any double counting of classes must be approved through the CAHS Academic Advising Office.
- For graduation application instructions, see here (p. 812).

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S or WLC 101A or WLC 101F or WLC 101G or WLC 101J or WLC 101R	INTRO FOREIGN LANG I: SPANISH INTRO FOREIGN LANG I: ARABIC INTRO FOREIGN LANG I:FRENCH INTRO FOREIGN LANG I:GERMAN INTRO FOREIGN LANG I:JAPANESE INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S or WLC 102A	INTRO FOREIGN LANG II:SPANISH INTRO FOREIGN LANG II: ARABIC	

or WLC 102F	INTRO FOREIGN LANG II:FRENCH
or WLC 102G	INTRO FOREIGN LANG II:GERMAN
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN
WLC 201S	INTERM FOREIGN LANG:SPANISH
or WLC 201A	INTERM FOREIGN LANG I: ARABIC
or WLC 201F	INTERM FOREIGN LANG:FRENCH
or WLC 201G	INTERM FOREIGN LANG:GERMAN
or WLC 201J	INTERM FOREIGN LANG: JAPANESE
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN
WLC 202S	INTERM FOREIGN LANG II:SPANISH
or WLC 202A	INTERM FOREIGN LANG II: ARABIC
or WLC 202F	INTERM FOREIGN LANG II:FRENCH
or WLC 202G	INTERM FOREIGN LANG II:GERMAN
or WLC 202J	INTERM FORGN LANG II:JAPANESE
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN
WLC 204	INTERNATIONAL CINEMA
PHL 101	INTRODUCTION TO PHILOSOPHY
PHL 102	INTRO TO ETHICS
PHL 103	INTRODUCTION TO LOGIC
PHL 150	TECH, SCIENCE & HUMAN VALUES
WGS 200	INTRO WOMEN'S & GENDER STUDIES
AMS 229	ANCIENT & MEDIEVAL WORLDS
ARH 100	ARH SURV:ANCIENT-MEDIEVAL
ARH 101	ARH SURV:RENAISSANCE-MODERN
ARH 103	ARH SUR:NON-WESTERN TRADITIONS
ARS 160	DRAWING: FOUNDATIONS
TH 122	THEATRE APPRECIATION
TH 123	INTRO TO FILM STUDIES
MU 100	INTRO TO MUSIC LITERATURE
Area III: Mathematics and Sciences	
Mathematics	
MA 105	NATURE OF MATHEMATICS
MA 107	ALGEBRA WITH APPLICATIONS
MA 110	FINITE MATHEMATICS
MA 112	PRECALCULUS ALGEBRA
MA 113	PRECALCULUS TRIGONOMETRY
MA 115	PRECALCULUS ALGEBRA & TRIG
MA 120	MATH PROFESSIONAL APPLICATIONS
MA 171	CALCULUS A
Natural Sciences (Lab)	
AST 100	SURVEY OF ASTRONOMY
AST 106	EXPLORING THE COSMOS I
AST 107	EXPLORING THE COSMOS II
BYS 109	FUNDAMENTALS OF BIOLOGY
BYS 119	PRINCIPLES OF BIOLOGY
BYS 120	ORGANISMAL BIOLOGY
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I

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3-4

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CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB
ESS 103	ENVIRONMENTAL EARTH SCIENCE
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG
PH 100	CONCEPTUAL PHYSICS
PH 101	GENERAL PHYSICS I
PH 102	GENERAL PHYSICS II
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III

Area IV: History and Social and Behavioral Sciences* **12**

History **3-6**

HY 103	WORLD HISTORY TO 1500
HY 104	WORLD HISTORY SINCE 1500
HY 221	UNITED STATES TO 1877
HY 222	UNITED STATES SINCE 1877

Social and Behavioral Sciences **6-9**

ECN 142	PRINC OF MACROECONOMICS
ECN 143	PRINC OF MICROECONOMICS
GS 200	GLOBAL SYSTEMS AND CULTURES
ESS 105	WORLD REGIONAL GEOGRAPHY
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY
PSC 101	INTRO TO AMERICAN GOVERNMENT
PSC 102	INTRO TO COMPARATIVE POLITICS
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS
PY 101	GENERAL PSYCHOLOGY I
PY 201	LIFE-SPAN DEVELOPMENT
SOC 100	INTRO TO SOCIOLOGY
SOC 102	ANALYSIS OF SOCIAL PROBLEMS
SOC 103	INTRO TO CRIMINOLOGY
SOC 105	INTRO CULTURAL ANTHROPOLOGY

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). In Area V, take no more than six hours in a single discipline from Areas II, III, or Area IV. Area V should cover a breadth of disciplinary study.

Code	Title	Semester Hours
Pre-Professional		19
WLC 101, 102, 201, or 202		
CM 231 shares with the major		
Choose 13 additional credit hours from the above listed Fine Arts, Humanities, History, Mathematics, Science, or Social and Behavioral Sciences.		
Required Core		36
CM 113	Intro to Rhetorical Communication	
CM 231	FOUNDATIONS OF HUMAN COMMUNICA	
CM 331	COMMUNICATION THEORY	
or CM 408	CLASSICAL RHET THEORY	
or CM 409	CONTEMPORARY RHETORICAL THEORY	
CM 370	COMM RESEARCH METHODS	

CM 375	RHETORICAL CRITICISM	
CM 431	SENIOR SEMINAR	
Choose three CM 300+ ¹		
Choose three CM Electives at any level		

Minor Courses **18+**

Elective Courses

Elective hours vary by program, see advisor.

Total Semester Hours **120**

¹ CM 313 is not allowed to count in CM major or minor.

Year 1

Fall		Semester Hours
EH 101	COLLEGE WRITING I	3
FYE 101	CHARGER SUCCESS	1
WLC 101		3
Social and Behavioral Science		3
Math 1XX		3
Term Semester Hours:		13
Spring		
EH 102	COLLEGE WRITING II	3
CM 113	Intro to Rhetorical Communication	3
Fine Arts		3
Social/Behavioral Science		3
Science w/Lab		4
Term Semester Hours:		16

Year 2

Fall		
CM 231	FOUNDATIONS OF HUMAN COMMUNICA	3
HY 103	WORLD HISTORY TO 1500	3
Area V GER Course		3
Humanities or Literature		3
Minor Course		3
Term Semester Hours:		15
Spring		
CM Elective		3
HY 104	WORLD HISTORY SINCE 1500	3
EH 207	READINGS LITERATURE/CULTURE I	3
or EH 208	or READINGS LITERATURE/CULTURE 2	
Science w/Lab		4
Minor Course		3
Term Semester Hours:		16

Year 3

Fall		
CM 375	RHETORICAL CRITICISM	3
CM Elective		3
Minor Course		3
Area V GER Course		3
Area V GER Course		3
Term Semester Hours:		15
Spring		
CM 331	COMMUNICATION THEORY	3

CM 300+		3
Minor Course		3
Area V GER Course		3
Area V GER Course		3
Term Semester Hours:		15
Year 4		
Fall		
CM 370	COMM RESEARCH METHODS	3
CM 300+		3
Minor Course		6
Elective		3
Term Semester Hours:		15
Spring		
CM 431	SENIOR SEMINAR	3
CM 300+		3
Minor Course		3
Elective		3
Elective		3
Term Semester Hours:		15
Total Semester Hours:		120

Communication Arts Minor

A minor in communication arts consists of 21 semester hours of coursework taken within the department, at least 12 semester hours of which must be taken at or above the 300-level. At least half of the upper-level requirement must be taken at UAH.

All minors require the following:

Code	Title	Semester Hours
CM 113	Intro to Rhetorical Communication	3
CM 231	FOUNDATIONS OF HUMAN COMMUNICA	3
CM 331 or CM 408 or CM 409		3
9 semester hours of CM electives at the 300 level or higher ¹		9
3 semester hours of CM electives at any level		3
Total Semester Hours		21

¹ CM 313 is not allowed to count in minor.

English

Morton Hall, Room 278
 Telephone: 256.824.6320
 Email: eh@uah.edu

Mission Statement

The English Department is comprised of scholar-teachers committed to the promotion of literacy and the cultivation of scholarly and professional competencies in critical thinking and persuasive writing across a wide spectrum of literary, technical, and rhetorical situations. We foster intellectual and cultural diversity, originality of thought, and clarity and cogency of expression through degree programs designed to advance careful, sophisticated reading practices as well as complex analytical and research skills. We aim to cultivate our students' management, organization, and production of knowledge. Our curricula prepare students for a wide array of professional endeavors, including law, teaching, publishing, technical communication, advertising, media, and business, as well as the pursuit of advanced degrees.

The Department of English offers courses to fulfill requirements for the following:

MAJORS

- BA in English (<https://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/english/english-ba-curriculum-one-students-not-seeking-teacher-certification/>)
- BA in English/Language Arts (<https://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/english/english-ba-curriculum-two-english-language-arts-students-seeking-teacher-certification/>) (for students seeking teacher certification)
- BA in Writing (<https://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/english/writing/>)

MINORS

- Creative Writing (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/english/creative-writing/>)
- English (<https://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/english/english-minor/>)
- Technical Writing (<https://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/english/technical-writing-cognate-studies/>)
- Writing (<https://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/english/writing-minor/>)

Majors in English

- English, BA (p. 99)
- English, BA - Language Arts (For Students Seeking Teacher Certification) (p. 104)
- Writing, BA (p. 224)

Minors in English

- English (p. 108)
- Creative Writing (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/english/creative-writing/>)
- Technical Writing (p. 108)
- Writing (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/english/writing-minor/>)

EH 101 - COLLEGE WRITING I

Semester Hours: 3

Introduction to academic writing, critical reading, and rhetorical knowledge.

EH 101L - STUDIO FOR COLLEGE WRITING I

Semester Hours: 0

A writing workshop/lab to be taken concurrently with EH 101S. The course provides supplementary instruction and practice in written English language skills, editing techniques, writing strategies (brainstorming, drafting, revising/editing) as well as critical reading (skimming, scanning, inferring) for students needing additional support. Students must pass EH 101L to pass EH 101S.

EH 101S - COLLEGE WRITING I W/STUDIO

Semester Hours: 3

Introduction to academic writing, critical reading, and rhetorical knowledge. For students whose preparation suggests a need for intensive support as they progress through the composition sequence. Requires concurrent registration in studio section 100L.

EH 102 - COLLEGE WRITING II

Semester Hours: 3

Intermediate academic writing. Focuses on research questions and techniques, as well as critical engagement with published and student texts.

Prerequisite: EH 101 or 101S.

EH 103 - ACCELERATED COLLEGE WRITING

Semester Hours: 3

Accelerated introduction to academic writing, critical reading, and research questions. Focuses on research questions and techniques, as well as critical engagement with published and student texts. Prerequisites: minimum highschool GPA 3.5; minimum 26 on ACT or minimum 1170 on SAT.

EH 105 - HONORS ENGLISH SEMINAR

Semester Hours: 3

Interpretive and comparative readings in texts of enduring intellectual, esthetic, and ethical importance; critical and analytic writing and research projects. Grading Scale: A, B, C, D, F. Minimum grade of C- required to advance to 200-level English classes. Prerequisites: Formal admission to the University Honors Program.

EH 207 - READINGS LITERATURE/CULTURE I

Semester Hours: 3

Critical analysis of texts from ancient times through the Age of Discovery. The course introduces students to the methods of literary study through an examination of works in their social, historical, and philosophical contexts. Prerequisite: EH 102 or EH 103 or EH 105.

EH 208 - READINGS LITERATURE/CULTURE 2

Semester Hours: 3

Critical analysis of texts from the Age of Discovery through the present. The course introduces students to the methods of literary study through an examination of works in their social, historical, and philosophical contexts. Prerequisite: EH 102 or EH 103 or EH 105.

EH 209 - HONORS SEM READINGS LIT/CUL I

Semester Hours: 3

Critical analysis of texts from ancient times through the Age of Discovery. The course offers an in-depth examination of important works and their cultural contexts in a seminar format. Prerequisite: EH 102 or EH 103 or EH 105, and Honor's College Student.

EH 210 - HONORS SEM READINGS LIT/CUL 2

Semester Hours: 3

Critical analysis of texts from the Age of Discovery through the present. The course offers an in-depth examination of important works and their cultural contexts in a seminar format. Prerequisite: EH 102 or EH 103 or EH 105, and Honor's College Student.

EH 211 - INTRO CREATIVE WRITING

Semester Hours: 3

Students will discuss contemporary stories/poems and will participate in workshops, where their own poetry and fiction is examined and critiqued by the class and instructor. The class culminates in two revision portfolios (one fiction and one poetry). Prerequisite: EH 102 or EH 103 or EH 105.

EH 242 - MYTHOLOGY

Semester Hours: 3

Archetypal, metaphorical, and historical significance of deities and myths. Prerequisite: EH 102 or EH 103 or EH 105.

EH 260 - INTRO TO WRITING MAJOR

Semester Hours: 2

An introduction to the Writing B.A., this course will overview the field of Writing Studies, its methods of inquiry and the interdisciplinary nature of its rhetoric, composition and language/literacy influences. Prerequisite: EH 102 or EH 103 or EH 105.

EH 300 - STRATEGIES FOR BUSINESS WRIT'G

Semester Hours: 3

Practical business writing with emphasis on rhetoric, organization, and research. Open to all students in the College of Business or by permission of the Department of English. Qualifies as elective in the English major. Does not count toward English minor. Junior standing required. Prerequisite: EH 102 or EH 103 or EH 105.

EH 301 - TECHNICAL WRITING

Semester Hours: 3

Practical writing, especially technical or scientific reports and proposals, with emphasis on organization, research, and presentation. Qualifies as elective in English major. Does not count toward English minor except Cognate Studies in Technical Writing. Junior Standing. Prerequisite: EH 102 or EH 103 or EH 105.

EH 302 - TECHNICAL EDITING

Semester Hours: 4

Clarifying, expanding, reducing, and rewriting technical reports and other documents created by others. Emphasis on elements of style and usage, revision, proofreading, and application of rhetorical techniques to the work of engineers, scientists, and technicians. Includes lab emphasizing software skills useful for technical editing. Qualifies as elective in English major. Does not count toward English minor with special approval. Prerequisite: EH 301.

EH 303 - PRAC & RSRCH IN TECH COMM

Semester Hours: 3

Provides an overview of technical communication as a career field and as a research field. Introduces students to best practices and career options in technical communication and to the research methods used by technical communication practitioners and researchers. Does not count toward English minor without special approval. Prerequisite: EH 301.

EH 305 - INTRO TO LITERARY STUDIES

Semester Hours: 3

Designed as an introduction to the study of literature, this course will address the history of textual interpretation, the practice of literary analysis, the theoretical debates central to literary studies, and the basic research and writing skills required for literary criticism. Prerequisite: Choose 1: EH 207, EH 208, EH 209, EH 210, EH 242.

EH 320 - PRACTICUM IN WRITING

Semester Hours: 3

Writing and editing under the supervision of professionals. Enrollment requires advance planning. Does not count toward English minor without special approval.. Prerequisite: EH 301 and EH 302.

EH 335 - SURVEY BRITISH LITERATURE

Semester Hours: 3

Writers, genres, and periods from Beowulf through the present. Prerequisite: EH 207 and 208 OR EH 209 and 210.

EH 336 - SURVEY AMERICAN LITERATURE

Semester Hours: 3

Writers, genres, and periods from the Age of Discovery through the present. Prerequisite: EH 207 and 208 OR EH 209 and 210.

EH 340 - ACADEMIC WRITING

Semester Hours: 3

Advanced academic writing designed to prepare students for the writing, research, and publishing requirements of their field of study. Prerequisite: EH 102 or EH 103 or EH 105.

EH 400 - COMPOSITION STUDIES FOR TCHERS

Semester Hours: 3

Introduction to effective strategies for the teaching of writing. Students will report on their own writing pedagogy as a result of reading and analyzing a range of writing research related to strategies of assigning, responding and assessing writing. Prerequisite: EH 207, EH 208, EH 209, EH 210 or EH 242.

EH 401 - THEORY & PRACTICE IN TECH COMM

Semester Hours: 3

Explores the relationships between common practices in technical communication and the theories that legitimize those practices. Introduces students to research and theories about fundamental issues in technical communication which may then become the basis for further graduate study in technical communication. Prerequisite: EH 301 or CM 301.

EH 403 - LITERARY CRITICISM & THEORY

Semester Hours: 3

Major texts and approaches from Plato to the present. Prerequisite: EH 207, EH 208, EH 209, EH 210 or EH 242.

EH 406 - FEMINISM AND COMPOSITION

Semester Hours: 3

Explores issues of gender in writing: postmodern feminism, feminist theories and research, gender and forms of writing, and finally, gender, teaching and identity. Students will investigate and analyze composition scholarship through reading, writing, and collaborative inquiry. Prerequisite: EH 207, EH 208, EH 209, EH 201 or EH 242.

EH 408 - HISTORY OF ENGLISH LANGUAGE

Semester Hours: 3

History of the emergence and development of English from the pre-Anglo-Saxon period to the present. Emphasis on cultural contexts. Prerequisite: EH 207, EH 208, EH 209, EH 210 or EH 242.

EH 409 - PROPOSAL WRITING

Semester Hours: 3

This course teaches effective strategies for writing successful proposals in business, academic, research, and non-profit contexts. Senior Standing required.

EH 410 - FICTION WRITING

Semester Hours: 3

Practice in writing fiction from conception to revision. Students will read and write contemporary literary fiction. Student work will be commented on and critiqued in regular class workshops. The class culminates in a revision portfolio. Prerequisite: EH 207, EH 208, EH 209, EH 210 or EH 242.

EH 411 - POETRY WRITING

Semester Hours: 3

Practice in writing poetry from conception to revision. Students will read and write contemporary poetry. Student work will be commented on and critiqued in regular class workshops. The class culminates in a revision portfolio. Prerequisite: EH 207, EH 208, EH 209, EH 210 or EH 242.

EH 412 - SPEC STUDIES CREATIVE WRITING

Semester Hours: 3

Topics in creative writing, professional writing, or other advanced writing announced in advance. Prerequisite: EH 207, EH 208, EH 209, EH 210 or EH 242.

EH 413 - CHILDREN'S & ADOLESCENT LIT

Semester Hours: 3

Course content will include the study of various genres of children's and adolescent literature and their relationship to beginning reading, enhancement of reading comprehension, and intervention instruction in the various content areas. Prerequisite: EH 207 and 208 OR EH 209 and 210.

EH 414 - CREATIVE NONFICTION WRITING

Semester Hours: 3

This composition class introduces students to the genre of creative non-fiction via revising, peer responding, prose modeling, and conferencing; and developing expertise in rhetorical writing concepts. Prerequisite: EH 207 and 208 OR EH 209 and 210.

EH 415 - ANGLOPHONE/POSTCOLONIAL LIT

Semester Hours: 3

An introduction to major concepts, figures, and works with emphasis upon historical and cultural context. Specific focus will vary. Prerequisite: EH 207, EH 208, EH 209, EH 210 or EH 242.

EH 418 - REP TEXTS-WOMEN WRITERS

Semester Hours: 3

Focus on women's contribution to the literary tradition. Prerequisite: EH 207, EH 208, EH 209, EH 210 or EH 242.

EH 420 - WRITING FOR TECH PROFESSIONALS

Semester Hours: 3

Teaches students in disciplines such as science, engineering, nursing, and user experience to improve their writing skills and produce important academic and professional documents. Junior Standing required.

EH 422 - STUDIES IN THE NOVEL

Semester Hours: 3

Focuses on varying topics in the novel with special attention to form. Texts may be drawn from diverse national and cultural origins. Prerequisite: EH 207 and 208 OR EH 209 and 210.

EH 423 - CONTEMPORARY BRITISH LITERATURE

Semester Hours: 3

Major works after 1945 with emphasis on historical and cultural contexts. Specific focus will vary. Prerequisite: EH 207, EH 208, EH 209, EH 210 or EH 242.

EH 424 - POETRY AND POETICS

Semester Hours: 3

An attempt to answer (at least provisionally) the questions 'What is a poem?' and 'What is poetry?'. How to read a poem closely and carefully, with attention to theory, history of genres, and especially the technical aspects of poetry. Prerequisite: EH 207 and 208 OR EH 209 and 210.

EH 425 - LITERATURE, SCIENCE & TECH

Semester Hours: 3

Considers the relationships among literature, scientific theories, and technological practices through a study of texts from ancient times to the present. Prerequisite: EH 207, EH 208, EH 209, EH 210 or EH 242.

EH 429 - STUDIES IN AMERICAN CINEMA

Semester Hours: 3

Focuses on select topics in American cinema with an emphasis on film history, technique, aesthetics, and cultural context. Prerequisite: EH 207 and 208 OR EH 209 and 210.

EH 430 - THE AMERICAN NOVEL

Semester Hours: 3

The American novel. In alternate years the course may focus on 19th or 20th century American novels. Prerequisite: EH 207, EH 208, EH 209, EH 210 or EH 242.

EH 432 - AMERICAN LITERARY MODERNISM

Semester Hours: 3

Major writers and cultural/historical events surrounding American Modernism, with a focus on long texts and shorter forays into the major poets.

Prerequisite: EH 207, EH 208, EH 209, EH 210 or EH 242.

EH 433 - WILLIAM FAULKNER

Semester Hours: 3

Critical study of the major novels. Prerequisite: EH 207, EH 208, EH 209, EH 210 or EH 242.

EH 434 - SCIENCE FICTION

Semester Hours: 3

Selected short stories and novels, exploring the thematic and narrative concerns of both classic and contemporary science fiction. In alternate years, the course may focus on a specific problem or concern in science fiction. Prerequisite: EH 207 and 208 OR EH 209 and 210.

EH 435 - SPECIAL STUDIES AMERICAN LIT

Semester Hours: 3

Topics announced in advance. Prerequisite: EH 207, EH 208, EH 209, EH 210 or EH 242.

EH 437 - THE AMERICAN NINETEENTH CNTRY

Semester Hours: 3

This class will investigate Anglophone cultural expression and literary critical traditions associated with long nineteenth century (1789-1919). Specific thematic concern or period of focus is left to the discretion of the instructor. Prerequisite: EH 207 and 208 OR EH 209 and 210.

EH 438 - AFRICAN AMERICAN LITERATURE

Semester Hours: 3

Themes, concepts and imagery in the Black American literary tradition. Prerequisite: EH 207, EH 208, EH 209, EH 210 or EH 242.

EH 439 - ETHNIC AMERICAN NOVEL

Semester Hours: 3

Race, ethnicity, and the 20th-century American Novel. Prerequisite: EH 207, EH 208, EH 209, EH 210 or EH 242.

EH 440 - SPECIAL TOPICS ENGLISH STUDIES

Semester Hours: 3

Topics announced in advance. Prerequisite: EH 207, EH 208, EH 209, EH 210 or EH 242.

EH 442 - USABILITY STUDIES

Semester Hours: 3

Introduces students to theory and practice of usability, which involves designing useful, easy-to-use websites, software, and products. The course involves group projects conducting real-world usability testing. Junior Standing required.

EH 448 - THE BIBLE AS LITERATURE

Semester Hours: 3

An introduction to the major literary forms of the Bible. Material will be approached analytically, involving both socio-historical and literary-critical perspectives. Prerequisite: EH 207, EH 208, EH 209, EH 210 or EH 242.

EH 450 - CHAUCER

Semester Hours: 3

A study of Geoffrey Chaucer's Middle English works including the early drama visions, Troilus and Criseyde, and the Canterbury Tales. Prerequisite: EH 207, EH 208, EH 209, EH 210 or EH 242.

EH 451 - ARTHURIAN ROMANCE

Semester Hours: 3

A study of Arthurian Literature focused on medieval Welsh, Scottish, English, and French poetry and prose, as well as early-modern and modern adaptations of Arthurian stories in poetry, prose, drama, and film. Prerequisite: EH 207, EH 208, EH 209, EH 210 or EH 242.

EH 452 - USER CENTERED DESIGN

Semester Hours: 3

Introduces students to user-centered design principles that inform the practice of user experience design. Students will use visual thinking as they complete contextual inquiries and mapping exercises.

EH 454 - NEW MEDIA WRITING & RHETORIC

Semester Hours: 3

This course teaches students to apply rhetorical principles across a variety of media and includes an examination of communication strategies used widely in academic and industry settings. The course focuses on new media through an exploration of digital technologies and the way digital culture and new media have dramatically impacted reading, writing, and research practices. Prerequisites: EH 101 and EH 102.

EH 460 - SIXTEENTH-CENTURY LITERATURE

Semester Hours: 3

Selected works from the reigns of Henry VIII and Elizabeth I Close readings of texts in their historical, intellectual, and social contexts. Prerequisite: EH 207, EH 208, EH 209, EH 210 or EH 242.

EH 461 - SHAKESPEARE I

Semester Hours: 3

Introduction to Shakespeare's canon, selected from tragedies, comedies, histories, romances; the course may include a variety of critical approaches (historical, political, feminist, queer, performative, linguistic, and cultural). Prerequisite: EH 207 and 208 OR EH 209 and 210.

EH 462 - SHAKESPEARE II

Semester Hours: 3

Specialized study of Shakespeare's works, with particular attention to a given genre, time period, theme, cultural context, and/or critical/theoretical approach. Prerequisite: EH 207 and 208 OR EH 209 and 210.

EH 463 - CAPSTONE IN WRITING

Semester Hour: 1

A senior capstone course for the Writing BA for which students will complete a portfolio of their writing. Portfolios will include reflection on and revision to selected samples of course-participants' writing and a scholarly project completed for the capstone course. Prerequisites: EH 260.

EH 465 - DRAMATIC LITERATURE

Semester Hours: 3

Studies in Drama and interpretive strategies for reading plays. May be organized nationally, by genre, or by theme/topic. Prerequisite: EH 207 and 208 OR EH 209 and 210.

EH 470 - MILTON

Semester Hours: 3

A study of the development of Milton's thought and art as it appears in his early poems, selected prose, and later poetry, with particular attention given to Paradise Lost. Prerequisite: EH 207, EH 208, EH 209, EH 210 or EH 242.

EH 473 - EARLY MODERN LITERATURE

Semester Hours: 3

This course will examine a particular theme, issue and/or debate within the early modern period, roughly 1500-1700: constructions of subjectivity and community, the exploration of the New World, the rediscovery of the natural world through scientific investigation. The course will likely introduce modern scholarship. Prerequisite: EH 207, EH 208, EH 209, EH 210 or EH 242.

EH 475 - RHETORIC AND WRITING

Semester Hours: 3

Provides a focused look at specific issues of rhetoric in society, with an emphasis on academic analysis and rhetorical strategy.

EH 480 - THE LONG EIGHTEENTH CENTURY

Semester Hours: 3

Introduction to major works from the Restoration through the American and French Revolutions, 1680-1800, with an emphasis on Britain and the colonies. Topics may include: the rise of the novel, the rise of the lyric, consciousness of modernity, satire, book history, working-class writers, female authorship, empire. Prerequisite: EH 207 and 208 OR EH 209 and 210.

EH 485 - THE ENLIGHTENMENT

Semester Hours: 3

The European Enlightenment emphasized the importance of reasoned, open-eyed investigations into nature and human society. Its legacies include the scientific method, the valuation of universal human rights, and the American and French Revolutions. Authors may include: Bacon, Behn, Hume, Swift, Voltaire, Montagu, Franklin, Jefferson, Equiano, and Wollstonecraft. Prerequisite: EH 207, EH 208, EH 209, EH 210 or EH 242.

EH 498 - INDEPENDENT STUDY

Semester Hours: 3

Individual investigation into significant issues in linguistics, literature, technical communication, or composition studies under direct supervision of instructor. Prerequisites: Written approval by the instructor and the department chair of a project prospectus. Junior or Senior standing.

EH 499 - SENIOR RESEARCH PROJECT

Semester Hours: 3

Required: special approval from chair and instructor.

EHL 301 - TECH WRTG FOR GRAD STUDENTS

Semester Hours: 3

Practical writing, especially technical or scientific reports and proposals, with emphasis on organization, research, and presentation. Designed to address the specific needs of nonnative speakers of English who are developing their skills in written discourse. Prerequisite: ESL 103.

EHL 405 - SUR GEN LINGUISTICS:APP ENG I

Semester Hours: 3

Come to see the strange in familiar as you engage in the study of the system of language through focused analysis of the components of English. Language is usually the lens through which we observe and report on the world. In this course, it becomes the object of observations and discussion.

EHL 406 - CRITICAL ISSUES

Semester Hours: 3

Come to an understanding of the complex of policies, legislation, and practice that impact the progress of English Learners in elementary and secondary schools across the U.S. Understand the impact of federal, state, and local policies on classroom settings and teacher-student interactions.

EHL 407 - ADV EH GRAM:APP LINGUISTICS II

Semester Hours: 3

Through an in-depth analysis of the structure of sentences and discourse in contemporary English, you will understand more clearly the impact of the choices we make in the language we use in day-to-day conversations, instructional settings, political discourse, and beyond.

EHL 409 - SPEC STUDIES: APPL LINGUISTICS

Semester Hours: 3

Special topics in linguistics. Focus and emphasis of topics announced in advance.

English, BA

- English, BA requires 120 total credit hours.
- Two courses (6 semester hours) at the 400 level are required in the major.
- No more than three sophomore literature courses (9 semester hours).
- No more than three courses (9 semester hours) in creative writing.
- 36 of 120 credit hours must be taken at 300 level or higher.
- Must have a 2.0 GPA in major, minor, and overall.
- No more than 6 credit hours of HPE may count in degree requirements.
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- No more than 60 credit hours from a two-year school can be applied toward a UAH degree.
- Double counting of classes must be approved through the CAHS advising office.
- For graduation application instructions, see here (p. 812).

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	

EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S	INTRO FOREIGN LANG I: SPANISH	
or WLC 101A	INTRO FOREIGN LANG I: ARABIC	
or WLC 101F	INTRO FOREIGN LANG I:FRENCH	
or WLC 101G	INTRO FOREIGN LANG I:GERMAN	
or WLC 101J	INTRO FOREIGN LANG I:JAPANESE	
or WLC 101R	INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S	INTRO FOREIGN LANG II:SPANISH	
or WLC 102A	INTRO FOREIGN LANG II: ARABIC	
or WLC 102F	INTRO FOREIGN LANG II:FRENCH	
or WLC 102G	INTRO FOREIGN LANG II:GERMAN	
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE	
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN	
WLC 201S	INTERM FOREIGN LANG:SPANISH	
or WLC 201A	INTERM FOREIGN LANG I: ARABIC	
or WLC 201F	INTERM FOREIGN LANG:FRENCH	
or WLC 201G	INTERM FOREIGN LANG:GERMAN	
or WLC 201J	INTERM FOREIGN LANG: JAPANESE	
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN	
WLC 202S	INTERM FOREIGN LANG II:SPANISH	
or WLC 202A	INTERM FOREIGN LANG II: ARABIC	
or WLC 202F	INTERM FOREIGN LANG II:FRENCH	
or WLC 202G	INTERM FOREIGN LANG II:GERMAN	
or WLC 202J	INTERM FORGN LANG II:JAPANESE	
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN	
WLC 204	INTERNATIONAL CINEMA	
PHL 101	INTRODUCTION TO PHILOSOPHY	
PHL 102	INTRO TO ETHICS	
PHL 103	INTRODUCTION TO LOGIC	
PHL 150	TECH, SCIENCE & HUMAN VALUES	
WGS 200	INTRO WOMEN'S & GENDER STUDIES	
AMS 229	ANCIENT & MEDIEVAL WORLDS	
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	

ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Area III: Mathematics and Sciences		11-12
Mathematics		3-4
MA 105	NATURE OF MATHEMATICS	
MA 107	ALGEBRA WITH APPLICATIONS	
MA 110	FINITE MATHEMATICS	
MA 112	PRECALCULUS ALGEBRA	
MA 113	PRECALCULUS TRIGONOMETRY	
MA 115	PRECALCULUS ALGEBRA & TRIG	
MA 120	MATH PROFESSIONAL APPLICATIONS	
MA 171	CALCULUS A	
Natural Sciences (Lab)		8
AST 100	SURVEY OF ASTRONOMY	
AST 106	EXPLORING THE COSMOS I	
AST 107	EXPLORING THE COSMOS II	
BYS 109	FUNDAMENTALS OF BIOLOGY	
BYS 119	PRINCIPLES OF BIOLOGY	
BYS 120	ORGANISMAL BIOLOGY	
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I	
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB	
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB	
ESS 103	ENVIRONMENTAL EARTH SCIENCE	
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG	
PH 100	CONCEPTUAL PHYSICS	
PH 101	GENERAL PHYSICS I	
PH 102	GENERAL PHYSICS II	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	
Area IV: History and Social and Behavioral Sciences*		12
History		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Sciences		6-9
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	

ESS 105	WORLD REGIONAL GEOGRAPHY
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY
PSC 101	INTRO TO AMERICAN GOVERNMENT
PSC 102	INTRO TO COMPARATIVE POLITICS
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS
PY 101	GENERAL PSYCHOLOGY I
PY 201	LIFE-SPAN DEVELOPMENT
SOC 100	INTRO TO SOCIOLOGY
SOC 102	ANALYSIS OF SOCIAL PROBLEMS
SOC 103	INTRO TO CRIMINOLOGY
SOC 105	INTRO CULTURAL ANTHROPOLOGY

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Area V allows no more than six hours in a single discipline from Area II or Area IV. Area V should cover a breadth of disciplinary study.

Code	Title	Semester Hours
Pre-Professional Courses		19
WLC 101, 102, 201, or 202		3
Select 16 hours of pre-professional electives		16
English Major ¹		36
Core Courses		12
EH 207	READINGS LITERATURE/CULTURE I	3
or EH 242	MYTHOLOGY	
or EH 208	READINGS LITERATURE/CULTURE 2	
or EH 209	HONORS SEM READINGS LIT/CUL I	
or EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 211	INTRO CREATIVE WRITING	3
EH 305	INTRO TO LITERARY STUDIES	3
EH 300	STRATEGIES FOR BUSINESS WRIT'G	3
or EH 301	TECHNICAL WRITING	
or EH 340	ACADEMIC WRITING	
Electives ²		24
Select 8 courses from the following:		
EH 242	MYTHOLOGY	3
EH 209	HONORS SEM READINGS LIT/CUL I	3
or EH 207	READINGS LITERATURE/CULTURE I	
EH 210	HONORS SEM READINGS LIT/CUL 2	3
EH 208	READINGS LITERATURE/CULTURE 2	3
EH 301	TECHNICAL WRITING	3
or EH 300	STRATEGIES FOR BUSINESS WRIT'G	
EH 302	TECHNICAL EDITING	4
EH 303	PRAC & RSRCH IN TECH COMM	3
EH 320	PRACTICUM IN WRITING	3
EH 340	ACADEMIC WRITING	3
EH 400	COMPOSITION STUDIES FOR TCHERS	3
EH 401	THEORY & PRACTICE IN TECH COMM	3
EH 403	LITERARY CRITICISM & THEORY	3
EH 406	FEMINISM AND COMPOSITION	3
EH 408	HISTORY OF ENGLISH LANGUAGE	3
EH 410	FICTION WRITING	3
EH 411	POETRY WRITING	3
EH 412	SPEC STUDIES CREATIVE WRITING	3

EH 414	CREATIVE NONFICTION WRITING	3
EH 415	ANGLOPHONE/POSTCOLONIAL LIT	3
EH 418	REP TEXTS-WOMEN WRITERS	3
EH 422	STUDIES IN THE NOVEL	3
EH 423	CONTEMPORARY BRITISH LITERATUR	3
EH 424	POETRY AND POETICS	3
EH 425	LITERATURE, SCIENCE & TECH	3
EH 429	STUDIES IN AMERICAN CINEMA	3
EH 430	THE AMERICAN NOVEL	3
EH 432	AMERICAN LITERARY MODERNISM	3
EH 433	WILLIAM FAULKNER	3
EH 434	SCIENCE FICTION	3
EH 435	SPECIAL STUDIES AMERICAN LIT	3
EH 437	THE AMERICAN NINETEENTH CNTRY	3
EH 438	AFRICAN AMERICAN LITERATURE	3
EH 439	ETHNIC AMERICAN NOVEL	3
EH 440	SPECIAL TOPICS ENGLISH STUDIES	3
EH 442	USABILITY STUDIES	3
EH 448	THE BIBLE AS LITERATURE	3
EH 450	CHAU CER	3
EH 451	ARTHURIAN ROMANCE	3
EH 454	NEW MEDIA WRITING & RHETORIC	3
EH 460	SIXTEENTH-CENTURY LITERATURE	3
EH 475	RHETORIC AND WRITING	3
EH 461	SHAKESPEARE I	3
EH 462	SHAKESPEARE II	3
EH 465	DRAMATIC LITERATURE	3
EH 470	MILTON	3
EH 473	EARLY MODERN LITERATURE	3
EH 480	THE LONG EIGHTEENTH CENTURY	3
EH 485	THE ENLIGHTENMENT	3
EH 498	INDEPENDENT STUDY	3

Minor Courses 21

Elective Courses

Elective hours vary by program, see advisor.

Total Semester Hours 120

¹ 12 Hours at the upper level (300+) must be earned at UAH.

² In the electives area, only one class may be at the 200 level, no more than 9 hours may be in creative writing, and 6 of the hours must be at the 400+ level.

Year 1

Fall		Semester Hours
EH 101	COLLEGE WRITING I	3
Fine Arts		3
Social/Behavioral Science		3
Math		3
FYE 101	CHARGER SUCCESS	1
Term Semester Hours:		13

Spring

EH 102	COLLEGE WRITING II	3
Humanities or Fine Arts		3
Social/Behavioral Science		3

Science w/Lab		4
HY 104	WORLD HISTORY SINCE 1500	3
or HY 103	or WORLD HISTORY TO 1500	
Term Semester Hours:		16
Year 2		
Fall		
WLC 101		3
EH 207	READINGS LITERATURE/CULTURE I	3
or EH 242	or MYTHOLOGY	
Social/Behavioral Science		3
Science w/Lab		4
Area V Course		3
Term Semester Hours:		16
Spring		
EH 208	READINGS LITERATURE/CULTURE 2	3
Area V Courses		6
Minor Courses		6
Term Semester Hours:		15
Year 3		
Fall		
EH 305	INTRO TO LITERARY STUDIES	3
English Elective 200+		3
English Elective 300+		3
Area V Courses		6
Term Semester Hours:		15
Spring		
EH 335	SURVEY BRITISH LITERATURE	3
English 300+ Elective		3
English 300+ Elective		3
Minor Course		3
Area V Course		3
Term Semester Hours:		15
Year 4		
Fall		
EH 336	SURVEY AMERICAN LITERATURE	3
English 300+ Elective		3
Minor Courses		6
Elective		3
Term Semester Hours:		15
Spring		
English 300+ Electives		6
Minor Courses		6
Elective		3
Term Semester Hours:		15
Total Semester Hours:		120

English, BA - Language Arts (For Students Seeking Teacher Certification)

- English, BA Curriculum II requires 128 credit hours.
- 39 of 128 credit hours must be taken at 300 level or higher.
- Must have a 2.0 GPA in major, minor, and overall.

- No more than 6 credit hours of HPE may count in degree requirements.
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- No more than 64 credit hours from a two-year school can be applied toward a UAH degree.
- All double counting of classes must be approved through the CAHS Academic Advising Office.
- For graduation application instructions, see here (p. 812).

Code	Title	Semester Hours
Freshman Composition		6
EH 101	COLLEGE WRITING I	
EH 102	COLLEGE WRITING II	
Humanities and Fine Arts		6
12 hours of Humanities and Fine Arts chosen from the following categories below		
Fine Arts: Choose one		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
MU 100	INTRO TO MUSIC LITERATURE	
TH 122	THEATRE APPRECIATION	
Literature		
Students will fulfill Literature requirements within the English Major Core.		
Humanities and Fine Arts: Choose one		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
MU 100	INTRO TO MUSIC LITERATURE	
TH 122	THEATRE APPRECIATION	
CM 113	Intro to Rhetorical Communication	
WLC 101, 102, 201, or 202 ¹		
PHL 101	INTRODUCTION TO PHILOSOPHY	
PHL 102	INTRO TO ETHICS	
PHL 103	INTRODUCTION TO LOGIC	
PHL 150	TECH, SCIENCE & HUMAN VALUES	
WGS 200	INTRO WOMEN'S & GENDER STUDIES	
Mathematics and Natural Sciences		11
Mathematics: Choose one		3-4
MA 107	ALGEBRA WITH APPLICATIONS	
MA 110	FINITE MATHEMATICS	
MA 112	PRECALCULUS ALGEBRA	
MA 113	PRECALCULUS TRIGONOMETRY	
MA 115	PRECALCULUS ALGEBRA & TRIG	
MA 120	MATH PROFESSIONAL APPLICATIONS	
MA 171	CALCULUS A	
Natural Sciences: Choose two		8
AST 106	EXPLORING THE COSMOS I	
AST 107	EXPLORING THE COSMOS II	
BYS 119	PRINCIPLES OF BIOLOGY	
BYS 120	ORGANISMAL BIOLOGY	
CH 101	INTRO TO CHEMISTRY	
& CH 105	and INTRO CHEMISTRY LAB	

CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II
ESS 103	ENVIRONMENTAL EARTH SCIENCE
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG
PH 100	CONCEPTUAL PHYSICS
PH 101	GENERAL PHYSICS I
PH 102	GENERAL PHYSICS II
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II
PH 113/116	GEN PHYSICS W/CALC III

History and Social and Behavioral Sciences 12

History: Choose one 3

HY 103	WORLD HISTORY TO 1500
HY 104	WORLD HISTORY SINCE 1500
HY 221	UNITED STATES TO 1877
HY 222	UNITED STATES SINCE 1877

Social and Behavioral Sciences: Choose three 9

ECN 142	PRINC OF MACROECONOMICS
ECN 143	PRINC OF MICROECONOMICS
GS 200	GLOBAL SYSTEMS AND CULTURES
ESS 105	WORLD REGIONAL GEOGRAPHY
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY
PSC 101	INTRO TO AMERICAN GOVERNMENT
PSC 102	INTRO TO COMPARATIVE POLITICS
PY 101	GENERAL PSYCHOLOGY I
PY 201	LIFE-SPAN DEVELOPMENT
SOC 100	INTRO TO SOCIOLOGY
SOC 102	ANALYSIS OF SOCIAL PROBLEMS
SOC 105	INTRO CULTURAL ANTHROPOLOGY

Code	Title	Semester Hours
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Pre-Professional Area 23

CM 231, TH 221, and CM 205 may count in Pre-Professional area and EH major. They may not count in any other area of the GER.

Choose 14 additional credit hours from the above listed Fine Arts, Humanities, Literature, Mathematics, Sciences, History, and Social and Behavioral Sciences.

English Language Arts Major 45

Select 6 semester hours from the following: 6

EH 207	READINGS LITERATURE/CULTURE I
EH 208	READINGS LITERATURE/CULTURE 2
EH 209	HONORS SEM READINGS LIT/CUL I
EH 210	HONORS SEM READINGS LIT/CUL 2
EH 242	MYTHOLOGY

Introduction to the English Major and Minor

EH 305	INTRO TO LITERARY STUDIES	3
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Survey of General Linguistics

EHL 405	SUR GEN LINGUISTICS:APP ENG I	3
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Composition Studies for Teachers

EH 400	COMPOSITION STUDIES FOR TCHERS	3
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American Literature

Select 3 semester hours from the following: 3

EH 336	SURVEY AMERICAN LITERATURE
EH 422	STUDIES IN THE NOVEL
EH 429	STUDIES IN AMERICAN CINEMA
EH 430	THE AMERICAN NOVEL
EH 432	AMERICAN LITERARY MODERNISM
EH 433	WILLIAM FAULKNER
EH 435	SPECIAL STUDIES AMERICAN LIT
EH 437	THE AMERICAN NINETEENTH CNTRY
EH 438	AFRICAN AMERICAN LITERATURE
EH 439	ETHNIC AMERICAN NOVEL

English Literature

Select 3 semester hours from the following: 3

EH 335	SURVEY BRITISH LITERATURE
EH 418	REP TEXTS-WOMEN WRITERS
EH 422	STUDIES IN THE NOVEL
EH 423	CONTEMPORARY BRITISH LITERATUR
EH 440	SPECIAL TOPICS ENGLISH STUDIES
EH 450	CHAUCE
EH 451	ARTHURIAN ROMANCE
EH 460	SIXTEENTH-CENTURY LITERATURE
EH 461	SHAKESPEARE I
EH 462	SHAKESPEARE II
EH 470	MILTON
EH 473	EARLY MODERN LITERATURE
EH 480	THE LONG EIGHTEENTH CENTURY
EH 485	THE ENLIGHTENMENT

The Novel

Select 3 semester hours from the following: 3

EH 422	STUDIES IN THE NOVEL
EH 430	THE AMERICAN NOVEL
EH 439	ETHNIC AMERICAN NOVEL
EH 435	SPECIAL STUDIES AMERICAN LIT
EH 440	SPECIAL TOPICS ENGLISH STUDIES (with a topic covering the novel)

Literature Elective

Select 3 semester hours from the courses listed above at the 300 level or above, as well as the following: 3

EH 403	LITERARY CRITICISM & THEORY
EH 406	FEMINISM AND COMPOSITION
EH 408	HISTORY OF ENGLISH LANGUAGE
EH 410	FICTION WRITING
EH 411	POETRY WRITING
EH 412	SPEC STUDIES CREATIVE WRITING
EH 415	ANGLOPHONE/POSTCOLONIAL LIT
EH 418	REP TEXTS-WOMEN WRITERS
EH 422	STUDIES IN THE NOVEL
EH 424	POETRY AND POETICS
EH 425	LITERATURE, SCIENCE & TECH
EH 434	SCIENCE FICTION
EH 448	THE BIBLE AS LITERATURE
EH 465	DRAMATIC LITERATURE

Speech and Communication

CM 113	Intro to Rhetorical Communication	3
CM 231	FOUNDATIONS OF HUMAN COMMUNICA	3

Drama and Theatre

TH 221	ACTING	3
TH 425	THEATRE MAINSTAGE	1-3

Media Writing

CM 205	INTRO TO JOURNALISM	3
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Mass Media

CM 430	MASS MEDIA IN AMERICA	3
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Education Courses

ED 301	INTRO TO EDUCATION PRACTICUM	1
ED 307	MULTICULTURAL FND EDUCATION	3
ED 308	EDUCATIONAL PSYCHOLOGY	3
EDC 301	TCHG THE EXCEPTIONAL CHILD	3
EDC 311	INSTR STRATEGIES INCLUSIVE CLR	3
ED 309	CLASSROOM & BEHAVIOR MGMT	3
ED 350	TECHNOLOGY IN CLASSROOM	3
ED 408	TCHG READING/CONTENT AREA	3
ED 410	FOUNDATIONS EDUC EVALUAT	3
ED 421	SECNDRY ELA INSTR WRIT TO READ	2
ED 431	SEC ELA METHD: READING TO WRIT	2-3
ED 497	HIGH SCHOOL INTERNSHIP	12

Total Semester Hours **120**

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Area V allows no more than six hours in a single discipline from Area II or Area IV. Area V should cover a breadth of disciplinary study.

English Minor

A minor in English requires 21 semester hours above freshman composition courses; 12 semester hours must be upper level (numbered 300 or above), including at least 3 semester hours at the 400-level. Half of the upper-level requirement (6 semester hours) must be taken at UAH.

Requirements

Code	Title	Semester Hours
Sophomore literature (as described in GER)		6
EH 305	INTRO TO LITERARY STUDIES	3
Courses numbered 300 or 400 ¹		6
Courses numbered 400		3
EH elective 200+ level ²		3
Total Semester Hours		21

¹ Courses in technical and business writing may not be used in the minor without special approval by the department chair.

² 100 level EH courses are not allowed to count in EH minor.

Technical Writing Minor

The 22 credit hour minor prepares students for a career in technical writing by combining intensive writing training with practical experience and fundamental technical skills. All students must take EH 301, EH 302, EH 401, and EH 320 plus 9 hours of relevant electives. Students with non-technical majors (e.g., English, Communication Arts) should plan early to take courses in technical or scientific fields. Students with technical majors (e.g., Engineering, Physics, Computer Science) will take additional courses focusing on writing and communication skills. English majors are not allowed to share classes with the Technical Writing Minor. Technical Writing minors are not allowed to major in Writing with a Technical Writing concentration (other concentrations are approved, however).

A typical program for a non-technical major is as follows:

Code	Title	Semester Hours
EH 301	TECHNICAL WRITING	3
EH 302	TECHNICAL EDITING	4
EH 401	THEORY & PRACTICE IN TECH COMM	3
EH 320	PRACTICUM IN WRITING	3
Technical and Science Majors ¹		9
9 hours of Arts, Humanities, and Social Science Electives		
Arts, Humanities, & Social Science and Business Majors ¹		
9 hours of technical or science electives		
Total Semester Hours		22

¹ All technical electives must be chosen with and approved by the Director of the Technical Writing program.

Global Studies

Global Studies Program

Office: MOR 278P

Telephone: 256.824.6288

Global Studies Minor

The **Global Studies Minor** provides students a multi- and interdisciplinary minor that helps them prepare for global-oriented careers in business, government, non-governmental organizations, international development organizations, and philanthropic agencies.

For information about the **Certificate in Foreign Language and Global Engagement** or the **Global Professional Pathways Certificate**, please go to the **Department of World Languages and Cultures**.

Mission

The Global Studies Program fosters an interdisciplinary environment of investigation of global issues that enables students to discover, create, and communicate knowledge, develop critical thinking and intercultural competencies, and cultivate civic responsibility in preparation for opportunities in a wide array of globally-oriented fields.

Coursework in Global Studies includes two core courses in Global Studies (GS 200, 'Global Systems and Cultures,' and GS 400, 'Capstone and Portfolio Course in Global Studies'), and 18 credits based on courses from five 'Core Competencies' that each correspond to a learning outcome for the minor.

- **Core Competency: Foreign Language** (6 credits)
 - Learning Outcome: Students will obtain a solid foundation in a foreign language and be ready to proceed to intermediate competency. Student will complete two courses in one foreign language.
- **Core Competency: Global Economics, Markets, and Development** (3 credits):
 - Learning Outcome: Students will acquire a foundational literacy in economics and economic development.
- **Core Competency: Global Politics and Security** (3 credits):
 - Learning Outcome: Students will examine and reflect on the complexities involved in global politics and security.
- **Core Competency: Global Environment, Technology, and Health** (3 credits):
 - Learning Outcome: Students will explore the impact of the global processes of business, industry, and technological developments on the environment and public health.
- **Core Competency: Cultures in Exchange and Contact** (3 credits):
 - Learning Outcome: Students will investigate the challenges and opportunities in a world of continual migration and interaction of cultures, ideas, and ways of life.

Please click on the minor tab above to see which courses are eligible for satisfying the core competencies.

The minor must include a minimum of 24 hours:

- At least nine hours must be in courses numbered 300 or above.
- Up to six hours may also count toward major program.
- Up to six hours may count toward GERs.

Global Studies Core:

Code	Title	Semester Hours
Core Coursework		6
GS 200	GLOBAL SYSTEMS AND CULTURES	
GS 400	GLOBAL STUDIES CAPSTONE	

Foreign Language and Thematic Core:

Code	Title	Semester Hours
Foreign Languages		6
Choose from: WLC 101, 102, 201, 202, 301, 302, 303, 304, 305, or 404		
The 6 Hours of foreign language must be taken in the same language		

Thematic Core Competencies 12

Students must complete courses in at least three of the four thematic core competencies listed below

Global Economics, Markets, and Development

Students will acquire a foundational literacy in economics and economic development. Choose one course:

ECN 142	PRINC OF MACROECONOMICS
ECN 143	PRINC OF MICROECONOMICS
MGT 450	INTERNATIONAL BUSINESS
ECN 454	INTERNATIONAL ECONOMICS
FIN 454	INTERNATIONAL FINANCE

OR course approved by Global Studies Program Director

Global Politics and Security

Students will examine and reflect on the complexities involved in global politics and security. Choose one course:

HY 440	FOREIGN REL U.S. SINCE 1920
PSC 102	INTRO TO COMPARATIVE POLITICS
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS
PSC 440	REGIONAL STUDIES
PSC 464	AMERICAN FOREIGN POLICY
PSC 466	NATL SECURITY STRATEGY & PLCY
PSC 470	ISSUES IN SECURITY POLICY

OR course approved by Global Studies Program Director

Global Environment, Technology, and Health

Students will explore the impact of the global processes of business, industry, and technological developments on the environment and public health. Choose one course:

ESS 111	WEATHER, CLIMATE & GLOBAL CHNG
ESS 210	COLLAPSE OF CIVILIZATIONS
ESS 407	ENV THRTS, PUB POLY, & DEC MKG
SOC 369	ENVIRONMENTAL SOCIOLOGY
HY 383	FOOD AND WORLD HISTORY
PHL 150	TECH, SCIENCE & HUMAN VALUES

OR course approved by Global Studies Program Director

Cultures in Exchange and Contact

Students will investigate the challenges and opportunities in a world of continual migration and interaction of cultures, ideas, and ways of life. Choose one course:

ARH 103	ARH SUR:NON-WESTERN TRADITIONS
EH 208	READINGS LITERATURE/CULTURE 2

EH 415	ANGLOPHONE/POSTCOLONIAL LIT
WLC 204	INTERNATIONAL CINEMA
ESS 105	WORLD REGIONAL GEOGRAPHY
HY 382	MODERN LATIN AMERICAN
HY 385	MODERN MIDDLE EAST
HY 424	THE ATLANTIC WORLD
HY 481	EMPIRES AND NATIONS
HY 482	COMPTV SLAVERY & ABOLITION
PHL 314	ASIAN PHILOSOPHY
SOC 330	RACE AND ETHNICITY

OR course approved by Global Studies Program Director

Total Hours Required

24

The **Global Studies Program** features on-campus courses associated with the **Global Studies Minor** (GS 200 and GS 400), the **Certificate in Foreign Language and Global Engagement** (GS 200), the **Global Professional Pathways Certificate** (GS 450), as well as credit options (GS 199, GS 299, and GS 399) for courses completed abroad. Students may also receive credit for GS 499 for a course completed abroad or as an independent study on campus.

GS 199 - STUDY ABROAD

Semester Hours: 1-3

Course will involve travel to selected countries for academic study purposes. The course is open to all UAH students with permission of the instructor. May be repeated for credit when the content of the course differs.

GS 200 - GLOBAL SYSTEMS AND CULTURES

Semester Hours: 3

A multidisciplinary introduction to global studies through a focus on cultural, economic, political, and historical dimensions of interactions among world nations and cultures.

GS 299 - ST: GLOBAL STUDIES ABROAD

Semester Hours: 1-3

Course will involve travel to selected countries for academic study purposes. The course is open to all UAH students with permission of the instructor. May be repeated for credit when the content of the course differs.

GS 399 - STUDY ABROAD

Semester Hours: 1-3

Course will involve travel to selected countries for academic study purposes. The course is open to all UAH students with permission of the instructor. May be repeated for credit when the content of the course differs.

GS 400 - GLOBAL STUDIES CAPSTONE

Semester Hours: 3

Capstone independent study for students completing the Global Studies minor. Students complete a portfolio essay assignment and essays connected to the program's core competencies. Prerequisite: GS 200, its equivalent, or approval of instructor. Offered as needed as independent study to students in final semester of study.

GS 450 - GLOBAL PROFESSIONAL PORTFOLIO

Semester Hour: 1

This course serves as the capstone learning experience for students completing the Global Professional Pathways Certificate program. Students will complete the Global Professional Pathways Portfolio in which they reflect on and assess their foreign language study and experience abroad and how these learning experiences have helped them prepare for a global career in their field.

GS 499 - SELECTED TOPICS IN GLOBAL STU

Semester Hours: 1-3

Selected topics in Global Studies. Course may also take place abroad as part of a study abroad program. May be repeated for credit with permission of Global Studies Program director.

History

409 Roberts Hall

Telephone: 256.824.6310

Email: history@uah.edu

The Department of History offers the following undergraduate degrees:

- History, BA (p. 117)
- History, BA Secondary Education (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/history/history-education/>)
- History and Social Sciences, BA Secondary (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/history/ed/>)
- History Major with Public History Track (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/history/history-public-history/>)

Mission

The faculty of the History Department is committed to our students and to teaching excellence. We are all active researchers who pursue publications and participate actively in local, national, and international historical organizations. We offer a wide-range of classes that foster student growth and accommodate diverse student interests. Undergraduate classes start with general surveys and proceed to specialized electives. Every course entails reading, discussion, and writing to build skills in investigating problems, analyzing information, and crafting narratives. The goal is to help students understand continuity and change, learn the complexity of judgment of past failures and successes, and become better citizens who know national patterns and cosmopolitan perspectives. Doing history, students will become skillful in research, separating important information from the inconsequential, weighing disparate interpretations, identifying and explaining trends, discussing complex topics, and presenting information orally and in writing.

The History Department offers an undergraduate B.A., as well as a minor. The department's majors who complete Class A&B certificates in education meet all the requirements of Alabama teacher certification. We also offer courses supporting various interdisciplinary minors within the College of Arts, Humanities, and Social Sciences.

History for Second Area of Study for Elementary Education Teacher Candidates

Students majoring in elementary education may select history as their second area of study. Requirements can be found in the Education section of the catalog. Preliminary counseling is available in the College of Education.

Advanced Placement Credit

Elective credit will be given to AP American History, European History, and/or World History. Students who have earned a score of 3 on Advanced Placement (AP) Program examinations of the College Entrance Examination Board will receive credit for HY 221, while a score of 4 or 5 will receive credit for HY 221 and HY 222 at UAH. For AP European History, students submitting a score of 3 will receive credit for HY 103, while a score of 4 or 5 will earn credit for HY 103 and HY 104. In World History, a score of 3 on the AP exam will receive credit for HY 103 and students submitting a score of 4 or 5 will receive credit for HY 103 and HY 104.

Transfer Credit

With the exception of those community colleges covered within the Alabama Articulation and General Studies agreement, only in exceptional circumstances will the History Department accept transfer credit for non-interactive telecommunications courses or correspondence courses in HY 103, HY 104, HY 221, or HY 222. Students who wish to receive such credit should petition the department chair.

CLEP/Departmental Examination Credit

A student who earns an acceptable score on the CLEP examination for World History (HY 103 and/or HY 104), or U.S. History (HY 221 and/or HY 222) may petition the History Department requesting an essay examination on the subject for which credit is desired. Acceptable scores on the CLEP examination are 56 for HY 103 and HY 104, and 60 for HY 221 and HY 222. The petition will not be reviewed until a satisfactory CLEP score has been reported. After consultation with a faculty member designated by the department chair, the student may take an essay examination. If he or she also receives B or better on the essay, credit will be granted for the appropriate course(s).

Major in History

- History, BA (p. 117)
- History, BA Secondary Education (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/history/history-education/>)
- History and Social Sciences, BA Secondary (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/history/ed/>)
- History Major with Public History Track (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/history/history-public-history/>)

Minor in History

- History (p. 122)
- Public History (p. 122)

HY 103 - WORLD HISTORY TO 1500

Semester Hours: 3

Explore the historical development of peoples and cultures from their beginnings to 1500. Trace cross-cultural interactions among societies, states, and economies of Asia, Europe, Africa, the Americas and Oceania.

HY 104 - WORLD HISTORY SINCE 1500

Semester Hours: 3

Explore global interdependence from the period of transoceanic exploration to the present. Trace cross-cultural interactions among societies, states, and economies of Asia, Europe, Africa, the Americas, and Oceania.

HY 221 - UNITED STATES TO 1877

Semester Hours: 3

Discovery of America through the Civil War and Reconstruction. Open to all students other than beginning freshmen, with exceptions as indicated.

HY 222 - UNITED STATES SINCE 1877

Semester Hours: 3

United States from the end of the Civil War era to the present. Open to all students other than beginning freshmen, with exceptions as indicated.

HY 300 - CRAFT OF HISTORY

Semester Hours: 3

Introduction to historical methods and thought, designed to prepare history majors for upper-level coursework. Required of all history majors, including transfer students. Open to non-history majors. Prerequisites: HY 103 and HY 104.

HY 306 - COLLAPSE OF CIVILIZATIONS

Semester Hours: 3

This course will investigate why some cultures succeed and others fail.

HY 310 - INTRODUCTION TO PUBLIC HISTORY

Semester Hours: 3

Introduces the interdisciplinary field of public history, including historic preservation, cultural resource management, local and state history, methodology, historical archaeology, museum studies, oral history, and archival management through academic training and practical experience.

HY 311 - HISTORIC ARCHAEOLOGY

Semester Hours: 3

Introduces intellectual and practical concepts using elements of research, fieldwork, analysis, and interpretation to explore and recreate the documented and undocumented past.

HY 312 - CULTURAL RESOURCE MANAGEMENT

Semester Hours: 3

Cultural resource management encompasses recognition description, maintenance, security, and overall management of historical items, places, and ideas through preservation and protection.

HY 318 - CONSTITUTIONAL HY OF THE U.S.

Semester Hours: 3

Growth and development of the American constitutional system with emphasis on those aspects, which relate to the fundamental structure of American government and social order.

HY 325 - HISTORY OF ALABAMA

Semester Hours: 3

The state's past from colonial times to the present with emphasis on its place in United States history.

HY 329 - IMPERIAL ROME

Semester Hours: 3

Roman Empire from the Principate to the barbarian invasions.

HY 331 - WORLD OF MIDDLE AGES

Semester Hours: 3

Survey of the origins and development of medieval society in Europe from the fall of Rome to the Age of Discovery, including the Latin West, Byzantium, and Islamic world.

HY 360 - AMERICAN HISTORY THROUGH FILM

Semester Hours: 3

This course will explore how motion pictures have shaped our views on American history and how the past has shaped movie making.

HY 363 - INDIGENOUS PEOPLES OF AMERICAS

Semester Hours: 3

Surveys the history of Indigenous peoples of the Americas from the fifteenth century to the present.

HY 367 - WOMEN IN U.S. HISTORY

Semester Hours: 3

Women in the United States from the colonial period to the present.

HY 368 - AMERICAN ENVIRONMENTAL HISTORY

Semester Hours: 3

Explores the interrelationship of people and the environment in American history from 1500 to the present.

HY 370 - TECHNOLOGY IN AMERICAN HISTORY

Semester Hours: 3

Explores the history of the interrelationship of people and technology in American history from 1600 to the present.

HY 371 - US MILITARY HY FRM INDP TO PRS

Semester Hours: 3

Explores the evolution of the U.S. military from the War of Independence to the present.

HY 373 - FOREIGN REL US TO 1920

Semester Hours: 3

American foreign relations from the Revolutionary era through World War I. American territorial and commercial expansion, imperialism, and emergence as a world power.

HY 381 - COLONIAL LATIN AMERICA

Semester Hours: 3

This course surveys the history of Colonial Latin America from the Hispanic period to the wars of independence in the nineteenth century.

HY 382 - MODERN LATIN AMERICAN

Semester Hours: 3

This course surveys the history of Latin America from the nineteenth century to the present.

HY 383 - FOOD AND WORLD HISTORY

Semester Hours: 3

Examines the role of food and drink in various historical settings.

HY 384 - ISLAMIC WORLD TO 1800

Semester Hours: 3

This course explores how Islam emerged as a civilization and connected geographic areas across the globe. Topics include: the prophet Muhammad; early Arab conquests; the Sunni-Shiite split; the expansion of the Islamic world into Europe, Africa, and Asia; and the challenge of European imperialism.

HY 385 - MODERN MIDDLE EAST

Semester Hours: 3

This course seeks to establish a historical basis for understanding the current events of the modern Middle East (1800-present). Topics include: the making of the modern Middle East both before and after WWI; the Arab-Israeli conflict; and the relationship between the U.S. and the Middle East.

HY 390 - WOMEN IN MODERN EUROPEAN HIS

Semester Hours: 3

Explores European women's history from the Enlightenment to the present. Focus on gender and women's roles in different historical contexts.

HY 391 - EUROPE, 1500-1815

Semester Hours: 3

Examination of the economic, scientific, social, political, and cultural developments in Europe from the Renaissance to the French Revolution.

HY 392 - EUROPE SINCE 1815

Semester Hours: 3

Europe from the French Revolution to the present.

HY 399 - SPECIAL TOPIC IN HISTORY

Semester Hours: 3

Intensive examination of particular problems, periods, or topics in history.

HY 401 - DAILY LIFE IN ANCIENT ROME

Semester Hours: 3

This course will re-create the daily lives of the ancient Romans using secondary readings, ancient literature, archaeology, and film. It focuses on the lives of ordinary people, with an eye to their struggles, everyday practices, beliefs, values, and mentalities.

HY 410 - SPEC TOPICS IN PUBLIC HISTORY

Semester Hours: 3

Intensive examination of a particular problem, aspect, or methodology in public history.

HY 413 - THE OLD SOUTH

Semester Hours: 3

Southern society, economics, politics and culture concentrating on the nineteenth century South through Reconstruction.

HY 414 - THE NEW SOUTH

Semester Hours: 3

Post-Reconstruction South emphasizing the economic, social, and political readjustments made during the twentieth century. Open to students who have completed 12 semester hours in history or have senior standing or have permission of instructor.

HY 424 - THE ATLANTIC WORLD

Semester Hours: 3

Examines interactions across the Atlantic Ocean among Africans, Americans, and Europeans. This course meets the requirements for either American or non-American credit in the history major.

HY 426 - COLONIAL AMERICA

Semester Hours: 3

Explores the founding of New World colonies, including political, social, economic, and religious developments during the colonial period.

HY 427 - AGE OF AMERICAN REVOLUTI

Semester Hours: 3

Explores the multinational connections and conflicts that lead some English colonists to revolt. Considers the political, social, and economic aspects of the time period.

HY 428 - EARLY AMERICAN REPUBLIC

Semester Hours: 3

Political, social, and economic changes between the American Revolution and the nineteenth century that laid the foundation for the United States.

HY 429 - CIVIL WAR & RECONSTRUCTION

Semester Hours: 3

An examination of the major political, economic, and social developments in the United States during the Civil War and Reconstruction eras.

HY 437 - THE RISE OF MODERN AMER

Semester Hours: 3

Economic and social changes, imperialism, and the growth in government in the United States from 1877 to the 1920s.

HY 438 - MODERN AMERICA

Semester Hours: 3

American society, politics, economics, and foreign affairs from the end of World War I to the origins of the Cold War.

HY 439 - RECENT AMERICAN HISTORY

Semester Hours: 3

Contemporary America from the 1950s to the present, analyzing both domestic and foreign affairs.

HY 440 - FOREIGN REL U.S. SINCE 1920

Semester Hours: 3

United States as a world power. American involvement in World War II, Vietnam, and the Cold War, and the growth of American presence in Asia, Latin America, and the Middle East.

HY 445 - COMPTVE MILITARY PLCY & STRAT

Semester Hours: 3

A comparative analysis of the military policy and strategy of states and empires in World History.

HY 451 - SCIENCE & RELIGION IN HISTORY

Semester Hours: 3

Integrated survey of the history of science and religion in mostly Western contexts from Greek. Antiquity to present debates. Prerequisites: HY 300.

HY 472 - US MILITARY HISTORY SINCE 1920

Semester Hours: 3

The evolution United States armed forces from 1920 to the present. The class will enhance understanding of the development and evolution of American strategy, doctrine, and operational issues.

HY 473 - U.S.-LATIN AMERICAN RELATIONS

Semester Hours: 3

This class focuses on the history of political, economic, and cultural interactions between Latin America and the United States from 1800 to the present. Topics include military intervention, trade, cultural exchanges, the Cold War, the drug war, and immigration.

HY 474 - RENAISSANCE & REFORMATION

Semester Hours: 3

Selected topics in the Italian Renaissance and European Reformation.

HY 475 - SECTARIANISM ISLAMIC WORLD

Semester Hours: 3

This course focuses on sectarianism, the practice and rhetoric surrounding marginalization of certain social-religious groups in the Islamic world. It explores the historical foundations of sectarianism (from early 7th century to today) both within the Islamic world and across the globe.

HY 476 - BEING YOUNG MODERN MIDDLE EAST

Semester Hours: 3

This course focuses on the lives of young men and women of the Modern Middle East. It explores how children and youth experienced historical phenomena in the region, the ways in which these experiences affected the foundations of their adulthood, and how their actions shaped historical events.

HY 480 - ROMANS&BARBARIANS LATE ANTIQTY

Semester Hours: 3

This course explores the dynamic world of Late Antiquity including political developments, social and religious transformation, and exchange patterns in the Mediterranean. It is a history of cultural interaction, continuity, and change during a formative period in western civilization.

HY 481 - EMPIRES AND NATIONS

Semester Hours: 3

Thematic focus on empires and nations as political and cultural constructs in European and world history. Students may take HY 481 more than once for credit ONLY IF 1) a different instructor teaches each offering, and 2) the temporal and/or geographic focus is distinct each time.

HY 482 - COMPTV SLAVERY & ABOLITION

Semester Hours: 3

Explore what slavery has meant in the ancient world, Indian Ocean, Africa, the United States, and/or other locations over time.

HY 483 - WOMEN & GENDER LATIN AMERICA

Semester Hours: 3

This course studies the history of women and gender relations in Latin America from the colonial period to the present.

HY 484 - LATIN AMERICAN HIST THRU FILM

Semester Hours: 3

Latin American history through the perspective of fictional films.

HY 485 - NAZI GERMANY AND THE HOLOCAUST

Semester Hours: 3

Seminar course on the historiography of Nazi Germany and the Holocaust.

HY 486 - COMMUNISM LEGACY RUSSIA EAST EU

Semester Hours: 3

Overview and analysis of communist states and post-communist legacies in Russia and Eastern Europe.

HY 490 - RESEARCH SEMINAR IN HY

Semester Hours: 3

Research and writing with primary sources and historiography. Required of all history majors. Prerequisites: HY 300. Offered once annually.

HY 492 - PUB MEMORY & INTERP

Semester Hours: 3

Examines how public memory is created by looking at the social, political, and economic forces that shape public history and considers how historical knowledge is conveyed to the public. Prerequisites: 6 hours in History or Instructor's Permission.

HY 493 - FUNDAMENTALS OF ARCHIVES

Semester Hours: 3

Survey of basic archival theory and practice, with emphasis on the role of the archivist in contemporary society.

HY 494 - DEVELOPING DIGITAL ARCHIVES

Semester Hours: 3

Survey of the theory and practice of developing digital access tools in archives, libraries, and museums.

HY 495 - PUBLIC HISTORY INTERNSHIP

Semester Hours: 3

A semester-long public history internship for completing a significant project using historical skills as a professional usually in an off-campus setting. Students must complete 125 hours of work during their internship. Permission of instructor or chair is required.

HY 498 - STUDIES IN HISTORY

Semester Hours: 1-3

A readings or research class on a particular problem, period or topic in history. This course may be repeated for credit.

HY 499 - INDEPENDENT STUDY

Semester Hours: 3

In exceptional circumstances, a student and professor may work together on a specialized topic.

History, BA

- History, BA requires 120 total credit hours.
- 6 semester hours in US history beyond HY 221 and HY 222.
- 6 semester hours in Non-US History beyond HY 103 and HY 104.
- Students should take HY 300 in their Sophomore year or, for transfer students, in their first semester at UAH.
- Students should take HY 490 in their Senior year.
- Three History courses (9 semester hours) at the 400 level.
- No more than two classes from the following count toward the major: HY 310, HY 311, HY 312, HY 410, HY 492, HY 493, HY 494, HY 495.
- Students in the History, BA are not permitted to take the Public History minor.
- 36 of 120 credit hours must be taken at 300 level or higher.
- Must have a 2.0 GPA in major, minor, and overall.
- No more than 6 credit hours of HPE may count in degree requirements.
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- No more than 60 credit hours from a two-year school can be applied toward a UAH degree.
- Any double counting of classes must be approved through the CAHS Academic Advising office.
- For graduation application instructions, see here (p. 812).

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S or WLC 101A or WLC 101F or WLC 101G or WLC 101J or WLC 101R	INTRO FOREIGN LANG I: SPANISH INTRO FOREIGN LANG I: ARABIC INTRO FOREIGN LANG I:FRENCH INTRO FOREIGN LANG I:GERMAN INTRO FOREIGN LANG I:JAPANESE INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S or WLC 102A or WLC 102F or WLC 102G or WLC 102J or WLC 102R	INTRO FOREIGN LANG II:SPANISH INTRO FOREIGN LANG II: ARABIC INTRO FOREIGN LANG II:FRENCH INTRO FOREIGN LANG II:GERMAN INTRO FOREIGN LANG II:JAPANESE INTRO FOREIGN LANG II:RUSSIAN	
WLC 201S or WLC 201A or WLC 201F or WLC 201G or WLC 201J or WLC 201R	INTERM FOREIGN LANG:SPANISH INTERM FOREIGN LANG I: ARABIC INTERM FOREIGN LANG:FRENCH INTERM FOREIGN LANG:GERMAN INTERM FOREIGN LANG: JAPANESE INTERM FOREIGN LANG:RUSSIAN	
WLC 202S or WLC 202A or WLC 202F or WLC 202G or WLC 202J or WLC 202R	INTERM FOREIGN LANG II:SPANISH INTERM FOREIGN LANG II: ARABIC INTERM FOREIGN LANG II:FRENCH INTERM FOREIGN LANG II:GERMAN INTERM FORGN LANG II:JAPANESE INTERM FOREIGN LANG II:RUSSIAN	
WLC 204	INTERNATIONAL CINEMA	
PHL 101	INTRODUCTION TO PHILOSOPHY	
PHL 102	INTRO TO ETHICS	

PHL 103	INTRODUCTION TO LOGIC
PHL 150	TECH, SCIENCE & HUMAN VALUES
WGS 200	INTRO WOMEN'S & GENDER STUDIES
AMS 229	ANCIENT & MEDIEVAL WORLDS
ARH 100	ARH SURV:ANCIENT-MEDIEVAL
ARH 101	ARH SURV:RENAISSANCE-MODERN
ARH 103	ARH SUR:NON-WESTERN TRADITIONS
ARS 160	DRAWING: FOUNDATIONS
TH 122	THEATRE APPRECIATION
TH 123	INTRO TO FILM STUDIES
MU 100	INTRO TO MUSIC LITERATURE

Area III: Mathematics and Sciences**11-12****Mathematics** **3-4**

MA 105	NATURE OF MATHEMATICS
MA 107	ALGEBRA WITH APPLICATIONS
MA 110	FINITE MATHEMATICS
MA 112	PRECALCULUS ALGEBRA
MA 113	PRECALCULUS TRIGONOMETRY
MA 115	PRECALCULUS ALGEBRA & TRIG
MA 120	MATH PROFESSIONAL APPLICATIONS
MA 171	CALCULUS A

Natural Sciences (Lab) **8**

AST 100	SURVEY OF ASTRONOMY
AST 106	EXPLORING THE COSMOS I
AST 107	EXPLORING THE COSMOS II
BYS 109	FUNDAMENTALS OF BIOLOGY
BYS 119	PRINCIPLES OF BIOLOGY
BYS 120	ORGANISMAL BIOLOGY
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB
ESS 103	ENVIRONMENTAL EARTH SCIENCE
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG
PH 100	CONCEPTUAL PHYSICS
PH 101	GENERAL PHYSICS I
PH 102	GENERAL PHYSICS II
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III

Area IV: History and Social and Behavioral Sciences***12****History** **3-6**

HY 103	WORLD HISTORY TO 1500
HY 104	WORLD HISTORY SINCE 1500
HY 221	UNITED STATES TO 1877

HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Sciences		6-9
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
ESS 105	WORLD REGIONAL GEOGRAPHY	
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS	
PY 101	GENERAL PSYCHOLOGY I	
PY 201	LIFE-SPAN DEVELOPMENT	
SOC 100	INTRO TO SOCIOLOGY	
SOC 102	ANALYSIS OF SOCIAL PROBLEMS	
SOC 103	INTRO TO CRIMINOLOGY	
SOC 105	INTRO CULTURAL ANTHROPOLOGY	

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). In Area V, take no more than six hours in a single discipline from Area II or Area IV. Area V should cover a breadth of disciplinary study.

Code	Title	Semester Hours
Pre-Professional		19
Choose one from WLC 101, 102, 201, or 202		
HY 221 and HY 222 will apply in Pre-Professional area and in HY major (they will not apply in Area IV above).		
Pre-professional Electives		
Choose 10 additional hours from Areas II, III, and IV listed above.		
History Courses		30
HY 221	UNITED STATES TO 1877	3
HY 222	UNITED STATES SINCE 1877	3
HY 300	CRAFT OF HISTORY	3
HY 490	RESEARCH SEMINAR IN HY	3
US History 300+ 6 semester hours		6
Non US History 300+ 6 semester hours		6
HY Electives 300+ 6 semester hours		6
Minor Courses		18+
Elective Courses		
Elective hours vary by program, please see advisor.		
Total Semester Hours		120

Additional Information

A student majoring in history will find a variety of programs of study enabling her or him to develop depth and breadth in history and related areas from the other humanities, the social sciences, mathematics, and the natural sciences. Counseling is available in the History Department for programs of study in the following:

- general
- secondary school teaching
- graduate school preparation
- pre-professional and pre-law preparation
- international studies
- public history
- and more

Students initiate the POS by meeting with the CAHS Academic Advisors and following up with a faculty advisor in the department to review and sign it. Note, that while a POS is a contract and maps out the selection of courses that a student needs to progress toward a degree, he or she can always change majors and/or minors, and even colleges, at any point.

Year 1

		Semester Hours
Fall		
HY 103	WORLD HISTORY TO 1500	3
EH 101	COLLEGE WRITING I	3
Math		3
Fine Arts		3
FYE 101	CHARGER SUCCESS	1
Term Semester Hours:		13
Spring		
HY 104	WORLD HISTORY SINCE 1500	3
EH 102	COLLEGE WRITING II	3
Humanities		3
Science w/Lab		4
Social/Behavioral Science		3
Term Semester Hours:		16

Year 2

Fall		
HY 221	UNITED STATES TO 1877	3
HY 300	CRAFT OF HISTORY	3
WLC 101		3
Science w/Lab		4
EH 207 or EH 208	READINGS LITERATURE/CULTURE I or READINGS LITERATURE/CULTURE 2	3
Term Semester Hours:		16
Spring		
HY 222	UNITED STATES SINCE 1877	3
Literature or Humanities		3
Social/Behavioral Science		3
Area V Course		3
HY 200+ Course		3
Term Semester Hours:		15

Year 3

Fall		
HY 300+		3
HY 300+		3
Elective		3
Area V Course		3
Minor Course		3
Term Semester Hours:		15
Spring		
HY 300+		3
HY 300+		3
Area V Course		3
Minor Courses		6
Term Semester Hours:		15

Year 4

Fall		
HY 300+		3
HY 300+		3

Elective		3
Minor Course		3
Area V Course		3
Term Semester Hours:		15
Spring		
HY 490	RESEARCH SEMINAR IN HY	3
Elective		3
Minor Courses		9
Term Semester Hours:		15
Total Semester Hours:		120

History Minor

A history minor must take a minimum of 21 semester hours of history including:

Code	Title	Semester Hours
6 Hours HY Sequence: choose one sequence from below		6
HY 103 & HY 104	WORLD HISTORY TO 1500 and WORLD HISTORY SINCE 1500	
HY 221 & HY 222	UNITED STATES TO 1877 and UNITED STATES SINCE 1877	
3 semester hours HY 200+ level		3
12 semester hours HY 300+ level		12
Total Hours		21

Public History Minor

The UAH Public History program is designed for students who are interested in careers presenting historical knowledge outside the classroom to a public audience. The minor is inter-disciplinary because public history expresses itself in various ways. It is found, for example, in museum shows, photography and works of art, tour guide brochures, video documentaries, web sites, historic preservation, writing, and artifact collection. It is also inter-disciplinary because public historians have diverse careers working in archives and libraries, state and local historical organizations, museums, historic sites, media, businesses, and throughout all levels of government.

The goal of advising will be selection of a range of courses that will fit the student's interests and broaden skills and knowledge outside the major and beyond departmental minors. The Public History Advisor will help develop a thematic focus for the minor plan of study and help choose electives that support its fulfillment.

No History/History Education major is permitted to do a Public History minor.

Public History Minor requires a minimum of 21 semester hours, at least 12 semester hours at 300 level or above and must be taken at UAH. No more than one 100-level class may count toward the minor.

Code	Title	Semester Hours
Public History Electives		6
select 6 hours of the following:		
HY 310	INTRODUCTION TO PUBLIC HISTORY	
HY 311	HISTORIC ARCHAEOLOGY	
HY 312	CULTURAL RESOURCE MANAGEMENT	
HY 410	SPEC TOPICS IN PUBLIC HISTORY	
HY 492	PUB MEMORY & INTERP	
HY 493	FUNDAMENTALS OF ARCHIVES	
HY 494	DEVELOPING DIGITAL ARCHIVES	
HY 498	STUDIES IN HISTORY	
Interdisciplinary Electives		6
Select 6 semester hours of the following:		

ARS 230	GRAPHIC DESIGN: INTRODUCTION	
ARS 250	PHOTOGRAPHY: INTRODUCTION	
ARS 332	GRAPHIC DESIGN: WEB DESIGN	
CM 113	Intro to Rhetorical Communication	
CM 205	INTRO TO JOURNALISM	
CM 251	DECISION-MAKING IN SMALL GROUP	
CM 313	BUSINESS & PROFESSIONAL COMM	
CM 405	ADVANCED MEDIA WRITING	
CM 430	MASS MEDIA IN AMERICA	
CM 444	ADVERTISING	
EH 300	STRATEGIES FOR BUSINESS WRIT'G	
EH 301	TECHNICAL WRITING	
EH 302	TECHNICAL EDITING	
MKT 301	PRINCIPLES OF MARKETING	
TH 360	VIDEO PRODUCTION II	
Historical-Cultural Electives		6
Select 6 semester hours from these recommended departments: ARH, HY, SOC, PSC		
Internship		3
Select one of the following:		
HY 495	PUBLIC HISTORY INTERNSHIP	
ARS 492	ART INTERNSHIP	
Total Semester Hours		21

Music

Roberts Hall B102
 Telephone: 256.824.6436
 Email: music@uah.edu

The University of Alabama in Huntsville is an accredited institutional member of the National Association of Schools of Music.

Students are advised to officially declare a major and to obtain a Program of Study by the beginning of the sophomore year, if not before. Students may initiate the Program of Study by meeting with the College of Arts, Humanities, and Social Sciences Academic Advisor.

Degrees offered:

Music, BA

Students wishing to pursue a major in music should have **pre-college training in their principal performing instrument or voice and have ability to read music fluently**. Basic keyboard ability is helpful but not mandatory.

Entering freshmen and transferring students are required to take a placement examination in rudiments (scales, keys, intervals, triads, general notation), music reading, and performance (principal instrument or voice). Deficiencies may be removed through remedial instruction.

The University of Alabama in Huntsville offers a Bachelor of Arts in Music with several different emphases. Students choose one (or more) of these emphases:

- Liberal Arts Emphasis (p. 135)
- Performance Emphasis (p. 152)
- Jazz Emphasis (p. 131)
- Music Technology Emphasis (p. 148)
- Music Business Emphasis (p. 140)
- Church Music Emphasis (p. 128)
- Piano Pedagogy Emphasis (p. 155)
- Music Education Emphasis (p. 143)

Entry Requirements for Music Majors and Minors

Admission to the University of Alabama in Huntsville does not guarantee admission to the UAH Department of Music. Auditions are required for all applicants majoring or minoring in music. The audition is one of the most important factors in the admission process. It will determine admission to the Department of Music as well as eligibility for a music scholarship. Those who have not auditioned and been accepted as music majors may not take studio instruction at the 200-level.

All applicants are strongly encouraged to audition in person. Video auditions are acceptable if travel distance precludes a personal audition. For audition dates, please consult the audition application or visit the Department of Music website at www.uah.edu/music (<http://www.uah.edu/music/>).

Majors in Music

- Music, BA - Liberal Arts Emphasis (p. 135)
- Music, BA - Performance Emphasis (p. 152)
- Music, BA - Jazz Emphasis (p. 131)
- Music, BA - Music Technology Emphasis (p. 148)
- Music, BA - Music Business Emphasis (p. 140)
- Music, BA - Church Music Emphasis (p. 128)
- Music, BA - Piano Pedagogy Emphasis (p. 155)
- Music, BA - Music Education Emphasis (p. 143)

Minors in Music

- Film and Media Arts (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/music/film-and-media-arts-minor/>)
- Music (p. 159)
- Music Technology (p. 159)

MU 100 - INTRO TO MUSIC LITERATURE

Semester Hours: 3

Basic music appreciation. Exploration of ideas and issues in various types of western music through reading, listening, and discussion. Offered every semester.

MU 102 - INTRODUCTION TO WORLD MUSIC

Semester Hours: 3

Exploration of ideas and issues in various types of non-Western music through reading, listening, and discussion. Includes optional travel abroad. Offered summer semesters only.

MU 106 - INTRO TO MUSIC TECHNOLOGY

Semester Hour: 1

Introduction to Music Technology provides students with an overview of the technical and scientific aspects of music such as: acoustics, music psychology/sociology, and modern electronics. There will be particular emphasis on the use of electronic devices, MIDI and computer software to facilitate recording, playback, composition, storage, performance and analysis. Offered Fall and Spring semesters only.

MU 108 - INTRODUCTION TO MUSIC THEORY

Semester Hours: 3

Music fundamentals presented in a practical way for students who have no musical training as well as for majors/minors with limited theory knowledge. Mechanical aspects of clefs, notation, scales, intervals, chords, and rhythm with some aural skills, and practice in writing and harmonizing melodies. For students who expect to major or minor in music, this course may not be taken for degree credit. Offered Summer and Fall semesters only.

MU 110 - INTRO ARTS MANAGEMENT

Semester Hours: 3

Designed to explore arts management and administration, focusing primarily on non-profit considerations, but also addressing commercial activities in the arts.

MU 120 - BEGINNING CLASS VOICE

Semester Hour: 1

This course is designed to aid beginning singers in learning the fundamentals of solo singing.

MU 130 - PIANO CLASS

Semester Hour: 1

Techniques of performance, note reading, and basic musicianship.

MU 131 - PIANO CLASS II

Semester Hour: 1

MU 140 - BEGINNING GUITAR CLASS

Semester Hour: 1

The course objective is to provide basic guitar instruction for students who have had little or no experience playing the guitar. The course will cover note reading, posture, chords, strumming patterns, simple arpeggios, scales, and simple to intermediate solo playing.

MU 199 - MUSIC FORUM

Semester Hours: 0

Concert attendance is an indispensable aspect of a student's music education. Attendance requirements for this course include Thursday morning Music Forums as well as the number of formal concerts specified in the syllabus.

MU 201 - MUSIC THEORY I

Semester Hours: 3

Fundamentals of basic musicianship through practical as well as theoretical studies. Development of skills in written harmony and analysis. Appropriate Musicianship skills (e.g. MU 203) to be taken concurrently throughout theory program. Prerequisites: The approval of instructor or department chair. Offered Spring semesters only.

MU 202 - MUSIC THEORY II

Semester Hours: 3

Continuation of MU 201. Offered Fall semesters only. Prerequisites: MU 201 and MU 203.

MU 203 - MUSICIANSHIP SKILLS I

Semester Hour: 1

To be taken concurrently with MU 201 and designed to complement written studies. Exercises in sight singing using solfege, numbers or other systems. Basic conducting patterns, rhythmic execution and melodic, harmonic, and rhythmic dictation. Prerequisites: Approval of instructor or department chair. Offered Spring semesters only.

MU 204 - MUSICIANSHIP SKILLS II

Semester Hour: 1

Continuation of MU 203. Offered Fall semesters only. Prerequisites: MU 201 and MU 203.

MU 205 - JAZZ THEORY

Semester Hours: 2

This course serves as an introduction to the theoretical analysis of jazz harmony, with an emphasis on styles from the bebop era and later. Offered every other Fall semester. Prerequisites: MU 201.

MU 207 - MUSIC TECHNOLOGY I

Semester Hours: 3

Students will learn the basics of using a computer interface to create and edit music, using a software MIDI sequencer and Digital Audio Workstation. Students will learn the basics of MIDI sequencing and music production. Prerequisites: MU 106.

MU 208 - MUSIC TECHNOLOGY II

Semester Hours: 3

Students will learn advanced techniques in digital audio production, including (but not limited to): Advanced MIDI sequencing, audio sampling, and production/mastering. Prerequisites: MU 106, MU 207.

MU 301 - THEORY OF MUSIC III

Semester Hours: 3

A study on chromatic harmony and a continuation of the studies of MU 201 and MU 202. Prerequisites: MU 202 and MU 204.

MU 302 - MUSICAL MATLS OF MODERN ERA

Semester Hours: 3

Systems of tonal organization, compositional procedures, terminology, and analytical methods that related to music since 1900. Offered every other Fall semester only. Prerequisites: MU 301 and MU 303 and MU 304.

MU 303 - MUSICIANSHIP SKILLS III

Semester Hour: 1

Continuation of MU 204. Offered Spring semesters only. Prerequisites: MU 202 and MU 204.

MU 305 - MUSIC TECHNOLOGY III

Semester Hours: 3

This course will focus primarily on analogue and digital audio systems setup and implementation. Mixing consoles, amplifiers, loudspeakers, microphones, keyboards, playback equipment, processing, cabling, configuration, computer hardware and software will be discussed and demonstrated in depth. Prerequisite: MU 106.

MU 306 - MUSIC TECHNOLOGY IV

Semester Hours: 3

An exploration of music technology hardware and software, including an overview of acoustics, MIDI and digital audio data structures, and an introduction to multimedia authoring. Offered every other Spring semester only. Prerequisites: MU 106.

MU 311 - HISTORY OF MUSIC I

Semester Hours: 3

Focus on music as an art in western civilization to 1750. Representative musical works and style. Understanding of musical concepts in view of historical background and cultural context. Offered Fall semesters only. Prerequisites: MU 100 and MU 301.

MU 312 - HISTORY OF MUSIC II

Semester Hours: 3

Focus on music as an art in western civilization from 1750 to the present. Representative musical works and style. Understanding of musical concepts in view of historical background and cultural context. Offered Spring semesters only. Prerequisites: MU 100 and MU 301.

MU 313 - SURVEY OF CHURCH MUSIC

Semester Hours: 3

Explores Christian music from historical and musical perspectives. Prerequisites: MU 100 and MU 301.

MU 314 - THE BEATLES

Semester Hours: 3

The purpose of this course is to familiarize the student with the music, lyrics, recordings, personal and public lives, production techniques, career strategy, social ramifications, and technological impact of the musical group known as The Beatles. The course will provide the student with an appreciation for the music itself, and a broader comprehension of the social, economic, political, and cultural upheavals that gave rise to the musical trends of the Sixties.

MU 316 - HIST & APPRECIATION OF JAZZ

Semester Hours: 3

This course is designed to explore the history and development of jazz as an art form, from its origins as popular music to its evolution into an Art Music. Improvisation will be explained and explored in the context of the different styles of jazz. The course will focus on understanding through listening to jazz. Every other spring semester only. Prerequisite: MU 100.

MU 317 - JAZZ ARRANGING

Semester Hours: 2

This course provides the student with instruction in arranging for small and large jazz ensembles, both instrumental and vocal. Offered every other Spring semester only. Prerequisite: MU 205.

MU 320 - PIANO PEDAGOGY

Semester Hours: 2

Materials, techniques, and practices in teaching beginners and students through lower advanced grades of piano. Practical experience. Offered upon demand. Prerequisite: approval of instructor.

MU 321 - PIANO PEDAGOGY II

Semester Hours: 2

An examination of relevant methods in piano pedagogy and technique for all levels of instruction. The course will also assess the historical achievements made by previous pedagogues in the field of piano pedagogy. Prerequisite: MU 320.

MU 322 - DICTION FOR SINGERS

Semester Hours: 2

Intended as an overview for vocal and choral students who wish to learn the diction requirements for singing in Latin, Italian, German, French, and English. Offered every Fall semester only. Prerequisite: MUA 111.

MU 325 - CONDUCTING

Semester Hours: 2

Basic techniques of choral and instrumental conducting. Offered Fall semesters only. Prerequisite: MU 301.

MU 399 - SPECIAL TOPICS IN MUSIC

Semester Hours: 3

Special topics in music. Focus and emphasis of topics announced in advance. Offered upon demand.

MU 401 - FORM AND ANALYSIS

Semester Hours: 2

Musical forms and analysis. Offered every other Fall semester only. Prerequisites: MU 303 and 312.

MU 402 - CHURCH MUSIC METDS, MATRL & AD

Semester Hours: 3

Church Music Methods, Materials, and Administration. Prerequisite: MU 301.

MU 404 - MUSIC TECHNOLOGY INDIV PROJECT

Semester Hour: 1

Three-semester sequence for students enrolled in music technology majors and minors. Students will create individual projects in MIDI, sound creation and editing, and multimedia. Prerequisite: MU 306.

MU 406 - INTERNSHIP IN MUSIC TECHNOLOGY

Semester Hours: 3

An internship of eight hours per week working in the music technology industry. Offered upon demand. Prerequisite: MU 306.

MU 407 - INTERNSHIP MUSIC BUSINESS

Semester Hours: 3

Internship in Music Business. Prerequisites: MU 100 and MU 110 and MU 301 and MKT 301 and MGT 301 and FIN 410.

MU 408 - INTERNSHIP CHURCH MUSIC

Semester Hours: 3

An internship of nine hours per week working in church music. Prerequisites: MU 100 and MU 301 and MU 313 and MU 402 and MUE 328.

MU 409 - INTERNSHIP GRP PIANO PEDAGOGY

Semester Hour: 1

An internship of three hours per week working with an approved group piano program. Prerequisites: MU 100 and MU 321 and MU 420 and MUE 328.

MU 410 - INTERNSHIP INDIVID PIANO PEDAG

Semester Hours: 3

An internship of nine hours per week working with a local piano teacher. Prerequisites: MU 100 and MU 321 and MU 420 and MUE 328.

MU 411 - INTNSHIP INDVL PIANO PEDAGOGY

Semester Hours: 3

Courses of study and activity developed by the student and submitted to music faculty for approval. Projects to reinforce learning and performance experiences. May be repeated, but no more than two hours count toward degree requirements. Offered upon demand. Prerequisites: MU 100 and MU 321 and MU 420 and MUE 328.

MU 416 - ORCHESTRATION

Semester Hours: 2

Instruments of the band and orchestra, their ranges, transpositions, and capabilities. Practical experience in arranging for instruments. Offered every other Fall semester only. Prerequisite: MU 302.

MU 420 - PIANO LITERATURE

Semester Hours: 2

Music for string keyboard instruments from the pre-pianoforte period to the present. Representative works from all periods. Offered upon demand.

Prerequisites: MU 302 and MU 304 and MU 312.

MU 425 - ADVANCED CONDUCTING

Semester Hours: 2

Review of basic conducting patterns. Emphasis on communication as the role of the conductor. Detailed score preparation. Offered every other Spring semester only. Prerequisite: MU 325.

MU 440 - STUDIO INSTR-VOICE

Semester Hours: 0.5

Music, BA - Church Music Emphasis

The Bachelor of Arts in Music with an Emphasis in Church Music includes the standard College of Liberal Arts General Education Requirements, the Music Core, an additional 21 semester hours of music, sociology, and psychology coursework, and electives to total 120 semester hours. The core of this emphasis is a traditional music degree, with the same 'classical' performance requirements as in the other music emphases. Students with an interest in church music will benefit from the degree offering.

- Music, BA requires 120 credit hours.
- No minor is required.
- Must have a 2.0 GPA in major and overall.
- No more than 6 credit hours of HPE may count in degree requirements.
- 36 of 120 credit hours must be taken at 300 level or higher.
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- No more than 60 credit hours from a two-year school can be applied toward a UAH degree.
- All double counting of classes must be approved through the CAHS Academic Advising Office.
- For graduation application instructions, see here (p. 812).

Degree Requirements:

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6

CM 113	Intro to Rhetorical Communication
WLC 101S	INTRO FOREIGN LANG I: SPANISH
or WLC 101A	INTRO FOREIGN LANG I: ARABIC
or WLC 101F	INTRO FOREIGN LANG I:FRENCH
or WLC 101G	INTRO FOREIGN LANG I:GERMAN
or WLC 101J	INTRO FOREIGN LANG I:JAPANESE
or WLC 101R	INTRO FOREIGN LANG I:RUSSIAN
WLC 102S	INTRO FOREIGN LANG II:SPANISH
or WLC 102A	INTRO FOREIGN LANG II: ARABIC
or WLC 102F	INTRO FOREIGN LANG II:FRENCH
or WLC 102G	INTRO FOREIGN LANG II:GERMAN
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN
WLC 201S	INTERM FOREIGN LANG:SPANISH
or WLC 201A	INTERM FOREIGN LANG I: ARABIC
or WLC 201F	INTERM FOREIGN LANG:FRENCH
or WLC 201G	INTERM FOREIGN LANG:GERMAN
or WLC 201J	INTERM FOREIGN LANG: JAPANESE
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN
WLC 202S	INTERM FOREIGN LANG II:SPANISH
or WLC 202A	INTERM FOREIGN LANG II: ARABIC
or WLC 202F	INTERM FOREIGN LANG II:FRENCH
or WLC 202G	INTERM FOREIGN LANG II:GERMAN
or WLC 202J	INTERM FORGN LANG II:JAPANESE
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN
WLC 204	INTERNATIONAL CINEMA
PHL 101	INTRODUCTION TO PHILOSOPHY
PHL 102	INTRO TO ETHICS
PHL 103	INTRODUCTION TO LOGIC
PHL 150	TECH, SCIENCE & HUMAN VALUES
WGS 200	INTRO WOMEN'S & GENDER STUDIES
AMS 229	ANCIENT & MEDIEVAL WORLDS
ARH 100	ARH SURV:ANCIENT-MEDIEVAL
ARH 101	ARH SURV:RENAISSANCE-MODERN
ARH 103	ARH SUR:NON-WESTERN TRADITIONS
ARS 160	DRAWING: FOUNDATIONS
TH 122	THEATRE APPRECIATION
TH 123	INTRO TO FILM STUDIES
MU 100	INTRO TO MUSIC LITERATURE

Area III: Mathematics and Sciences**11-12****Mathematics****3-4**

MA 105	NATURE OF MATHEMATICS
MA 107	ALGEBRA WITH APPLICATIONS
MA 110	FINITE MATHEMATICS
MA 112	PRECALCULUS ALGEBRA
MA 113	PRECALCULUS TRIGONOMETRY
MA 115	PRECALCULUS ALGEBRA & TRIG
MA 120	MATH PROFESSIONAL APPLICATIONS
MA 171	CALCULUS A

Natural Sciences (Lab)**8**

AST 100	SURVEY OF ASTRONOMY
AST 106	EXPLORING THE COSMOS I

AST 107	EXPLORING THE COSMOS II	
BYS 109	FUNDAMENTALS OF BIOLOGY	
BYS 119	PRINCIPLES OF BIOLOGY	
BYS 120	ORGANISMAL BIOLOGY	
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I	
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB	
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB	
ESS 103	ENVIRONMENTAL EARTH SCIENCE	
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG	
PH 100	CONCEPTUAL PHYSICS	
PH 101	GENERAL PHYSICS I	
PH 102	GENERAL PHYSICS II	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	
Area IV: History and Social and Behavioral Sciences*		12
History		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Sciences		6-9
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
ESS 105	WORLD REGIONAL GEOGRAPHY	
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS	
PY 101	GENERAL PSYCHOLOGY I	
PY 201	LIFE-SPAN DEVELOPMENT	
SOC 100	INTRO TO SOCIOLOGY	
SOC 102	ANALYSIS OF SOCIAL PROBLEMS	
SOC 103	INTRO TO CRIMINOLOGY	
SOC 105	INTRO CULTURAL ANTHROPOLOGY	

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV).

Code	Title	Semester Hours
Pre-Professional Courses		3
WLC 101, 102, 201, or 202		
Music Core		40
The Music Core consists of a common 40 semester hours of music courses that are included in every Bachelor of Arts degree in Music.		

MU 100	INTRO TO MUSIC LITERATURE	3
Principal Instrument		9
MUA 200-level		
MUA 300-level		
MUA 400-level		
MUA 498	SENIOR RECITAL	
Music Theory		12
MU 201	MUSIC THEORY I	
MU 203	MUSICIANSHIP SKILLS I	
MU 202	MUSIC THEORY II	
MU 204	MUSICIANSHIP SKILLS II	
MU 301	THEORY OF MUSIC III	
MU 303	MUSICIANSHIP SKILLS III	
Ensembles ¹		7
MUX 300-level		
Additional Music Requirements		9
MU 106	INTRO TO MUSIC TECHNOLOGY	
MU 311	HISTORY OF MUSIC I	
MU 312	HISTORY OF MUSIC II	
MU 325	CONDUCTING	
Music Forum		0
Students must pass this course 7 times, transfer students must pass this course for every semester they are in enrolled as a Music major at UAH		
MU 199	MUSIC FORUM	
Church Music Emphasis		21
MU 313	SURVEY OF CHURCH MUSIC	
MU 402	CHURCH MUSIC METDS, MATRL & AD	
MU 408	INTERNSHIP CHURCH MUSIC	
MUA 111 & MUA 121	STUDIO INSTR-VOICE and STUDIO INSTR-ORGAN	
MUE 328	TEACHING GENERAL MUSIC	
PHL 314	ASIAN PHILOSOPHY	
SOC 375	SOCIAL PSYCHOLOGY	
Elective Courses		
Elective hours vary by program, see advisor.		
Total Semester Hours		120

¹ Must include at least one hour of MUX 396. 4 of the 7 hours should be conducted ensembles.

Music, BA - Jazz Emphasis

The Bachelor of Arts in Music with an Emphasis in Jazz includes the standard College of Liberal Arts General Education Requirements, the Music Core, an additional 25 semester hours of music coursework, and electives to total 120 semester hours. The core of this emphasis is a traditional music degree, with the same "classical" performance requirements as in the other music emphases. Students desiring additional studies in jazz beyond the standard music major will benefit from this degree offering.

- Music, BA requires 120 credit hours.
- No minor is required.
- Must have a 2.0 GPA in major and overall.
- No more than 6 credit hours of HPE may count in degree requirements.
- 36 of 120 credit hours must be taken at 300 level or higher.
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- No more than 60 credit hours from a two-year school can be applied toward a UAH degree.

- All double counting of classes must be approved through the CAHS Academic Advising Office.
- For graduation application instructions, see here (p. 812).

Degree Requirements:

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S or WLC 101A or WLC 101F or WLC 101G or WLC 101J or WLC 101R	INTRO FOREIGN LANG I: SPANISH INTRO FOREIGN LANG I: ARABIC INTRO FOREIGN LANG I:FRENCH INTRO FOREIGN LANG I:GERMAN INTRO FOREIGN LANG I:JAPANESE INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S or WLC 102A or WLC 102F or WLC 102G or WLC 102J or WLC 102R	INTRO FOREIGN LANG II:SPANISH INTRO FOREIGN LANG II: ARABIC INTRO FOREIGN LANG II:FRENCH INTRO FOREIGN LANG II:GERMAN INTRO FOREIGN LANG II:JAPANESE INTRO FOREIGN LANG II:RUSSIAN	
WLC 201S or WLC 201A or WLC 201F or WLC 201G or WLC 201J or WLC 201R	INTERM FOREIGN LANG:SPANISH INTERM FOREIGN LANG I: ARABIC INTERM FOREIGN LANG:FRENCH INTERM FOREIGN LANG:GERMAN INTERM FOREIGN LANG: JAPANESE INTERM FOREIGN LANG:RUSSIAN	
WLC 202S or WLC 202A or WLC 202F or WLC 202G or WLC 202J or WLC 202R	INTERM FOREIGN LANG II:SPANISH INTERM FOREIGN LANG II: ARABIC INTERM FOREIGN LANG II:FRENCH INTERM FOREIGN LANG II:GERMAN INTERM FORGN LANG II:JAPANESE INTERM FOREIGN LANG II:RUSSIAN	

WLC 204	INTERNATIONAL CINEMA
PHL 101	INTRODUCTION TO PHILOSOPHY
PHL 102	INTRO TO ETHICS
PHL 103	INTRODUCTION TO LOGIC
PHL 150	TECH, SCIENCE & HUMAN VALUES
WGS 200	INTRO WOMEN'S & GENDER STUDIES
AMS 229	ANCIENT & MEDIEVAL WORLDS
ARH 100	ARH SURV:ANCIENT-MEDIEVAL
ARH 101	ARH SURV:RENAISSANCE-MODERN
ARH 103	ARH SUR:NON-WESTERN TRADITIONS
ARS 160	DRAWING: FOUNDATIONS
TH 122	THEATRE APPRECIATION
TH 123	INTRO TO FILM STUDIES
MU 100	INTRO TO MUSIC LITERATURE

Area III: Mathematics and Sciences**11-12**

Mathematics	3-4
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MA 105	NATURE OF MATHEMATICS
MA 107	ALGEBRA WITH APPLICATIONS
MA 110	FINITE MATHEMATICS
MA 112	PRECALCULUS ALGEBRA
MA 113	PRECALCULUS TRIGONOMETRY
MA 115	PRECALCULUS ALGEBRA & TRIG
MA 120	MATH PROFESSIONAL APPLICATIONS
MA 171	CALCULUS A

Natural Sciences (Lab)	8
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AST 100	SURVEY OF ASTRONOMY
AST 106	EXPLORING THE COSMOS I
AST 107	EXPLORING THE COSMOS II
BYS 109	FUNDAMENTALS OF BIOLOGY
BYS 119	PRINCIPLES OF BIOLOGY
BYS 120	ORGANISMAL BIOLOGY
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB
ESS 103	ENVIRONMENTAL EARTH SCIENCE
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG
PH 100	CONCEPTUAL PHYSICS
PH 101	GENERAL PHYSICS I
PH 102	GENERAL PHYSICS II
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III

Area IV: History and Social and Behavioral Sciences***12**

History	3-6
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HY 103	WORLD HISTORY TO 1500
HY 104	WORLD HISTORY SINCE 1500
HY 221	UNITED STATES TO 1877
HY 222	UNITED STATES SINCE 1877

Social and Behavioral Sciences 6-9

ECN 142	PRINC OF MACROECONOMICS
ECN 143	PRINC OF MICROECONOMICS
GS 200	GLOBAL SYSTEMS AND CULTURES
ESS 105	WORLD REGIONAL GEOGRAPHY
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY
PSC 101	INTRO TO AMERICAN GOVERNMENT
PSC 102	INTRO TO COMPARATIVE POLITICS
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS
PY 101	GENERAL PSYCHOLOGY I
PY 201	LIFE-SPAN DEVELOPMENT
SOC 100	INTRO TO SOCIOLOGY
SOC 102	ANALYSIS OF SOCIAL PROBLEMS
SOC 103	INTRO TO CRIMINOLOGY
SOC 105	INTRO CULTURAL ANTHROPOLOGY

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV).

Code	Title	Semester Hours
Pre-Professional Courses		3
WLC 101, 102, 201, or 202		
Music Core		40
The Music Core consists of a common 40 semester hours of music courses that are included in every Bachelor of Arts degree in Music.		
MU 100	INTRO TO MUSIC LITERATURE	3
Principal Instrument		9
MUA 200-level		
MUA 300-level		
MUA 400-level		
MUA 498	SENIOR RECITAL	
Music Theory		12
MU 201	MUSIC THEORY I	
MU 203	MUSICIANSHIP SKILLS I	
MU 202	MUSIC THEORY II	
MU 204	MUSICIANSHIP SKILLS II	
MU 301	THEORY OF MUSIC III	
MU 303	MUSICIANSHIP SKILLS III	
Ensembles ¹		7
MUX 300-level		
Additional Music Requirements		9
MU 106	INTRO TO MUSIC TECHNOLOGY	
MU 311	HISTORY OF MUSIC I	
MU 312	HISTORY OF MUSIC II	
MU 325	CONDUCTING	
Music Forum		0
Students must pass this course 7 times, transfer students must pass this course for every semester they are in enrolled as a Music major at UAH		
MU 199	MUSIC FORUM	
Jazz Emphasis		25

MUJ 200 level, at least 3 semesters		4.5
MUJ 498	SENIOR JAZZ RECITAL	1.5
MUX 389	UAH JAZZ ENSEMBLE (At least four semesters)	1
MUX 386	JAZZ CHAMBER ENSEMBLES (At least four semesters)	0.5
MUJ 205	JAZZ THEORY	2
MU 317	JAZZ ARRANGING	2
MUJ 308	JAZZ IMPROVISATION I	2
MUJ 309	JAZZ IMPROVISATION II	2
MU 316	HIST & APPRECIATION OF JAZZ	3
MUJ 131	JAZZ STUDIO INSTR-PIANO (At least two semesters)	2
Elective Courses		18+
Elective hours vary by program, see advisor.		
Total Semester Hours		120

¹ Must include at least one hour of MUX 396. 4 of the 7 hours, should be conducted ensembles.

Music, BA - Liberal Arts Emphasis

The Bachelor of Arts in Music with an Emphasis in Liberal Arts includes the General Education Requirements, the Music Core, a minor (or second major) in a discipline other than music, and electives to total 120 semester hours. This emphasis serves as a traditional liberal arts education. Students with dual interests and abilities will benefit from this degree offering.

- Music, BA requires 120 credit hours.
- 36 of 120 credit hours must be taken at 300 level or higher.
- Must have a 2.0 GPA in major, minor, and overall.
- No more than 6 credit hours of HPE may count in degree requirements.
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- No more than 60 credit hours from a two-year school can be applied toward a UAH degree.
- All double counting of classes must be approved through the CAHS Academic Advising Office.
- For graduation application instructions, see here (p. 812).

Degree Requirements:

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	

EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S	INTRO FOREIGN LANG I: SPANISH	
or WLC 101A	INTRO FOREIGN LANG I: ARABIC	
or WLC 101F	INTRO FOREIGN LANG I:FRENCH	
or WLC 101G	INTRO FOREIGN LANG I:GERMAN	
or WLC 101J	INTRO FOREIGN LANG I:JAPANESE	
or WLC 101R	INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S	INTRO FOREIGN LANG II:SPANISH	
or WLC 102A	INTRO FOREIGN LANG II: ARABIC	
or WLC 102F	INTRO FOREIGN LANG II:FRENCH	
or WLC 102G	INTRO FOREIGN LANG II:GERMAN	
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE	
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN	
WLC 201S	INTERM FOREIGN LANG:SPANISH	
or WLC 201A	INTERM FOREIGN LANG I: ARABIC	
or WLC 201F	INTERM FOREIGN LANG:FRENCH	
or WLC 201G	INTERM FOREIGN LANG:GERMAN	
or WLC 201J	INTERM FOREIGN LANG: JAPANESE	
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN	
WLC 202S	INTERM FOREIGN LANG II:SPANISH	
or WLC 202A	INTERM FOREIGN LANG II: ARABIC	
or WLC 202F	INTERM FOREIGN LANG II:FRENCH	
or WLC 202G	INTERM FOREIGN LANG II:GERMAN	
or WLC 202J	INTERM FORGN LANG II:JAPANESE	
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN	
WLC 204	INTERNATIONAL CINEMA	
PHL 101	INTRODUCTION TO PHILOSOPHY	
PHL 102	INTRO TO ETHICS	
PHL 103	INTRODUCTION TO LOGIC	
PHL 150	TECH, SCIENCE & HUMAN VALUES	
WGS 200	INTRO WOMEN'S & GENDER STUDIES	
AMS 229	ANCIENT & MEDIEVAL WORLDS	
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Area III: Mathematics and Sciences		11-12
Mathematics		3-4
MA 105	NATURE OF MATHEMATICS	
MA 107	ALGEBRA WITH APPLICATIONS	
MA 110	FINITE MATHEMATICS	
MA 112	PRECALCULUS ALGEBRA	
MA 113	PRECALCULUS TRIGONOMETRY	
MA 115	PRECALCULUS ALGEBRA & TRIG	
MA 120	MATH PROFESSIONAL APPLICATIONS	
MA 171	CALCULUS A	

Natural Sciences (Lab)

8

AST 100	SURVEY OF ASTRONOMY
AST 106	EXPLORING THE COSMOS I
AST 107	EXPLORING THE COSMOS II
BYS 109	FUNDAMENTALS OF BIOLOGY
BYS 119	PRINCIPLES OF BIOLOGY
BYS 120	ORGANISMAL BIOLOGY
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB
ESS 103	ENVIRONMENTAL EARTH SCIENCE
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG
PH 100	CONCEPTUAL PHYSICS
PH 101	GENERAL PHYSICS I
PH 102	GENERAL PHYSICS II
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III

Area IV: History and Social and Behavioral Sciences***12**

History

3-6

HY 103	WORLD HISTORY TO 1500
HY 104	WORLD HISTORY SINCE 1500
HY 221	UNITED STATES TO 1877
HY 222	UNITED STATES SINCE 1877

Social and Behavioral Sciences

6-9

ECN 142	PRINC OF MACROECONOMICS
ECN 143	PRINC OF MICROECONOMICS
GS 200	GLOBAL SYSTEMS AND CULTURES
ESS 105	WORLD REGIONAL GEOGRAPHY
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY
PSC 101	INTRO TO AMERICAN GOVERNMENT
PSC 102	INTRO TO COMPARATIVE POLITICS
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS
PY 101	GENERAL PSYCHOLOGY I
PY 201	LIFE-SPAN DEVELOPMENT
SOC 100	INTRO TO SOCIOLOGY
SOC 102	ANALYSIS OF SOCIAL PROBLEMS
SOC 103	INTRO TO CRIMINOLOGY
SOC 105	INTRO CULTURAL ANTHROPOLOGY

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV).

Code	Title	Semester Hours
Pre-Professional Courses		3
WLC 101, 102, 201, or 202		
Music Core		
The Music Core consists of a common 40 semester hours of music courses that are included in every Bachelor of Arts degree in Music.		
MU 100	INTRO TO MUSIC LITERATURE	3
Principal Instrument		9
MUA 200-level		
MUA 300-level		
MUA 400-level		
MUA 498	SENIOR RECITAL	
Music Theory		12
MU 201	MUSIC THEORY I	
MU 203	MUSICIANSHIP SKILLS I	
MU 202	MUSIC THEORY II	
MU 204	MUSICIANSHIP SKILLS II	
MU 301	THEORY OF MUSIC III	
MU 303	MUSICIANSHIP SKILLS III	
Ensembles ¹		7
MUX 300-level		
Additional Music Requirements		9
MU 106	INTRO TO MUSIC TECHNOLOGY	
MU 311	HISTORY OF MUSIC I	
MU 312	HISTORY OF MUSIC II	
MU 325	CONDUCTING	
Music Forum		0
Students must pass this course 7 times, transfer students must pass this course for every semester they are in enrolled as a Music major at UAH		
MU 199	MUSIC FORUM	
Minor Courses		18+
Elective Courses		
Elective hours vary by program, see advisor.		
Total Semester Hours		120

¹ Must include at least one hour of MUX 396. 4 of the 7 hours should be conducted ensembles.

Year 1

Fall		Semester Hours
EH 101	COLLEGE WRITING I	3
FYE 101	CHARGER SUCCESS	1
Math		3
MU 106	INTRO TO MUSIC TECHNOLOGY	1
MU 100	INTRO TO MUSIC LITERATURE	3
Principle Instrument		1.5
Term Semester Hours:		12.5
Spring		
EH 102	COLLEGE WRITING II	3
MU 201 & MU 203	MUSIC THEORY I and MUSICIANSHIP SKILLS I	4
Science w/Lab		4
Principle Instrument		1.5

Ensemble		1
Term Semester Hours:		13.5
Year 2		
Fall		
EH 207	READINGS LITERATURE/CULTURE I	3
or EH 208	or READINGS LITERATURE/CULTURE 2	
WLC 101		3
Science w/Lab		4
Principle Instrument		1.5
MU 202	MUSIC THEORY II	4
& MU 204	and MUSICIANSHIP SKILLS II	
Ensemble		1
Term Semester Hours:		16.5
Spring		
WLC 102		3
Social/Behavioral Science		3
EH 207	READINGS LITERATURE/CULTURE I	3
or EH 208	or READINGS LITERATURE/CULTURE 2	
Principle Instrument		1.5
MU 301	THEORY OF MUSIC III	3
or MU 303	or MUSICIANSHIP SKILLS III	
Ensemble		1
Term Semester Hours:		14.5
Year 3		
Fall		
Humanities		3
HY 103	WORLD HISTORY TO 1500	3
or HY 104	or WORLD HISTORY SINCE 1500	
Principle Instrument 4XX		1.5
Ensemble and Electives		4
MU 311	HISTORY OF MUSIC I	3
MU 325	CONDUCTING	2
Term Semester Hours:		16.5
Spring		
HY 103	WORLD HISTORY TO 1500	3
or HY 104	or WORLD HISTORY SINCE 1500	
Social/Behavioral Science		3
MU 312	HISTORY OF MUSIC II	3
MUA 498		1.5
Ensemble		1
Minor Course		3
Term Semester Hours:		14.5
Year 4		
Fall		
Ensemble		1
Minor Courses		9
Electives		6
Term Semester Hours:		16
Spring		
Ensemble		1
Minor Courses		9

Electives	6
Term Semester Hours:	16
Total Semester Hours:	120

Music, BA - Music Business Emphasis

The Bachelor of Arts in Music with an Emphasis in Music Business includes the standard College of Liberal Arts General Education Requirement, the Music Core, an additional 21 semester hours of music and business coursework, and electives to total 120 semester hours. The core of this emphasis is a traditional music degree, with the same 'classical' performance requirements as in the other music emphases. Students with dual interests in music and business will benefit from this degree offering.

- Music, BA requires 120 credit hours.
- No minor is required.
- Must have a 2.0 GPA in major and overall.
- No more than 6 credit hours of HPE may count in degree requirements.
- 36 of 120 credit hours must be taken at 300 level or higher.
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- No more than 60 credit hours from a two-year school can be applied toward a UAH degree.
- All double counting of classes must be approved through the CAHS Academic Advising Office.
- For graduation application instructions, see here (p. 812).

Degree Requirements:

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S or WLC 101A or WLC 101F or WLC 101G or WLC 101J or WLC 101R	INTRO FOREIGN LANG I: SPANISH INTRO FOREIGN LANG I: ARABIC INTRO FOREIGN LANG I:FRENCH INTRO FOREIGN LANG I:GERMAN INTRO FOREIGN LANG I:JAPANESE INTRO FOREIGN LANG I:RUSSIAN	

WLC 102S	INTRO FOREIGN LANG II:SPANISH
or WLC 102A	INTRO FOREIGN LANG II: ARABIC
or WLC 102F	INTRO FOREIGN LANG II:FRENCH
or WLC 102G	INTRO FOREIGN LANG II:GERMAN
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN
WLC 201S	INTERM FOREIGN LANG:SPANISH
or WLC 201A	INTERM FOREIGN LANG I: ARABIC
or WLC 201F	INTERM FOREIGN LANG:FRENCH
or WLC 201G	INTERM FOREIGN LANG:GERMAN
or WLC 201J	INTERM FOREIGN LANG: JAPANESE
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN
WLC 202S	INTERM FOREIGN LANG II:SPANISH
or WLC 202A	INTERM FOREIGN LANG II: ARABIC
or WLC 202F	INTERM FOREIGN LANG II:FRENCH
or WLC 202G	INTERM FOREIGN LANG II:GERMAN
or WLC 202J	INTERM FORGN LANG II:JAPANESE
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN
WLC 204	INTERNATIONAL CINEMA
PHL 101	INTRODUCTION TO PHILOSOPHY
PHL 102	INTRO TO ETHICS
PHL 103	INTRODUCTION TO LOGIC
PHL 150	TECH, SCIENCE & HUMAN VALUES
WGS 200	INTRO WOMEN'S & GENDER STUDIES
AMS 229	ANCIENT & MEDIEVAL WORLDS
ARH 100	ARH SURV:ANCIENT-MEDIEVAL
ARH 101	ARH SURV:RENAISSANCE-MODERN
ARH 103	ARH SUR:NON-WESTERN TRADITIONS
ARS 160	DRAWING: FOUNDATIONS
TH 122	THEATRE APPRECIATION
TH 123	INTRO TO FILM STUDIES
MU 100	INTRO TO MUSIC LITERATURE
Area III: Mathematics and Sciences	
Mathematics	
MA 105	NATURE OF MATHEMATICS
MA 107	ALGEBRA WITH APPLICATIONS
MA 110	FINITE MATHEMATICS
MA 112	PRECALCULUS ALGEBRA
MA 113	PRECALCULUS TRIGONOMETRY
MA 115	PRECALCULUS ALGEBRA & TRIG
MA 120	MATH PROFESSIONAL APPLICATIONS
MA 171	CALCULUS A
Natural Sciences (Lab)	
AST 100	SURVEY OF ASTRONOMY
AST 106	EXPLORING THE COSMOS I
AST 107	EXPLORING THE COSMOS II
BYS 109	FUNDAMENTALS OF BIOLOGY
BYS 119	PRINCIPLES OF BIOLOGY
BYS 120	ORGANISMAL BIOLOGY
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB

11-12

3-4

8

CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB
ESS 103	ENVIRONMENTAL EARTH SCIENCE
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG
PH 100	CONCEPTUAL PHYSICS
PH 101	GENERAL PHYSICS I
PH 102	GENERAL PHYSICS II
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III

Area IV: History and Social and Behavioral Sciences* **12**

History **3-6**

HY 103	WORLD HISTORY TO 1500
HY 104	WORLD HISTORY SINCE 1500
HY 221	UNITED STATES TO 1877
HY 222	UNITED STATES SINCE 1877

Social and Behavioral Sciences **6-9**

ECN 142	PRINC OF MACROECONOMICS
ECN 143	PRINC OF MICROECONOMICS
GS 200	GLOBAL SYSTEMS AND CULTURES
ESS 105	WORLD REGIONAL GEOGRAPHY
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY
PSC 101	INTRO TO AMERICAN GOVERNMENT
PSC 102	INTRO TO COMPARATIVE POLITICS
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS
PY 101	GENERAL PSYCHOLOGY I
PY 201	LIFE-SPAN DEVELOPMENT
SOC 100	INTRO TO SOCIOLOGY
SOC 102	ANALYSIS OF SOCIAL PROBLEMS
SOC 103	INTRO TO CRIMINOLOGY
SOC 105	INTRO CULTURAL ANTHROPOLOGY

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV).

Code	Title	Semester Hours
Pre-Professional Courses		3
WLC 101, 102, 201, or 202		
Music Core		40
The Music Core consists of a common 40 semester hours of music courses that are included in every Bachelor of Arts degree in Music.		
MU 100	INTRO TO MUSIC LITERATURE	3
Principal Instrument		9
MUA 200-level		
MUA 300-level		
MUA 400-level		
MUA 498	SENIOR RECITAL	
Music Theory		12

MU 201	MUSIC THEORY I	
MU 203	MUSICIANSHIP SKILLS I	
MU 202	MUSIC THEORY II	
MU 204	MUSICIANSHIP SKILLS II	
MU 301	THEORY OF MUSIC III	
MU 303	MUSICIANSHIP SKILLS III	
Ensembles ¹		7
MUX 300-level		
Additional Music Requirements		9
MU 106	INTRO TO MUSIC TECHNOLOGY	
MU 311	HISTORY OF MUSIC I	
MU 312	HISTORY OF MUSIC II	
MU 325	CONDUCTING	
Music Forum		0
Students must pass this course 7 times, transfer students must pass this course for every semester they are in enrolled as a Music major at UAH		
MU 199	MUSIC FORUM	
Music Business Emphasis		21
MU 110	INTRO ARTS MANAGEMENT	
MU 407	INTERNSHIP MUSIC BUSINESS	
MKT 301	PRINCIPLES OF MARKETING	
MGT 301	MANAGING ORGANIZATIONS	
FIN 301	PRINCIPLES OF FINANCE	
Choose two:		
MGT 101	INTRO ENTREPRENEURSHIP	
MGT 405	NEW VENTURE STRATEGIES	
MKT 315	SALES MGT/PROF SELLING	
MKT 420	SERVICES MARKETING	
Electives		
Elective Hours vary by program, see advisor.		
Total Semester Hours		120

¹ Must include at least one hour of MUX 396. 4 of the 7 hours should be conducted ensembles.

Music, BA - Music Education Emphasis

The Bachelor of Arts in Music with an Emphasis in Music Education includes 38 semester hours of General Education Requirements, the 40 semester hour Music Core, an additional 21 semester hours of music and professional music education coursework, and 37 semester hours of courses within the Department of Education, for a total of 136 semester hours. The course of study integrates music and professional education courses to develop a superior music teacher, certified to teach at all levels P-12 (Class B Professional Teacher's Certificate) with emphasis in either vocal or instrumental music. Students must demonstrate throughout their course of study competencies in both performance and teaching. Because of the demands of this program, there is little opportunity to elect courses other than those required and outlined below.

General Education Requirements for Choral and Instrumental Music Education

The General Education Requirements for the Music Education Emphasis are different from the General Education Requirements for other music emphases. The Music Education Emphasis leads to meeting the requirements for earning an Alabama Class B Professional Teacher's Certificate.

- Music Education, BA requires 136 credit hours.
- No minor is required.
- Must have a 2.0 GPA in major and overall.
- No more than 6 credit hours of HPE may count in degree requirements.
- 39 of 136 credit hours must be taken at 300 level or higher.
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- No more than 60 credit hours from a two-year school can be applied toward a UAH degree.

- All double counting of classes must be approved through the CAHS Academic Advising Office.
- For graduation application instructions, see here (p. 812).

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S or WLC 101A or WLC 101F or WLC 101G or WLC 101J or WLC 101R	INTRO FOREIGN LANG I: SPANISH INTRO FOREIGN LANG I: ARABIC INTRO FOREIGN LANG I:FRENCH INTRO FOREIGN LANG I:GERMAN INTRO FOREIGN LANG I:JAPANESE INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S or WLC 102A or WLC 102F or WLC 102G or WLC 102J or WLC 102R	INTRO FOREIGN LANG II:SPANISH INTRO FOREIGN LANG II: ARABIC INTRO FOREIGN LANG II:FRENCH INTRO FOREIGN LANG II:GERMAN INTRO FOREIGN LANG II:JAPANESE INTRO FOREIGN LANG II:RUSSIAN	
WLC 201S or WLC 201A or WLC 201F or WLC 201G or WLC 201J or WLC 201R	INTERM FOREIGN LANG:SPANISH INTERM FOREIGN LANG I: ARABIC INTERM FOREIGN LANG:FRENCH INTERM FOREIGN LANG:GERMAN INTERM FOREIGN LANG: JAPANESE INTERM FOREIGN LANG:RUSSIAN	
WLC 202S or WLC 202A or WLC 202F or WLC 202G or WLC 202J or WLC 202R	INTERM FOREIGN LANG II:SPANISH INTERM FOREIGN LANG II: ARABIC INTERM FOREIGN LANG II:FRENCH INTERM FOREIGN LANG II:GERMAN INTERM FORGN LANG II:JAPANESE INTERM FOREIGN LANG II:RUSSIAN	
WLC 204	INTERNATIONAL CINEMA	

PHL 101	INTRODUCTION TO PHILOSOPHY
PHL 102	INTRO TO ETHICS
PHL 103	INTRODUCTION TO LOGIC
PHL 150	TECH, SCIENCE & HUMAN VALUES
WGS 200	INTRO WOMEN'S & GENDER STUDIES
AMS 229	ANCIENT & MEDIEVAL WORLDS
ARH 100	ARH SURV:ANCIENT-MEDIEVAL
ARH 101	ARH SURV:RENAISSANCE-MODERN
ARH 103	ARH SUR:NON-WESTERN TRADITIONS
ARS 160	DRAWING: FOUNDATIONS
TH 122	THEATRE APPRECIATION
TH 123	INTRO TO FILM STUDIES
MU 100	INTRO TO MUSIC LITERATURE

Area III: Mathematics and Sciences**11-12****Mathematics** **3-4**

MA 105	NATURE OF MATHEMATICS
MA 107	ALGEBRA WITH APPLICATIONS
MA 110	FINITE MATHEMATICS
MA 112	PRECALCULUS ALGEBRA
MA 113	PRECALCULUS TRIGONOMETRY
MA 115	PRECALCULUS ALGEBRA & TRIG
MA 120	MATH PROFESSIONAL APPLICATIONS
MA 171	CALCULUS A

Natural Sciences (Lab)**8**

AST 100	SURVEY OF ASTRONOMY
AST 106	EXPLORING THE COSMOS I
AST 107	EXPLORING THE COSMOS II
BYS 109	FUNDAMENTALS OF BIOLOGY
BYS 119	PRINCIPLES OF BIOLOGY
BYS 120	ORGANISMAL BIOLOGY
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB
ESS 103	ENVIRONMENTAL EARTH SCIENCE
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG
PH 100	CONCEPTUAL PHYSICS
PH 101	GENERAL PHYSICS I
PH 102	GENERAL PHYSICS II
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III

Area IV: History and Social and Behavioral Sciences***12****History** **3-6**

HY 103	WORLD HISTORY TO 1500
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HY 104	WORLD HISTORY SINCE 1500
HY 221	UNITED STATES TO 1877
HY 222	UNITED STATES SINCE 1877
Social and Behavioral Sciences	
ECN 142	PRINC OF MACROECONOMICS
ECN 143	PRINC OF MICROECONOMICS
GS 200	GLOBAL SYSTEMS AND CULTURES
ESS 105	WORLD REGIONAL GEOGRAPHY
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY
PSC 101	INTRO TO AMERICAN GOVERNMENT
PSC 102	INTRO TO COMPARATIVE POLITICS
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS
PY 101	GENERAL PSYCHOLOGY I
PY 201	LIFE-SPAN DEVELOPMENT
SOC 100	INTRO TO SOCIOLOGY
SOC 102	ANALYSIS OF SOCIAL PROBLEMS
SOC 103	INTRO TO CRIMINOLOGY
SOC 105	INTRO CULTURAL ANTHROPOLOGY

6-9

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV).

Degree Requirements:

Requirements for Choral Music Education Students

Code	Title	Semester Hours
General Education Requirements for Choral and Instrumental Music Education		
College General Education Requirements as stated above		38
Music Core		
200-Level Studio Instruction (4 x 1.5) (MUA 2_1)		6
400-Level Studio Instruction (MUA 4_1)		1.5
MUA 498	SENIOR RECITAL	1.5
MUX 3XX	Ensembles ²	7
MU 100	INTRO TO MUSIC LITERATURE	3
MU 106	INTRO TO MUSIC TECHNOLOGY	1
MU 201	MUSIC THEORY I	3
MU 202	MUSIC THEORY II	3
MU 301	THEORY OF MUSIC III	3
MU 203	MUSICIANSHIP SKILLS I	1
MU 204	MUSICIANSHIP SKILLS II	1
MU 303	MUSICIANSHIP SKILLS III	1
MU 311	HISTORY OF MUSIC I	3
MU 312	HISTORY OF MUSIC II	3
MU 325	CONDUCTING	2
MU 199	MUSIC FORUM (0 semester hour x 7 sem.)	0
Additional Music Education Emphasis Courses		
Secondary Instrument:		
MUA 131	STUDIO INSTR-PIANO (3 x 1)	3
MUA 141	STUDIO INSTR-GUITAR	1
or MUA 151	STUDIO INSTR-STRINGS	
MU 322	DICTION FOR SINGERS	2
MUE 321	CHORAL/INSTRUMENTAL DIR OBSERV	1
MU 302	MUSICAL MATLS OF MODERN ERA	3
MU 401	FORM AND ANALYSIS	2

MU 416	ORCHESTRATION	2
MU 425	ADVANCED CONDUCTING	2
MUE 328	TEACHING GENERAL MUSIC	3
MUE 428	VOCAL/CHORAL METH SEC SCH	3
Piano Proficiency Exam		
Education		
ED 301	INTRO TO EDUCATION PRACTICUM	1
ED 308	EDUCATIONAL PSYCHOLOGY	3
ED 307	MULTICULTURAL FND EDUCATION	3
ED 309	CLASSROOM & BEHAVIOR MGMT	3
EDC 301	TCHG THE EXCEPTIONAL CHILD	3
EDC 311	INSTR STRATEGIES INCLUSIVE CLR	3
ED 408	TCHG READING/CONTENT AREA	3
ED 350	TECHNOLOGY IN CLASSROOM	3
ED 410	FOUNDATIONS EDUC EVALUAT	3
ED 499	P-12 INTERNSHIP (Music)	12
Total Semester Hours		137

¹ The Music Core consists of a common 40 semester hours of music courses that are included in every Bachelor of Arts degree in Music. This part of the curriculum includes private lessons, ensembles, and courses in music history and literature, music theory, conducting, and music technology. See the course lists below for specifics.

² At least half must be large conducted ensembles and at least one semester hour must be chamber ensembles.

Requirements for Instrumental Music Education Students

Code	Title	Semester Hours
General Education Requirements for Vocal and Instrumental Music Education		
College General Education Requirements as stated above		38
Music Core		
200-Level Studio Instruction (4 x 1.5) (MUA 2_1)		6
400-Level Studio Instruction (MUA 4_1)		1.5
MUA 498	SENIOR RECITAL	1.5
MUX 3XX	Ensembles ²	7
MU 100	INTRO TO MUSIC LITERATURE	3
MU 106	INTRO TO MUSIC TECHNOLOGY	1
MU 201	MUSIC THEORY I	3
MU 202	MUSIC THEORY II	3
MU 301	THEORY OF MUSIC III	3
MU 203	MUSICIANSHIP SKILLS I	1
MU 204	MUSICIANSHIP SKILLS II	1
MU 303	MUSICIANSHIP SKILLS III	1
MU 311	HISTORY OF MUSIC I	3
MU 312	HISTORY OF MUSIC II	3
MU 325	CONDUCTING	2
MU 199	MUSIC FORUM (0 semester hour x 7 sem.)	0
Additional Music Education Emphasis Courses		
Secondary Instrument:		
MUA 161 or MUA 171	STUDIO INSTR-WOODWINDS (2x1) STUDIO INSTR-BRASS	2
MUA 141 or MUA 151	STUDIO INSTR-GUITAR STUDIO INSTR-STRINGS	1
MUA 181	STUDIO INSTR-PERCUSSION	1

MUE 321	CHORAL/INSTRUMENTAL DIR OBSERV	1
MU 302	MUSICAL MATLS OF MODERN ERA	3
MU 401	FORM AND ANALYSIS	2
MU 416	ORCHESTRATION	2
MU 425	ADVANCED CONDUCTING	2
MUE 328	TEACHING GENERAL MUSIC	3
MUE 429	ORG & DIR INSTRU GRP SEC SCH	3
Piano Proficiency Exam		
Education		
ED 301	INTRO TO EDUCATION PRACTICUM	1
ED 307	MULTICULTURAL FND EDUCATION	3
ED 308	EDUCATIONAL PSYCHOLOGY	3
ED 309	CLASSROOM & BEHAVIOR MGMT	3
EDC 301	TCHG THE EXCEPTIONAL CHILD	3
EDC 311	INSTR STRATEGIES INCLUSIVE CLR	3
ED 350	TECHNOLOGY IN CLASSROOM	3
ED 408	TCHG READING/CONTENT AREA	3
ED 410	FOUNDATIONS EDUC EVALUAT	3
ED 499	P-12 INTERNSHIP (Music)	12
Total Semester Hours		135

¹ The Music Core consists of a common 40 semester hours of music courses that are included in every Bachelor of Arts degree in Music. This part of the curriculum includes private lessons, ensembles, and courses in music history and literature, music theory, conducting, and music technology. See the course lists below for specifics.

² At least half must be large conducted ensembles and at least one semester hour must be chamber ensembles.

Music, BA - Music Technology Emphasis

The Bachelor of Arts in Music with an Emphasis in Music Technology includes the standard College of Arts, Humanities, and Social Sciences General Education Requirements, the Music Core, an additional 22 semester hours of music technology, electrical engineering, and computer engineering coursework, and electives to total 120 semester hours. The core of this emphasis is a traditional music degree, with the same "classical" performance requirements as the other music programs. Students with dual interests in music and computer technology will benefit from this degree offering.

- Music, BA requires 120 credit hours.
- No minor is required.
- Must have a 2.0 GPA in major and overall.
- No more than 6 credit hours of HPE may count in degree requirements.
- 36 of 120 credit hours must be taken at 300 level or higher.
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- No more than 60 credit hours from a two-year school can be applied toward a UAH degree.
- All double counting of classes must be approved through the CAHS Academic Advising Office.
- For graduation application instructions, see here (p. 812).

Degree Requirements:

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3

ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S	INTRO FOREIGN LANG I: SPANISH	
or WLC 101A	INTRO FOREIGN LANG I: ARABIC	
or WLC 101F	INTRO FOREIGN LANG I:FRENCH	
or WLC 101G	INTRO FOREIGN LANG I:GERMAN	
or WLC 101J	INTRO FOREIGN LANG I:JAPANESE	
or WLC 101R	INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S	INTRO FOREIGN LANG II:SPANISH	
or WLC 102A	INTRO FOREIGN LANG II: ARABIC	
or WLC 102F	INTRO FOREIGN LANG II:FRENCH	
or WLC 102G	INTRO FOREIGN LANG II:GERMAN	
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE	
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN	
WLC 201S	INTERM FOREIGN LANG:SPANISH	
or WLC 201A	INTERM FOREIGN LANG I: ARABIC	
or WLC 201F	INTERM FOREIGN LANG:FRENCH	
or WLC 201G	INTERM FOREIGN LANG:GERMAN	
or WLC 201J	INTERM FOREIGN LANG: JAPANESE	
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN	
WLC 202S	INTERM FOREIGN LANG II:SPANISH	
or WLC 202A	INTERM FOREIGN LANG II: ARABIC	
or WLC 202F	INTERM FOREIGN LANG II:FRENCH	
or WLC 202G	INTERM FOREIGN LANG II:GERMAN	
or WLC 202J	INTERM FORGN LANG II:JAPANESE	
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN	
WLC 204	INTERNATIONAL CINEMA	
PHL 101	INTRODUCTION TO PHILOSOPHY	
PHL 102	INTRO TO ETHICS	
PHL 103	INTRODUCTION TO LOGIC	
PHL 150	TECH, SCIENCE & HUMAN VALUES	
WGS 200	INTRO WOMEN'S & GENDER STUDIES	
AMS 229	ANCIENT & MEDIEVAL WORLDS	
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	

MU 100	INTRO TO MUSIC LITERATURE	
Area III: Mathematics and Sciences		11-12
Mathematics		3-4
MA 105	NATURE OF MATHEMATICS	
MA 107	ALGEBRA WITH APPLICATIONS	
MA 110	FINITE MATHEMATICS	
MA 112	PRECALCULUS ALGEBRA	
MA 113	PRECALCULUS TRIGONOMETRY	
MA 115	PRECALCULUS ALGEBRA & TRIG	
MA 120	MATH PROFESSIONAL APPLICATIONS	
MA 171	CALCULUS A	
Natural Sciences (Lab)		8
AST 100	SURVEY OF ASTRONOMY	
AST 106	EXPLORING THE COSMOS I	
AST 107	EXPLORING THE COSMOS II	
BYS 109	FUNDAMENTALS OF BIOLOGY	
BYS 119	PRINCIPLES OF BIOLOGY	
BYS 120	ORGANISMAL BIOLOGY	
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I	
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB	
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB	
ESS 103	ENVIRONMENTAL EARTH SCIENCE	
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG	
PH 100	CONCEPTUAL PHYSICS	
PH 101	GENERAL PHYSICS I	
PH 102	GENERAL PHYSICS II	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	
Area IV: History and Social and Behavioral Sciences*		12
History		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Sciences		6-9
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
ESS 105	WORLD REGIONAL GEOGRAPHY	
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS	

PY 101	GENERAL PSYCHOLOGY I
PY 201	LIFE-SPAN DEVELOPMENT
SOC 100	INTRO TO SOCIOLOGY
SOC 102	ANALYSIS OF SOCIAL PROBLEMS
SOC 103	INTRO TO CRIMINOLOGY
SOC 105	INTRO CULTURAL ANTHROPOLOGY

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV).

Code	Title	Semester Hours
Pre-Professional Courses		3
WLC 101, 102, 201, or 202		
Music Core		
MU 100	INTRO TO MUSIC LITERATURE	3
The Music Core consists of a common 40 semester hours of music courses that are included in every Bachelor of Arts degree in Music.		
Principal Instrument		9
MUA 200-level		
MUA 300-level		
MUA 400-level		
MUA 498	SENIOR RECITAL	
Music Theory		12
MU 201	MUSIC THEORY I	
MU 203	MUSICIANSHIP SKILLS I	
MU 202	MUSIC THEORY II	
MU 204	MUSICIANSHIP SKILLS II	
MU 301	THEORY OF MUSIC III	
MU 303	MUSICIANSHIP SKILLS III	
Ensembles ¹		7
MUX 300-level		
Additional Music Requirements		9
MU 106	INTRO TO MUSIC TECHNOLOGY	
MU 311	HISTORY OF MUSIC I	
MU 312	HISTORY OF MUSIC II	
MU 325	CONDUCTING	
Music Forum		0
Students must pass this course 7 times, transfer students must pass this course for every semester they are in enrolled as a Music major at UAH		
MU 199	MUSIC FORUM	
Music Technology Emphasis		22
MU 207	MUSIC TECHNOLOGY I	3
MU 208	MUSIC TECHNOLOGY II	3
MU 305	MUSIC TECHNOLOGY III	3
MU 306	MUSIC TECHNOLOGY IV	3
MU 404	MUSIC TECHNOLOGY INDIV PROJECT	1
MU 406	INTERNSHIP IN MUSIC TECHNOLOGY	3
TH 260	VIDEO PRODUCTION	3
Technical Elective ²		3
Elective Courses		
Elective hours vary by program, see advisor.		
Total Semester Hours		120

¹ Must include at least one hour of MUX 396. 4 of the 7 hours should be conducted ensembles.

² The technical elective is selected by the student in conjunction with their Music Technology advisor.

Music, BA - Performance Emphasis

The Bachelor of Arts in Music with an Emphasis in Performance includes the standard College of Liberal Arts General Education Requirements, the Music Core, an additional 21 semester hours of music coursework, and electives to total 120 semester hours. Students desiring additional performance studies beyond the standard music major will benefit from this degree offering.

- Music, BA requires 120 credit hours.
- No minor is required.
- Must have a 2.0 GPA in major and overall.
- No more than 6 credit hours of HPE may count in degree requirements.
- 36 of 120 credit hours must be taken at 300 level or higher.
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- No more than 60 credit hours from a two-year school can be applied toward a UAH degree.
- All double counting of classes must be approved through the CAHS Advising Office.
- For graduation application instructions, see here (p. 812).

Degree Requirements:

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S or WLC 101A or WLC 101F or WLC 101G or WLC 101J or WLC 101R	INTRO FOREIGN LANG I: SPANISH INTRO FOREIGN LANG I: ARABIC INTRO FOREIGN LANG I:FRENCH INTRO FOREIGN LANG I:GERMAN INTRO FOREIGN LANG I:JAPANESE INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S or WLC 102A or WLC 102F	INTRO FOREIGN LANG II:SPANISH INTRO FOREIGN LANG II: ARABIC INTRO FOREIGN LANG II:FRENCH	

or WLC 102G	INTRO FOREIGN LANG II:GERMAN
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN
WLC 201S	INTERM FOREIGN LANG:SPANISH
or WLC 201A	INTERM FOREIGN LANG I: ARABIC
or WLC 201F	INTERM FOREIGN LANG:FRENCH
or WLC 201G	INTERM FOREIGN LANG:GERMAN
or WLC 201J	INTERM FOREIGN LANG: JAPANESE
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN
WLC 202S	INTERM FOREIGN LANG II:SPANISH
or WLC 202A	INTERM FOREIGN LANG II: ARABIC
or WLC 202F	INTERM FOREIGN LANG II:FRENCH
or WLC 202G	INTERM FOREIGN LANG II:GERMAN
or WLC 202J	INTERM FORGN LANG II:JAPANESE
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN
WLC 204	INTERNATIONAL CINEMA
PHL 101	INTRODUCTION TO PHILOSOPHY
PHL 102	INTRO TO ETHICS
PHL 103	INTRODUCTION TO LOGIC
PHL 150	TECH, SCIENCE & HUMAN VALUES
WGS 200	INTRO WOMEN'S & GENDER STUDIES
AMS 229	ANCIENT & MEDIEVAL WORLDS
ARH 100	ARH SURV:ANCIENT-MEDIEVAL
ARH 101	ARH SURV:RENAISSANCE-MODERN
ARH 103	ARH SUR:NON-WESTERN TRADITIONS
ARS 160	DRAWING: FOUNDATIONS
TH 122	THEATRE APPRECIATION
TH 123	INTRO TO FILM STUDIES
MU 100	INTRO TO MUSIC LITERATURE

Area III: Mathematics and Sciences**11-12****Mathematics****3-4**

MA 105	NATURE OF MATHEMATICS
MA 107	ALGEBRA WITH APPLICATIONS
MA 110	FINITE MATHEMATICS
MA 112	PRECALCULUS ALGEBRA
MA 113	PRECALCULUS TRIGONOMETRY
MA 115	PRECALCULUS ALGEBRA & TRIG
MA 120	MATH PROFESSIONAL APPLICATIONS
MA 171	CALCULUS A

Natural Sciences (Lab)**8**

AST 100	SURVEY OF ASTRONOMY
AST 106	EXPLORING THE COSMOS I
AST 107	EXPLORING THE COSMOS II
BYS 109	FUNDAMENTALS OF BIOLOGY
BYS 119	PRINCIPLES OF BIOLOGY
BYS 120	ORGANISMAL BIOLOGY
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II

CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB
ESS 103	ENVIRONMENTAL EARTH SCIENCE
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG
PH 100	CONCEPTUAL PHYSICS
PH 101	GENERAL PHYSICS I
PH 102	GENERAL PHYSICS II
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III

Area IV: History and Social and Behavioral Sciences* **12**

History **3-6**

HY 103	WORLD HISTORY TO 1500
HY 104	WORLD HISTORY SINCE 1500
HY 221	UNITED STATES TO 1877
HY 222	UNITED STATES SINCE 1877

Social and Behavioral Sciences **6-9**

ECN 142	PRINC OF MACROECONOMICS
ECN 143	PRINC OF MICROECONOMICS
GS 200	GLOBAL SYSTEMS AND CULTURES
ESS 105	WORLD REGIONAL GEOGRAPHY
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY
PSC 101	INTRO TO AMERICAN GOVERNMENT
PSC 102	INTRO TO COMPARATIVE POLITICS
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS
PY 101	GENERAL PSYCHOLOGY I
PY 201	LIFE-SPAN DEVELOPMENT
SOC 100	INTRO TO SOCIOLOGY
SOC 102	ANALYSIS OF SOCIAL PROBLEMS
SOC 103	INTRO TO CRIMINOLOGY
SOC 105	INTRO CULTURAL ANTHROPOLOGY

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV).

Code	Title	Semester Hours
Pre-Professional Courses		3
WLC 101, 102, 201, or 202		
Music Core		40
The Music Core consists of a common 40 semester hours of music courses that are included in every Bachelor of Arts degree in Music.		
MU 100	INTRO TO MUSIC LITERATURE	3
Principal Instrument		9
MUA 200-level		
MUA 300-level		
MUA 400-level		
MUA 498	SENIOR RECITAL	
Music Theory		12
MU 201	MUSIC THEORY I	
MU 203	MUSICIANSHIP SKILLS I	
MU 202	MUSIC THEORY II	
MU 204	MUSICIANSHIP SKILLS II	

MU 301	THEORY OF MUSIC III	
MU 303	MUSICIANSHIP SKILLS III	
Ensembles ¹		7
MUX 300-level		
Additional Music Requirements		9
MU 106	INTRO TO MUSIC TECHNOLOGY	
MU 311	HISTORY OF MUSIC I	
MU 312	HISTORY OF MUSIC II	
MU 325	CONDUCTING	
Music Forum		0
Students must pass this course 7 times, transfer students must pass this course for every semester they are in enrolled as a Music major at UAH		
MU 199	MUSIC FORUM	
Performance Emphasis		21
MUA 400 level		1.5
MUA 499	PERFORMANCE EMPHASIS RECITAL	1.5
Additional Ensembles MUX 300-level ¹		5
MU 302	MUSICAL MATLS OF MODERN ERA	3
MU 401	FORM AND ANALYSIS	2
MU 425	ADVANCED CONDUCTING	2
Piano Proficiency Exam		0
Elective Hours		4
Upper Level Electives 300+		2
Elective Courses		
Elective hours vary by program, see advisor.		
Total Semester Hours		120

¹ Must include at least one hour of MUX 396. In the Music Core, 4 of the 7 hours should be conducted ensembles. In the Performance emphasis, 3 of the 5 hours should be conducted ensembles.

Music, BA - Piano Pedagogy Emphasis

The Bachelor of Arts in Music with an Emphasis in Piano Pedagogy includes the standard College of Liberal Arts General Education Requirements, the Music Core, an additional 21 semester hours of music, sociology, and business coursework, and electives to total 120 semester hours. The core of this emphasis is a traditional music degree, with the same 'classical' performance requirements as in the other music emphases.

- Music, BA requires 120 credit hours.
- No minor is required.
- Must have a 2.0 GPA in major and overall.
- No more than 6 credit hours of HPE may count in degree requirements.
- 36 of 120 credit hours must be taken at 300 level or higher.
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- No more than 60 credit hours from a two-year school can be applied toward a UAH degree.
- All double counting of classes must be approved through the CAHS Academic Advising Office.
- For graduation application instructions, see here (p. 812).

Degree Requirements:

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101	COLLEGE WRITING I	
or EH 101S	COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	

EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S	INTRO FOREIGN LANG I: SPANISH	
or WLC 101A	INTRO FOREIGN LANG I: ARABIC	
or WLC 101F	INTRO FOREIGN LANG I:FRENCH	
or WLC 101G	INTRO FOREIGN LANG I:GERMAN	
or WLC 101J	INTRO FOREIGN LANG I:JAPANESE	
or WLC 101R	INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S	INTRO FOREIGN LANG II:SPANISH	
or WLC 102A	INTRO FOREIGN LANG II: ARABIC	
or WLC 102F	INTRO FOREIGN LANG II:FRENCH	
or WLC 102G	INTRO FOREIGN LANG II:GERMAN	
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE	
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN	
WLC 201S	INTERM FOREIGN LANG:SPANISH	
or WLC 201A	INTERM FOREIGN LANG I: ARABIC	
or WLC 201F	INTERM FOREIGN LANG:FRENCH	
or WLC 201G	INTERM FOREIGN LANG:GERMAN	
or WLC 201J	INTERM FOREIGN LANG: JAPANESE	
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN	
WLC 202S	INTERM FOREIGN LANG II:SPANISH	
or WLC 202A	INTERM FOREIGN LANG II: ARABIC	
or WLC 202F	INTERM FOREIGN LANG II:FRENCH	
or WLC 202G	INTERM FOREIGN LANG II:GERMAN	
or WLC 202J	INTERM FORGN LANG II:JAPANESE	
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN	
WLC 204	INTERNATIONAL CINEMA	
PHL 101	INTRODUCTION TO PHILOSOPHY	
PHL 102	INTRO TO ETHICS	
PHL 103	INTRODUCTION TO LOGIC	
PHL 150	TECH, SCIENCE & HUMAN VALUES	
WGS 200	INTRO WOMEN'S & GENDER STUDIES	
AMS 229	ANCIENT & MEDIEVAL WORLDS	
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	

ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Area III: Mathematics and Sciences		11-12
Mathematics		3-4
MA 105	NATURE OF MATHEMATICS	
MA 107	ALGEBRA WITH APPLICATIONS	
MA 110	FINITE MATHEMATICS	
MA 112	PRECALCULUS ALGEBRA	
MA 113	PRECALCULUS TRIGONOMETRY	
MA 115	PRECALCULUS ALGEBRA & TRIG	
MA 120	MATH PROFESSIONAL APPLICATIONS	
MA 171	CALCULUS A	
Natural Sciences (Lab)		8
AST 100	SURVEY OF ASTRONOMY	
AST 106	EXPLORING THE COSMOS I	
AST 107	EXPLORING THE COSMOS II	
BYS 109	FUNDAMENTALS OF BIOLOGY	
BYS 119	PRINCIPLES OF BIOLOGY	
BYS 120	ORGANISMAL BIOLOGY	
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I	
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB	
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB	
ESS 103	ENVIRONMENTAL EARTH SCIENCE	
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG	
PH 100	CONCEPTUAL PHYSICS	
PH 101	GENERAL PHYSICS I	
PH 102	GENERAL PHYSICS II	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	
Area IV: History and Social and Behavioral Sciences*		12
History		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Sciences		6-9
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
ESS 105	WORLD REGIONAL GEOGRAPHY	

ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY
PSC 101	INTRO TO AMERICAN GOVERNMENT
PSC 102	INTRO TO COMPARATIVE POLITICS
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS
PY 101	GENERAL PSYCHOLOGY I
PY 201	LIFE-SPAN DEVELOPMENT
SOC 100	INTRO TO SOCIOLOGY
SOC 102	ANALYSIS OF SOCIAL PROBLEMS
SOC 103	INTRO TO CRIMINOLOGY
SOC 105	INTRO CULTURAL ANTHROPOLOGY

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV).

Code	Title	Semester Hours
Pre-Professional Courses		3
WLC 101, 102, 201, or 202		
Music Core		40
The Music Core consists of a common 40 semester hours of music courses that are included in every Bachelor of Arts degree in Music.		
MU 100	INTRO TO MUSIC LITERATURE	3
Principal Instrument		9
MUA 200-level		
MUA 300-level		
MUA 400-level		
MUA 498	SENIOR RECITAL	
Music Theory		12
MU 201	MUSIC THEORY I	
MU 203	MUSICIANSHIP SKILLS I	
MU 202	MUSIC THEORY II	
MU 204	MUSICIANSHIP SKILLS II	
MU 301	THEORY OF MUSIC III	
MU 303	MUSICIANSHIP SKILLS III	
Ensembles ¹		7
MUX 300-level		
Additional Music Requirements		9
MU 106	INTRO TO MUSIC TECHNOLOGY	
MU 311	HISTORY OF MUSIC I	
MU 312	HISTORY OF MUSIC II	
MU 325	CONDUCTING	
Music Forum		0
Students must pass this course 7 times, transfer students must pass this course for every semester they are in enrolled as a Music major at UAH		
MU 199	MUSIC FORUM	
Piano Pedagogy Emphasis		22
MU 320	PIANO PEDAGOGY	
MU 321	PIANO PEDAGOGY II	
MU 420	PIANO LITERATURE	
MU 409	INTERNSHIP GRP PIANO PEDAGOGY	
MU 410	INTERNSHIP INDIVID PIANO PEDAG	
MU 110	INTRO ARTS MANAGEMENT	
MUE 328	TEACHING GENERAL MUSIC	
MKT 301	PRINCIPLES OF MARKETING	
FIN 301	PRINCIPLES OF FINANCE	

Elective Courses

Elective hours vary by program, see advisor.

Total Semester Hours**120**

¹ Must include at least one hour of MUX 396. 4 of the 7 hours should be conducted ensembles.

Music Minor

Students may select music as a supportive minor to their major discipline.

A total of 23 semester hours of music are necessary (12 semester hours upper-level), including the following courses:

Code	Title	Semester Hours
MU 100	INTRO TO MUSIC LITERATURE	3
MU 201	MUSIC THEORY I	3
MU 203	MUSICIANSHIP SKILLS I	1
MUX 3XX	Ensemble	6
MU 3XX	Upper Level Electives (not ensembles)	6
MUA or MUJ 1x1 - Studio Instruction		4
Total Semester Hours		23

Music Technology Minor

Students may select music technology as a supportive minor for Computer Engineering, Electrical Engineering and Computer Science.

The music technology minor includes the following courses:

Code	Title	Semester Hours
MU 100	INTRO TO MUSIC LITERATURE	3
MU 106	INTRO TO MUSIC TECHNOLOGY	1
MU 201	MUSIC THEORY I	3
MU 203	MUSICIANSHIP SKILLS I	1
MU 202	MUSIC THEORY II	3
MU 204	MUSICIANSHIP SKILLS II	1
MU 306	MUSIC TECHNOLOGY IV	3
MU 404	MUSIC TECHNOLOGY INDIV PROJECT	1
MU 406	INTERNSHIP IN MUSIC TECHNOLOGY	3
MUX 3XX	Ensemble	2
Total Semester Hours		21

Philosophy

Morton Hall 206
Telephone 256.824.2338
Email: nick.jones@uah.edu

Mission

To instruct people in critical and imaginative thinking, to teach Western and Eastern philosophical traditions, and to inspire the wonder at the world that Plato says begins all philosophical reflection.

The Department of Philosophy offers the following degree programs:

- Philosophy, BA (p. 162)
- Philosophy Minor (p. 166)

Program Objectives

1. Enable our students both to understand and accept their responsibilities as citizens and future leaders and also to succeed in their professional lives with the skills of critical thinking, imaginative problem-solving, and rigorous thought, which philosophy instruction imparts.
2. Promote the active development and dissemination of high-quality research. Every member of the department should be actively engaged in the production and publication of original philosophical works.
3. Fulfill service responsibilities to the university, the wider philosophical community, and finally, by promoting educational programs aimed at the university and larger community, to educate the general public about the value of philosophy.

Major in Philosophy

- Philosophy, BA (p. 162)

Minor in Philosophy

- Philosophy (p. 166)

PHL 101 - INTRODUCTION TO PHILOSOPHY

Semester Hours: 3

Introduction to philosophical reflection focusing upon central problems in the major branches of the western tradition: metaphysics, epistemology and value theory.

PHL 102 - INTRO TO ETHICS

Semester Hours: 3

Major ethical positions in both classical and modern thought. The course may include a consideration of case studies drawn from practical contexts in engineering, medicine and other areas.

PHL 103 - INTRODUCTION TO LOGIC

Semester Hours: 3

Methodology of formal and informal reasoning.

PHL 150 - TECH, SCIENCE & HUMAN VALUES

Semester Hours: 3

A philosophical examination of the intersection of human values with science and technology. Questions include: what exists, the nature and extent of knowledge, and moral problems posed by technical and scientific change.

PHL 220 - CRIT THINKING FOR INTEL ANALYS

Semester Hours: 3

Examines critical reasoning strategies designed to correct cognitive biases and improve tradecraft skills in the context of intelligence analysis.

PHL 301 - ANCIENT PHILOSOPHY

Semester Hours: 3

Survey of classical philosophy from the Pre-Socratics through Aristotle. Prerequisite: 3 hrs of PHL, except PHL 103.

PHL 302 - MODERN PHILOSOPHY

Semester Hours: 3

Survey of the British and Continental traditions from Descartes through Kant. Prerequisite: 3 hrs of PHL, except PHL 103.

PHL 303 - CONTINENTAL PHILOSOPHY

Semester Hours: 3

Examination of important trends in the Continental tradition from nineteenth through twenty-first century thought.

PHL 310 - PHILOSOPHY OF ART

Semester Hours: 3

Major aesthetic theories of the western tradition, may include visual or non-visual arts. Prerequisite: 3 hrs of PHL, except PHL 103.

PHL 311 - PHILOSOPHY OF SCIENCE

Semester Hours: 3

Critical assessment of the historical and logical foundations of the natural and theoretical sciences. Prerequisite: 3 hrs of PHL, except PHL 103.

PHL 312 - AMERICAN PHILOSOPHY

Semester Hours: 3

Survey of American thought with emphasis upon the development of pragmatism in the work of Peirce, James, and Dewey. Prerequisite: 3 hrs of PHL, except PHL 103.

PHL 314 - ASIAN PHILOSOPHY

Semester Hours: 3

Survey of philosophical traditions from Asia, such as various schools of Buddhism and Hinduism, Confucianism, Daoism. Topics may include: conceptions of human nature and the good life, the nature of the self and its relation to society, comparisons to philosophies from Europe and North America. Prerequisite: 3 hrs of PHL, except PHL 103.

PHL 317 - PHILOSOPHY OF MIND

Semester Hours: 3

A philosophical examination of a range of models, theories, and arguments concerning the nature of mind and its relationship to the physical world. Prerequisite: 3 hrs of PHL, except PHL 103.

PHL 320 - SYMBOLIC LOGIC

Semester Hours: 3

Symbolic deductive logic, including propositional calculus (truth-functional logic), predicate calculus (propositional functions and quantification), and the logic of relations. Prerequisite: PHL 103.

PHL 330 - CLASSICAL POLITICAL PHILOSOPHY

Semester Hours: 3

Careful analysis of the roots of political inquiry in selected works of ancient and medieval political philosophers. Major themes include the search for a just social order, the proper relationship between the citizen and the state, and other fundamental concepts of western political institutions. Prerequisite: PHL 101 or PHL 102 or PSC 101.

PHL 332 - MODERN POLITICAL PHILOSOPHY

Semester Hours: 3

Critical examination of the philosophical foundations for modern politics that emerged from the 15th through the 19th century in western Europe. Major themes include the concepts of individual rights, property, representation, majority rule, limited government, and revolution. Prerequisite: PHL 101 or PHL 102 or PSC 101.

PHL 335 - FEMINIST PHILOSOPHY

Semester Hours: 3

Philosophical examination of issues related to feminism and feminist theory. Topics may include: women in the history of philosophy, contemporary feminist political theory, feminist ethics, feminist epistemology, or gender theory (including racial and sexual identity). Prerequisite: 3 hrs of PHL, except PHL 103.

PHL 337 - PHILOSOPHY OF RACE

Semester Hours: 3

Philosophical examination of the nature and importance of race. Topics may include: the debate between essentialist and constructionist views of race, the political importance of race, and the intersection of race and other forms of identity. Prerequisite: 3 hrs of PHL, except PHL 103.

PHL 385 - SELECTED TOPICS

Semester Hours: 3

Intensive examination of particular problems, periods, or movements in the history of philosophy. Prerequisite: 3 hrs of PHL, except PHL 103.

PHL 395 - RESEARCH SEMINAR

Semester Hours: 3

Intensive examination of particular problems, periods, or movements in the history of philosophy. Intensive examination of selected topics leading to the preparation of a substantial philosophical paper. Required of all majors. May be taken twice for credit. Prerequisite: 3 hrs of PHL, except PHL 103.

PHL 397 - PHILOSOPHY INTERNSHIP

Semester Hours: 1-3

A supervised experience in a professional environment enhanced by a student's background in philosophy. Paid or unpaid. Prerequisites: 18 hrs of PHL, JR/SR standing, minimum 3.0 GPA in PHL Major, approval of department chair.

PHL 399 - DIR STUDY IN PHILOSOPHY

Semester Hours: 1-3

Independent study in an area of philosophy selected in consultation with faculty advisor. Requires approval of department chair. Prerequisite: 3 hrs of PHL, except PHL 103.

PHL 401 - METAPHYSICS

Semester Hours: 3

Critical examination of traditional and contemporary responses to questions about the nature of reality. Prerequisite: 6 hrs of PHL, except PHL 103.

PHL 402 - EPISTEMOLOGY

Semester Hours: 3

Investigation of fundamental problems of knowledge such as the relation of knowledge and belief, truth, certainty and skepticism, perception, logic, explanation, and justification. Prerequisite: 6 hrs of PHL, except PHL 103.

PHL 403 - ADV MORAL PHILOSOPHY

Semester Hours: 3

Critical examination of significant works in moral and political philosophy such as the relationship between morality and human nature, the individual and the state, and the consequences of actions. Prerequisite: 6 hrs of PHL, except PHL 103.

PHL 438 - CONTEMPORARY POLITICAL THOUGHT

Semester Hours: 3

Systematic study of recent and current thinking on issues and problems of politics, social theory, and ethics with special attention to the philosophical dimension of these issues and problems. Prerequisite: 6 hrs of PHL or PSC, except PHL 103.

Philosophy, BA

Students majoring in philosophy must complete a minimum of 30 semester hours in philosophy with at least 21 semester hours at the 300-level or above.

- Philosophy, BA requires 120 credit hours.
- 36 of 120 credit hours must be taken at 300 level or higher.
- Must have a minor consisting of 21 credit hours, at least 12 credit hours at the 300-level or higher.
- Must have a 2.0 GPA in major, minor, and overall.
- No more than 6 credit hours of HPE may count in degree requirements.
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- No more than 60 credit hours from a two-year school can be applied toward a UAH degree.
- All double counting of classes must be approved through the CAHS Advising Office.
- For graduation application instructions, see here (p. 812).

Degree Requirements:

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	

MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S	INTRO FOREIGN LANG I: SPANISH	
or WLC 101A	INTRO FOREIGN LANG I: ARABIC	
or WLC 101F	INTRO FOREIGN LANG I:FRENCH	
or WLC 101G	INTRO FOREIGN LANG I:GERMAN	
or WLC 101J	INTRO FOREIGN LANG I:JAPANESE	
or WLC 101R	INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S	INTRO FOREIGN LANG II:SPANISH	
or WLC 102A	INTRO FOREIGN LANG II: ARABIC	
or WLC 102F	INTRO FOREIGN LANG II:FRENCH	
or WLC 102G	INTRO FOREIGN LANG II:GERMAN	
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE	
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN	
WLC 201S	INTERM FOREIGN LANG:SPANISH	
or WLC 201A	INTERM FOREIGN LANG I: ARABIC	
or WLC 201F	INTERM FOREIGN LANG:FRENCH	
or WLC 201G	INTERM FOREIGN LANG:GERMAN	
or WLC 201J	INTERM FOREIGN LANG: JAPANESE	
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN	
WLC 202S	INTERM FOREIGN LANG II:SPANISH	
or WLC 202A	INTERM FOREIGN LANG II: ARABIC	
or WLC 202F	INTERM FOREIGN LANG II:FRENCH	
or WLC 202G	INTERM FOREIGN LANG II:GERMAN	
or WLC 202J	INTERM FORGN LANG II:JAPANESE	
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN	
WLC 204	INTERNATIONAL CINEMA	
PHL 101	INTRODUCTION TO PHILOSOPHY	
PHL 102	INTRO TO ETHICS	
PHL 103	INTRODUCTION TO LOGIC	
PHL 150	TECH, SCIENCE & HUMAN VALUES	
WGS 200	INTRO WOMEN'S & GENDER STUDIES	
AMS 229	ANCIENT & MEDIEVAL WORLDS	
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Area III: Mathematics and Sciences		11-12
Mathematics		3-4
MA 105	NATURE OF MATHEMATICS	
MA 107	ALGEBRA WITH APPLICATIONS	
MA 110	FINITE MATHEMATICS	

MA 112	PRECALCULUS ALGEBRA	
MA 113	PRECALCULUS TRIGONOMETRY	
MA 115	PRECALCULUS ALGEBRA & TRIG	
MA 120	MATH PROFESSIONAL APPLICATIONS	
MA 171	CALCULUS A	
Natural Sciences (Lab)		8
AST 100	SURVEY OF ASTRONOMY	
AST 106	EXPLORING THE COSMOS I	
AST 107	EXPLORING THE COSMOS II	
BYS 109	FUNDAMENTALS OF BIOLOGY	
BYS 119	PRINCIPLES OF BIOLOGY	
BYS 120	ORGANISMAL BIOLOGY	
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I	
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB	
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB	
ESS 103	ENVIRONMENTAL EARTH SCIENCE	
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG	
PH 100	CONCEPTUAL PHYSICS	
PH 101	GENERAL PHYSICS I	
PH 102	GENERAL PHYSICS II	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	
Area IV: History and Social and Behavioral Sciences*		12
History		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Sciences		6-9
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
ESS 105	WORLD REGIONAL GEOGRAPHY	
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS	
PY 101	GENERAL PSYCHOLOGY I	
PY 201	LIFE-SPAN DEVELOPMENT	
SOC 100	INTRO TO SOCIOLOGY	
SOC 102	ANALYSIS OF SOCIAL PROBLEMS	
SOC 103	INTRO TO CRIMINOLOGY	
SOC 105	INTRO CULTURAL ANTHROPOLOGY	

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). In Area V, take no more than six hours in a single discipline from Areas II, III, or IV. Area V should cover a breadth of disciplinary study.

Code	Title	Semester Hours
Pre-Professional		19
WLC 101, 102, 201, or 202		
Choose 16 additional hours from the above listed Humanities, Fine Arts, Mathematics, Sciences, History, and Social and Behavioral Sciences.		
Philosophy Courses		30
PHL 102	INTRO TO ETHICS	
PHL 103	INTRODUCTION TO LOGIC	
PHL 301	ANCIENT PHILOSOPHY	
PHL 302	MODERN PHILOSOPHY	
PHL 395	RESEARCH SEMINAR	
PHL 401	METAPHYSICS	
or PHL 402	EPISTEMOLOGY	
or PHL 403	ADV MORAL PHILOSOPHY	
PHL any level Elective		3
Choose three PHL Electives 300+		9
Minor Courses		18+
Elective Courses		
Elective courses vary by program, see advisor.		
Total Semester Hours		120
Year 1		
Fall		Semester Hours
EH 101	COLLEGE WRITING I	3
FYE 101	CHARGER SUCCESS	1
Math		3
Science w/Lab		4
PHL 1XX		3
Term Semester Hours:		14
Spring		
EH 102	COLLEGE WRITING II	3
PHL 102	INTRO TO ETHICS	3
HY 103	WORLD HISTORY TO 1500	3
or HY 104	or WORLD HISTORY SINCE 1500	
Social/Behavioral Science		3
Science w/Lab		4
Term Semester Hours:		16
Year 2		
Fall		
PHL 103	INTRODUCTION TO LOGIC	3
EH 207	READINGS LITERATURE/CULTURE I	3
or EH 208	or READINGS LITERATURE/CULTURE 2	
Science w/Lab		4
WLC 101		3
Social/Behavioral Science		3
Term Semester Hours:		16
Spring		
Humanities or Literature		3
Social/Behavioral Science		3

Area V		6
PHL 300+ Elective		3
Term Semester Hours:		15
Year 3		
Fall		
PHL 301	ANCIENT PHILOSOPHY	3
PHL 300+ Elective		3
Minor Course		3
Area V Courses		6
Term Semester Hours:		15
Spring		
PHL 302	MODERN PHILOSOPHY	3
Minor Courses		6
Area V Course		3
Elective		3
Term Semester Hours:		15
Year 4		
Fall		
PHL 395	RESEARCH SEMINAR	3
PHL 300+ Elective		3
Minor Courses		6
Elective		3
Term Semester Hours:		15
Spring		
PHL 4XX		3
Minor Courses		6
Electives		6
Term Semester Hours:		15
Total Semester Hours:		121

Philosophy Minor

Students minoring in philosophy must complete at least 21 semester hours in philosophy including PHL 103 and PHL 102. Recommendations concerning which courses might best complement a student's major and related interests are available from the philosophy faculty upon request. Appropriate philosophy courses may also be used as part of a program of cognate studies with other disciplines. Such a program must include at least 12 semester hours in courses numbered 300 or above.

Code	Title	Semester Hours
PHL 102	INTRO TO ETHICS	3
PHL 103	INTRODUCTION TO LOGIC	3
PHL 301	ANCIENT PHILOSOPHY	3
or PHL 302	MODERN PHILOSOPHY	
PHL Any level		3
PHL 300+		9
Total Semester Hours		21

Political Science

Morton Hall 206
 Telephone: 256.824.6192
 Email: polsci@uah.edu

The academic discipline of political science introduces students to critical thinking about the intellectual origins, defense, and critique of government, politics, and society in the United States and throughout the world. Political science classes focus on fundamental questions of governance: How should

state and society be organized? How do the values of civil society and economy influence political thinking? Who should exercise political power and who should not? What constitutes justice?

The Department of Political Science offers the following degree programs:

- Political Science, BA
- Political Science Minor
- Public Affairs and Policy, MA

Program Objectives

The Department of Political Science offers the Bachelor of Arts in Political Science, the Minor in Political Science, and the Master of Arts in Public Affairs and Policy. Faculty members and students engage in empirical research and ethical critique of current events and competing explanations of those events with regard to government, politics, and society. They take into account politically relevant conceptual elements and practices embedded in or struggling against the intellectual foundations and elaborate edifices of diverse political arrangements and causes. Faculty members profess certain acumen in the discipline within which they teach and do research and thus have accumulated more accurate and sophisticated explanations and discoveries into the human condition, particularly as they relate to living socially and making decisions collectively.

Major in Political Science

- Political Science, BA (p. 169)

Minors in Political Science

- Political Science (p. 174)

PSC 101 - INTRO TO AMERICAN GOVERNMENT

Semester Hours: 3

What motivates individuals and groups to act politically? This course introduces students to political structures, decision-making, and public policy in the U.S. The role of history in the development of current institutional structures and current political developments will be considered.

PSC 102 - INTRO TO COMPARATIVE POLITICS

Semester Hours: 3

In this class we explore ways to compare countries and political systems. We study a wide variety of countries for a better understanding of political dynamics around the world. This includes countries at various stages of industrialization and democratization, in different regions of the globe.

PSC 103 - INTRO TO STATE & LOCAL GOVT

Semester Hours: 3

Surveys the principles, forms, functions, and processes of state and local governments in the context of the American federal system, with specific emphasis on the political environment. Students will better understand the major functions of and the issues facing state and local governments.

PSC 260 - INTRODUCTION TO INTERNATIONAL RELATIONS

Semester Hours: 3

Examination of the basic factors underlying the conduct of international relations, focusing on conflict and changes taking place due to globalization. This course also seeks to stimulate intellectual curiosity, enhance critical thinking, and improve oral and writing skills.

PSC 300 - INTRO SOCIAL SCIENCE STATISTIC

Semester Hours: 3

This course covers basic statistical concepts, techniques, and the language of statistics; simple statistical modeling correlation and regression analysis; and nonlinear models and categorical models. Students will apply appropriate methods to analyze real world problems.

PSC 302 - THE AMERICAN CONGRESS

Semester Hours: 3

Studies the organization and role of the Congress, its leadership, internal processes, and relationships with other parts of the political system. The goal is to understand why Congress looks and acts the way it does, whose interests are represented, and how and why policies emerge as they do. Prerequisite: PSC 101.

PSC 304 - AMERICAN PRESIDENCY

Semester Hours: 3

Examination of the institution of the American presidency, its power, and the forces that shape it. Focus on developing students' ability to think conceptually and critically about the presidency, the president's role in the political system, and American politics in general. Prerequisite: PSC 101.

PSC 309 - POLITICAL PARTIES & INT GROUPS

Semester Hours: 3

A survey of major linkages between citizens and government, this course studies the formation, organization, activities, and impacts of political parties and interest groups - and factors affecting them. Students will think critically about these institutions and their roles in the American system. Prerequisite: PSC 101.

PSC 330 - CLASSI POLITI PHILOSOPHY

Semester Hours: 3

Careful analysis of the roots of political inquiry in selected works of ancient and medieval political philosophers. Major themes include the search for a just social order, the proper relationship between the citizen and the state, and other fundamental concepts of western political institutions. Prerequisite: PSC 101 or PHL 101 or PHL 102 or PHL 202 or permission of instructor.

PSC 332 - MODERN POLITICAL PHILOSO

Semester Hours: 3

Critical examination of the philosophical foundations for modern politics that emerged from the 15th through the 19th century in western Europe. Major themes include the concepts of individual rights, property, representation, majority rule, limited government, and revolution. Prerequisite: PSC 101 or PHL 101 or PHL 102 or permission of instructor.

PSC 334 - AMER POLITICAL THOUGHT

Semester Hours: 3

In-depth study of theorists, concepts and forces that have shaped American political values from the founding of the republic to the present. Major themes include the relationship between liberty and equality, rights and democracy, and industrialization and the public good. Prerequisite: PSC 101.

PSC 399 - CURRENT AFFAIRS

Semester Hour: 1

An examination of current national and international issues. Focus is on developing critical reading, listening, and writing skills. The course may be repeated up to three times.

PSC 420 - FEDERALISM & INTERGOV RELATION

Semester Hours: 3

Designed to help students navigate complex relationships among the 90,000+ government in the U.S., this course examines the framework of federalism and the tools available to governments to influence public policy outcomes. Students will investigate the impacts of these relationships on policy. Prerequisite: PSC 101.

PSC 436 - POLITICAL IDEOLOGIES

Semester Hours: 3

Critical examination of the philosophical foundations and political ethics of contemporary political ideologies. Among the major ideologies studied will be relevant examples of conservatism, liberalism, Marxism, Nazism, and religion, such as liberation theology and Islamism. Prerequisite: PSC 101.

PSC 438 - CONTEMPORARY POLITICAL THOUGHT

Semester Hours: 3

Systematic study of recent and current thinking on issues and problems of politics, social theory, and ethics with special attention to the philosophical dimension of these issues and problems.

PSC 440 - REGIONAL STUDIES

Semester Hours: 3

This class compares and examines the politics of Asia, Latin America, the Middle East, or Africa, depending on the term. We focus on select countries of themes within each region as part of our study of political structures, history, and culture, for a deeper understanding of each area. Prerequisites: PSC 101 and PSC 102.

PSC 451 - LAW, COURTS, & PUBLIC POLICY

Semester Hours: 3

Examines the role of the courts in the making of public policy in the United States, with an emphasis on the use of the courts by interest groups seeking to achieve specific policy goals. Prerequisite: PSC 101.

PSC 452 - AMER CONSTITUTIONAL LAW

Semester Hours: 3

Examination of the structure of the federal government and its powers through an analysis of leading cases from the Supreme Court. Topics include federalism, separation of powers, and the proper role and decision-making process of the Supreme Court. Prerequisite: PSC 101.

PSC 454 - CIVIL LIBERTIES

Semester Hours: 3

Examines the relationship between the government and individuals in American society through an analysis of Supreme Court cases. The focus is on contemporary questions about the rights of individuals and appropriate limits to freedom of action set by government. Prerequisite: PSC 101.

PSC 461 - ECONOMIC DEVELOPMENT

Semester Hours: 3

Understand economic development in the developing world. Examine economic transformation & social justice. Highlight domestic & international institutional, structural, & political sources of economic dynamism/lack thereof in the Global South. Prerequisites: Junior standing or higher.

PSC 462 - DECN MKNG FOREIGN & SEC PLCY

Semester Hours: 3

An examination of the history, culture, policies, and structures shaping the development of U.S. foreign and national security policies. Special attention will be placed on the roles of Congress, National Security Council, Defense Department, State Department, and the intelligence community. Prerequisite: PSC 101.

PSC 464 - AMERICAN FOREIGN POLICY

Semester Hours: 3

An examination of the substance of contemporary U.S. foreign policies and the goals the country seeks to achieve around the world. Students will attempt to evaluate the effectiveness of those policies and examine why it is often difficult for the country to achieve its goals. Prerequisite: PSC 101.

PSC 466 - NATL SECURITY STRATEGY & PLCY

Semester Hours: 3

An examination of current U.S. national security strategy and policy. The course will review current strategy and policy documents, examine specific responses to the variety of threats facing the United States, and evaluate whether those policies are effective at achieving their goals. Prerequisite: PSC 101.

PSC 470 - ISSUES IN SECURITY POLICY

Semester Hours: 3

Examination of select security-related policy issues. The content of this course will vary during different terms, and students may take the course multiple times so long as the content differs. Prerequisite: PSC 101.

PSC 480 - ADV TOPICS POLITICAL SCIENCE

Semester Hours: 3

Select topics in local, state, national and world politics. This course may be repeated for credit as long as content of the course has changed.

PSC 484 - SENIOR SEMINAR

Semester Hours: 3

This class engages students in an advanced examination of the subfields of political science that are offered by the department. The course may be repeated with different faculty for up to 6 hours of credit. Prerequisites: PSC 101 and PSC 102.

PSC 495 - INTERNSHIP IN GOVERNMENT

Semester Hours: 1-6

Students may receive academic credit for an internship with a local, state, or federal governmental agency, or with political, legal, or public policy related organizations. Prerequisite: Instructor Permission.

PSC 498 - DIRECTED READINGS & RESEARCH

Semester Hours: 3

Supervised in-depth readings and/or individual research in an area of specialized interest to both student and instructor. Open to all students who have completed 15 semester hours in Political Science and have permission of the instructor.

Political Science, BA

- Political Science, BA requires 120 credit hours.
- 36 of 120 credit hours must be taken at 300 level or higher.
- Students must have a 2.0 GPA in major, minor, and overall.
- No more than 6 credit hours of HPE may count in degree requirements.
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- No more than 60 credit hours from a two-year school can be applied toward a UAH degree.

- All double counting of classes must be approved through the CAHS Advising Office.
- For graduation application instructions, see here (p. 812).

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101	COLLEGE WRITING I	
or EH 101S	COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S	INTRO FOREIGN LANG I: SPANISH	
or WLC 101A	INTRO FOREIGN LANG I: ARABIC	
or WLC 101F	INTRO FOREIGN LANG I:FRENCH	
or WLC 101G	INTRO FOREIGN LANG I:GERMAN	
or WLC 101J	INTRO FOREIGN LANG I:JAPANESE	
or WLC 101R	INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S	INTRO FOREIGN LANG II:SPANISH	
or WLC 102A	INTRO FOREIGN LANG II: ARABIC	
or WLC 102F	INTRO FOREIGN LANG II:FRENCH	
or WLC 102G	INTRO FOREIGN LANG II:GERMAN	
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE	
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN	
WLC 201S	INTERM FOREIGN LANG:SPANISH	
or WLC 201A	INTERM FOREIGN LANG I: ARABIC	
or WLC 201F	INTERM FOREIGN LANG:FRENCH	
or WLC 201G	INTERM FOREIGN LANG:GERMAN	
or WLC 201J	INTERM FOREIGN LANG: JAPANESE	
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN	
WLC 202S	INTERM FOREIGN LANG II:SPANISH	
or WLC 202A	INTERM FOREIGN LANG II: ARABIC	
or WLC 202F	INTERM FOREIGN LANG II:FRENCH	
or WLC 202G	INTERM FOREIGN LANG II:GERMAN	
or WLC 202J	INTERM FORGN LANG II:JAPANESE	
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN	
WLC 204	INTERNATIONAL CINEMA	

PHL 101	INTRODUCTION TO PHILOSOPHY
PHL 102	INTRO TO ETHICS
PHL 103	INTRODUCTION TO LOGIC
PHL 150	TECH, SCIENCE & HUMAN VALUES
WGS 200	INTRO WOMEN'S & GENDER STUDIES
AMS 229	ANCIENT & MEDIEVAL WORLDS
ARH 100	ARH SURV:ANCIENT-MEDIEVAL
ARH 101	ARH SURV:RENAISSANCE-MODERN
ARH 103	ARH SUR:NON-WESTERN TRADITIONS
ARS 160	DRAWING: FOUNDATIONS
TH 122	THEATRE APPRECIATION
TH 123	INTRO TO FILM STUDIES
MU 100	INTRO TO MUSIC LITERATURE

Area III: Mathematics and Sciences**11-12****Mathematics** **3-4**

MA 105	NATURE OF MATHEMATICS
MA 107	ALGEBRA WITH APPLICATIONS
MA 110	FINITE MATHEMATICS
MA 112	PRECALCULUS ALGEBRA
MA 113	PRECALCULUS TRIGONOMETRY
MA 115	PRECALCULUS ALGEBRA & TRIG
MA 120	MATH PROFESSIONAL APPLICATIONS
MA 171	CALCULUS A

Natural Sciences (Lab)**8**

AST 100	SURVEY OF ASTRONOMY
AST 106	EXPLORING THE COSMOS I
AST 107	EXPLORING THE COSMOS II
BYS 109	FUNDAMENTALS OF BIOLOGY
BYS 119	PRINCIPLES OF BIOLOGY
BYS 120	ORGANISMAL BIOLOGY
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB
ESS 103	ENVIRONMENTAL EARTH SCIENCE
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG
PH 100	CONCEPTUAL PHYSICS
PH 101	GENERAL PHYSICS I
PH 102	GENERAL PHYSICS II
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III

Area IV: History and Social and Behavioral Sciences***12****History** **3-6**

HY 103	WORLD HISTORY TO 1500
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HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Sciences		6-9
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
ESS 105	WORLD REGIONAL GEOGRAPHY	
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS	
PY 101	GENERAL PSYCHOLOGY I	
PY 201	LIFE-SPAN DEVELOPMENT	
SOC 100	INTRO TO SOCIOLOGY	
SOC 102	ANALYSIS OF SOCIAL PROBLEMS	
SOC 103	INTRO TO CRIMINOLOGY	
SOC 105	INTRO CULTURAL ANTHROPOLOGY	

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). In Area V, take no more than six hours in a single discipline from Areas II, III, or IV. Area V should cover a breadth of disciplinary study.

Code	Title	Semester Hours
Pre-Professional		19
WLC 101, 102, 201, or 202		
PSC 101, 102, and 103 will double count in Major and Pre-Professional area. No other PSC class may count in Area IV of the GER.		
Pre-professional electives: Choose 7 credit hours from the approved list above in Humanities, Fine Arts, Mathematics, History, Science, or Social and Behavioral Sciences. These are additional classes that are not fulfilling the requirements above.		
Political Science Courses		36
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
PSC 103	INTRO TO STATE & LOCAL GOVT	
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS	
PSC 330	CLASSI POLITI PHILOSOPHY	
or PSC 332	MODERN POLITICAL PHILOSO	
PSC 484	SENIOR SEMINAR	
PSC Elective 100+		
Choose four PSC Electives 300+		
PSC 300	INTRO SOCIAL SCIENCE STATISTIC	3
Minor Courses		18+
Elective Courses		
Elective hours vary by program, see advisor.		
Total Semester Hours		120

Students with a major in Political Science must choose either a minor from another discipline or 21 semester hours of cognate studies involving courses from two or more disciplines, of which 12 semester hours must be in upper-level courses with a minimum of six semester hours from each discipline. Students are advised to officially declare a major and to obtain a Program of Study by meeting with an advisor in the College of Arts, Humanities, and Social Sciences. After the Program of Study is completed, a Political Science academic advisor will be assigned to the student and will meet with him or her in the Program of Study development process. Transfer students are advised to consult with the chair of the department before scheduling courses.

JUMP Program in Political Science

Through the Joint Undergraduate Master's Program (JUMP) undergraduate students majoring in Political Science may take up to 12 semester hours of approved courses at the graduate level while completing their BA degrees. These courses double-count toward both the BA in Political Science and the MA in Public Affairs degrees at UAH, allowing students to earn their MA degree more rapidly.

Students admitted to the JUMP program continue to pay undergraduate tuition for the graduate courses they take as part of the program, do not have to take the Graduate Record Examination (GRE), and do not have to pay a Graduate School application fee.

Students must apply and be accepted into the program, before they may take coursework that will count toward both degree programs. Students must meet the following criteria:

- Have advanced Sophomore or Junior standing
- Have a cumulative GPA of 3.25 or better
- Have completed at least nine semester hours of PSC coursework at UAH, with at least six semester hours at the 300-level or above

Year 1

		Semester Hours
Fall		
EH 101	COLLEGE WRITING I	3
Math		3
Fine Arts		3
PSC 101	INTRO TO AMERICAN GOVERNMENT	3
FYE 101	CHARGER SUCCESS	1
Term Semester Hours:		13

Spring

EH 102	COLLEGE WRITING II	3
Humanities		3
PSC 103	INTRO TO STATE LOCAL GOVT	3
Science w/Lab		4
Social/Behavioral Science		3
Term Semester Hours:		16

Year 2

Fall		
WLC 101		3
EH 207	READINGS LITERATURE/CULTURE I	3
or EH 208	or READINGS LITERATURE/CULTURE 2	
PSC 102	INTRO TO COMPARATIVE POLITICS	3
Social/Behavioral Science		3
Science w/Lab		4
Term Semester Hours:		16

Spring

EH 207	READINGS LITERATURE/CULTURE I	3
or EH 208	or READINGS LITERATURE/CULTURE 2	
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS	3
HY 103	WORLD HISTORY TO 1500	3
or HY 104	or WORLD HISTORY SINCE 1500	
Area V Courses		6
Term Semester Hours:		15

Year 3

Fall		
PSC 300	INTRO SOCIAL SCIENCE STATISTIC	3
HY 103	WORLD HISTORY TO 1500	3
or HY 104	or WORLD HISTORY SINCE 1500	
Area V Course		3
PSC 330	CLASSI POLITI PHILOSOPHY	3

or PSC 332	or MODERN POLITICAL PHILOSO	
Minor Course		3
Term Semester Hours:		15
Spring		
PSC 300+ Courses		6
Minor Courses		6
Elective		3
Term Semester Hours:		15
Year 4		
Fall		
PSC 484	SENIOR SEMINAR	3
PSC 300+ Courses		6
Minor Courses		6
Term Semester Hours:		15
Spring		
Minor Courses		6
PSC Elective		3
Electives		6
Term Semester Hours:		15
Total Semester Hours:		120

Political Science Minor

The student choosing a Minor in Political Science must take 21 semester hours of coursework including:

Code	Title	Semester Hours
PSC 101	INTRO TO AMERICAN GOVERNMENT	3
PSC 102	INTRO TO COMPARATIVE POLITICS	3
PSC 103	INTRO TO STATE & LOCAL GOVT	3
or PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS	
PSC 300-level or above		12
Total Semester Hours		21

Psychology

Morton Hall 206
 Telephone: 256.824.6191
 Email: psychol@uah.edu

The Department of Psychology offers B.A. and M.A. degrees in psychology. Psychology is an exciting and interesting scientific field that concerns why people think and behave the way they do. It is a tremendously varied field and a discipline with a bright and promising future. Though relatively young, psychology is an expansive discipline that incorporates topics from other disciplines such as biology, business, engineering, and education. Studying psychology requires students to solve problems, reason verbally and quantitatively, organize material, think critically, communicate clearly, and work effectively with others. At UAH, the psychology department is small and very student-centered. Students may take courses in clinical and counseling, experimental, social, developmental, cognitive, perceptual, biological, personality, industrial, and human factors psychology. In particular, students are required to gain an appreciation of the methods and tools used by psychologists to perform research or apply psychological principles in applied settings. Our capstone course in supervised research (PY 498) allows majors in the Psychological Sciences track to demonstrate those skills working with individual faculty members. Students in the Psychological Services track complete an internship as part of their capstone course (PY 488).

The Department of Psychology offers the following degree programs:

- Psychology, BA (p. 179)

There are two tracks within the psychology degree - the Psychological Sciences Track, for those interested in research and pursuing an advanced degree within any area of Psychology, and the Psychological Services Track, for those interested in human services and pursuing a master's in counseling, social work, or a Psy.D. degree.

Mission

The focus of the Department of Psychology is threefold:

- teaching
- scholarship
- service

Consequently, the mission of the department centers upon the development of students, development of faculty and scholarly activities, and service to scholarly and professional societies as well as to appropriate communities, including those within UAH.

The Department of Psychology supports the Mission of the College of Arts, Humanities, and Social Sciences in a variety of ways. We provide close interactions between teachers and learners in our seminar courses, as well as in our research courses and internship opportunities. The Department of Psychology encourages personal and professional growth in its promotion of students' career exploration, knowledge acquisition, skill development (i.e., critical thinking, technical writing, oral communication, and statistical analyses), and valuation of diversity.

Social Science Composite for Secondary Education Majors

Students planning to teach psychology in secondary schools will need to complete the Social Science Composite which includes courses in history, psychology, sociology, political science, and economics. The psychology courses included in this composite are PY 101, PY 102, and PY 375. Students seeking certification in secondary education should contact the Education Department for specific requirements.

Major in Psychology

- Psychology, BA (p. 179)

Minor in Psychology

- Psychology (p. 186)

PY 101 - GENERAL PSYCHOLOGY I

Semester Hours: 3

Introduction to methods and research findings in the field. Topics include learning, memory, cognition, human development, personality theories, and abnormal behavior. Credit for PY 101 may be obtained by either Advanced Placement (AP) or the College Level Examination Program (CLEP).

PY 102 - APPLICATIONS IN PSYCHOLOGY

Semester Hours: 3

Introduction to applied topics in psychology, such as statistical analysis, counseling, human factors, health psychology, and industrial and organizational psychology. Career opportunities are discussed. Students are required to engage in approved experiential activities such as participating in current research studies and attending lectures. Prerequisite: PY 101.

PY 201 - LIFE-SPAN DEVELOPMENT

Semester Hours: 3

Examination of the psychological, social, and physical factors that affect human behavior and development from conception to death. Prerequisite: PY 101.

PY 300 - PSYCHOLOGICAL STATISTICS

Semester Hours: 3

Introduction to psychological statistics, with an emphasis on quantitative analysis of experimental data. Topics covered include probability, descriptive statistics, and hypothesis testing. Prerequisite: MA 107 or MA 110 or MA 112 or MA 113 or MA 115 or MA 120 or MA 171. Corequisite: PY 300L.

PY 300L - PSYCHOLOGICAL STATISTICS LAB

Semester Hour: 1

This course has been changed to PY 304 effective Fall 2020 semester.

PY 301 - PERSONALITY

Semester Hours: 3

Examinations of various theories of personality with possible implications for research. Prerequisite: PY 102.

PY 302 - EXPERIMENTAL PSYCHOLOGY

Semester Hours: 4

Design and execution of experiments in psychology. Data analysis and manuscript preparation. Prerequisite: PY 102 and PY 300 and PY 300L OR AHS 300.

PY 303 - PY RESEARCH METHODS

Semester Hours: 3

Students will learn the fundamentals of psychological research - how to form research questions and hypotheses, select an appropriate design to ethically address specific research questions, and how to critically evaluate research and findings. Student will also be taught about creating surveys, interviewing and observing participants. Prerequisites: PY 101, PY 102, PY 300 and PY 300L.

PY 303L - PY RESEARCH METHODS LAB

Semester Hour: 1

This course has been changed to PY 305 effective Fall 2020 semester.

PY 304 - PSYCHOLOGICAL STATISTICS LAB

Semester Hour: 1

This course is an introduction to analyzing data with computerized statistical software. This course will provide students with a familiarity of SPSS, and the abilities to analyze experimental data, read computer statistical output and write-up statistical results. Corequisite: PY 300.

PY 305 - PY RESEARCH METHODS LAB

Semester Hour: 1

Lab associated with PY 303. Covers the design and execution of quantitative and qualitative research designs, data analysis, and manuscript preparation.

PY 316 - PERCEPTION

Semester Hours: 3

Examines sensory systems and elements of perception. Topics include vision research, audition, chemical senses, and body sensations. Prerequisite: PY 102.

PY 317 - PHILOSOPHY OF MIND

Semester Hours: 3

The problem of the nature of mind and its relationship to the physical world has been a perennial concern of philosophy. This course examines, theories, and arguments concerning the nature of mind. Prerequisite: PY 102.

PY 324 - WORK DESIGN

Semester Hours: 3

Introduces the portion of the design process that uses basic principles of methods analysis and ergonomics to fit a task to the human operator. Methods analysis topics include: work measurement, job analysis, and job evaluation. Prerequisite: PY 300 or ISE 390.

PY 330 - NONVERBAL COMMUNICATION

Semester Hours: 3

Examines the diversity of human nonverbal behavior and its influences on everyday communication experiences. Same as CM 330. Prerequisite: PY 101.

PY 333 - PY OF ADJUSTMENT & ADAPTATION

Semester Hours: 3

PY 333 will explore psychological approaches to understanding, managing, and modifying our physical and emotional well-being. Students will learn ways to apply psychological principles and concepts to enhance coping with various issues of adulthood. Relationships with others, the environment and the self will be examined. Prerequisites: PY 101 and PY 102.

PY 375 - SOCIAL PSYCHOLOGY

Semester Hours: 3

Examination of the social influences on both individual and group behavior. Topics may include attitudes, group processes, intergroup conflict, interpersonal attraction, aggression, altruism, and impression formation. Prerequisite: PY 101 or SOC 100.

PY 399 - PROFESSIONAL DEV FOR PSY MAJOR

Semester Hour: 1

Development of skills related to graduate work and to occupations in psychology. Career and internship exploration, resume and graduate school exploration. Exposure to work and research related topics, such as teamwork and ethics. Prerequisite: PY 102.

PY 400 - INTRO TO CLINICAL & COUNSELING

Semester Hours: 3

PY 400 introduces clinical/counseling psychology and professional psychology. History of diagnosis and treatment, theoretical models in counseling, contemporary practice models, research basis of clinical/counseling psychology, empirically validated therapies, and doctoral program models are covered. Prerequisite: PY 101 and Sophomore standing or higher.

PY 402 - INDUSTRIAL & ORGANIZA PSY

Semester Hours: 3

Application of basic principles of learning, motivation, and perception to typical industrial and organizational problems. Open to students who have completed 15 hours of psychology. Prerequisite: PY 102.

PY 403 - HUMAN FACTORS PSYCHOLOGY

Semester Hours: 3

Human performance in human-technology-environment systems. Includes consideration of human capabilities and limitations as related to controls and displays. Open to students who have completed 15 hours of psychology. Prerequisite: PY 102.

PY 404 - THEORIES OF COUNSELING

Semester Hours: 3

This course is designed to introduce theories of psychotherapy and the process of psychotherapy and counseling. This course is a survey of counseling/psychotherapy models and techniques with emphasis on Empirically Validated Therapies (EVT) and traditional models with substantial support in the research and clinical literature.

PY 405 - PSYCHOPHARMACOLOGY

Semester Hours: 3

Introduction to drug classification and action with emphasis on physiological psychological interactions. Open to students who have completed 15 hours of psychology. Prerequisite: PY 102.

PY 406 - PSYCHOLOGY OF WOMEN

Semester Hours: 3

Examines theory and research in the psychological functioning of women, both in the United States and other nations. Topics include achievement and education, mental and physical health issues, and victimization of women. Open to students who have completed 15 hours of psychology. Senior Standing Prerequisite: PY 102.

PY 407 - CROSS-CULTURAL PSYCHOLOGY

Semester Hours: 3

Examines psychological similarities and differences between members of industrialized and non-industrialized cultures. Comparisons will include development, social interaction, and perception. Open to students who have completed 15 hours of psychology. Senior Standing. Prerequisite: PY 102.

PY 408 - TEAMWORK & TEAM PROCESSES

Semester Hours: 3

This course provides an introduction to teams and teamwork processes. The foundation of the course is research-based; topics will be approached from the context of empirical research. The types of research designs that are typically used in team research are addressed. Junior Standing.

PY 409 - PSYCHOLOGY OF AGING

Semester Hours: 3

PY 409 examines psychological processes in adulthood and aging. Emphasis is placed on contemporary theories, methodological issues, and how psychological, biological, social, and environmental factors interact to predict growth, maintenance, or decline in abilities throughout adulthood and aging. Prerequisite: PY 101.

PY 410 - TASK ANALYSIS & PROTOTYPING

Semester Hours: 3

This course introduces students to methods for analyzing user actions as they interact with software and tools to complete tasks. Students apply a range of prototype techniques from fast, low-fidelity prototypes to interactive high-fidelity prototypes. Prerequisite: Junior Standing or higher.

PY 414 - HUMAN RESEARCH:LEARNING

Semester Hours: 3

Analysis of learning principles from simple relationships with animals to the complexities of human language and problem solving. Prerequisite: PY 102.

PY 415 - DEVELOPMENTAL PSYCHOLOGY

Semester Hours: 3

Examines sensory systems and elements of perception. Topics include vision research, audition, chemical senses, and body sensations. Prerequisite: PY 102.

PY 420 - SPECIAL TOPICS

Semester Hours: 3

Pre-announced special areas in seminar discussion, laboratory work, or practicum. May be taken twice for credit. Open to students who have completed 15 hours of psychology. Prerequisite: PY 102.

PY 422 - INDIVIDUAL RESEARCH

Semester Hours: 3

With advice of instructor, design and execution of original experiment in psychology. May be taken twice for credit. Open to students who have completed 15 hours of psychology. Prerequisite: PY 102.

PY 426 - HISTORY & SYSTEMS IN PSY

Semester Hours: 3

Survey of psychological theory and experimentation regarding human behavior and mental processes from ancient times to the present. Open to students who have completed 15 hours of psychology. Prerequisite: PY 102.

PY 430 - PSYCHOMETRICS

Semester Hours: 3

History and development of psychological testing with special emphasis given to both theory and process of effective evaluation. Prerequisite: PY 300.

PY 434 - PSYCHOLOGY AND LAW

Semester Hours: 3

This seminar is a survey of the major topics represented in the field of Psychology and Law. We will focus on how psychological research can contribute to a better understanding of issues related to law. Open to students who have completed 15 hours of psychology. Prerequisite: PY 302.

PY 435 - PSYCHOPATHOLOGY

Semester Hours: 3

Survey of major psychological approaches to conceptualizing abnormal behavior, with discussion of present diagnostic categories of psychological disorders. Open to students who have completed 15 hours of psychology. Prerequisite: PY 102.

PY 436 - BIOLOGICAL PSYCHOLOGY

Semester Hours: 3

Neural and endocrinological systems underlying behavior. Open to students who have completed 15 hours of psychology. Prerequisites: (either a or b): (a) 15 hrs of PY or approval of instructor; (b) BYS 119 and BYS 120 and 6 hours of PY or approval of instructor. Same as BYS 436.

PY 437 - PSYCHOBIOLOGY STRESS & ILLNESS

Semester Hours: 3

Overview of physiological stress responses and their influence on health behavior and illness. Open to students who have completed 15 hours of psychology. Prerequisite: PY 102.

PY 480 - COGNITION

Semester Hours: 3

Information processing: how information is acquired, encoded, organized, stored, and retrieved. This process will be applied to specific areas of psychology such as language, learning, or personality. Prerequisite: PY 102.

PY 488 - PY SERVICES INTERNSHIP

Semester Hours: 1-3

This course provides a supervised experience in a professional environment for students to apply their psychological skills to projects outside the classroom, facilitate their entry into the job market in psychological services after graduation, and enhance their pre-professional experience. Prerequisites: 18 hrs of Psychology courses; junior or senior standing; minimum 2.5 GPA in major, chair's approval.

PY 490 - READINGS IN PSYCHOLOGY

Semester Hours: 3

Supervised in-depth readings in area of particular interest to student. May be taken twice for credit. Open to students who have completed 15 hours of psychology. Prerequisite: PY 102.

PY 491 - SPECIAL TOPICS IN PSYCHO

Semester Hour: 1

Pre-announced special areas in seminar discussion, laboratory work, or practicum. May be taken twice for credit. Open to students who have completed 15 hours of psychology. Prerequisite: PY 102.

PY 492 - SPECIAL TOPICS IN PSYCHO

Semester Hours: 2

Pre-announced special areas in seminar discussion, laboratory work, or practicum. May be taken twice for credit. Open to students who have completed 15 hours of psychology. Prerequisite: PY 102.

PY 498 - HUMAN RESEARCH I

Semester Hours: 3

Capstone course for the PY major. Human behavior observation and/or experimentation. Students engage in data collection and analysis, and report their findings. Offered Fall Semester only. Prerequisite: PY 302.

PY 499 - HUMAN RESEARCH II

Semester Hours: 3

Continuation of PY 498. Open to students who have completed 15 hours of psychology. Prerequisite: PY 498 and approval of instructor. Offered Spring Semester only.

Psychology, BA

The program of study for a psychology major includes 35 semester hours of psychology with at least 26 semester hours numbered 300 or above. In addition, the psychology major must be accompanied by a minor that meets the requirements designated by the selected discipline. Course work required for the major is specified below in Curriculum for Majors.

- Psychology, BA requires 120 credit hours.
- 36 of 120 credit hours must be taken at 300 level or higher.
- Must have a 2.0 GPA in major, minor, and overall.
- No more than 6 credit hours of HPE may count in degree requirements.
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- No more than 60 credit hours from a two-year school can be applied toward a UAH degree.
- All double counting of classes must be approved through the CAHS Advising Office.
- For graduation application instructions, see here (p. 812).

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	

EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S	INTRO FOREIGN LANG I: SPANISH	
or WLC 101A	INTRO FOREIGN LANG I: ARABIC	
or WLC 101F	INTRO FOREIGN LANG I:FRENCH	
or WLC 101G	INTRO FOREIGN LANG I:GERMAN	
or WLC 101J	INTRO FOREIGN LANG I:JAPANESE	
or WLC 101R	INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S	INTRO FOREIGN LANG II:SPANISH	
or WLC 102A	INTRO FOREIGN LANG II: ARABIC	
or WLC 102F	INTRO FOREIGN LANG II:FRENCH	
or WLC 102G	INTRO FOREIGN LANG II:GERMAN	
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE	
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN	
WLC 201S	INTERM FOREIGN LANG:SPANISH	
or WLC 201A	INTERM FOREIGN LANG I: ARABIC	
or WLC 201F	INTERM FOREIGN LANG:FRENCH	
or WLC 201G	INTERM FOREIGN LANG:GERMAN	
or WLC 201J	INTERM FOREIGN LANG: JAPANESE	
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN	
WLC 202S	INTERM FOREIGN LANG II:SPANISH	
or WLC 202A	INTERM FOREIGN LANG II: ARABIC	
or WLC 202F	INTERM FOREIGN LANG II:FRENCH	
or WLC 202G	INTERM FOREIGN LANG II:GERMAN	
or WLC 202J	INTERM FORGN LANG II:JAPANESE	
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN	
WLC 204	INTERNATIONAL CINEMA	
PHL 101	INTRODUCTION TO PHILOSOPHY	
PHL 102	INTRO TO ETHICS	
PHL 103	INTRODUCTION TO LOGIC	
PHL 150	TECH, SCIENCE & HUMAN VALUES	
WGS 200	INTRO WOMEN'S & GENDER STUDIES	
AMS 229	ANCIENT & MEDIEVAL WORLDS	
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Area III: Mathematics and Sciences		11-12
Mathematics		3-4
MA 105	NATURE OF MATHEMATICS	
MA 107	ALGEBRA WITH APPLICATIONS	
MA 110	FINITE MATHEMATICS	
MA 112	PRECALCULUS ALGEBRA	
MA 113	PRECALCULUS TRIGONOMETRY	
MA 115	PRECALCULUS ALGEBRA & TRIG	
MA 120	MATH PROFESSIONAL APPLICATIONS	
MA 171	CALCULUS A	

Natural Sciences (Lab)		8
AST 100	SURVEY OF ASTRONOMY	
AST 106	EXPLORING THE COSMOS I	
AST 107	EXPLORING THE COSMOS II	
BYS 109	FUNDAMENTALS OF BIOLOGY	
BYS 119	PRINCIPLES OF BIOLOGY	
BYS 120	ORGANISMAL BIOLOGY	
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I	
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB	
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB	
ESS 103	ENVIRONMENTAL EARTH SCIENCE	
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG	
PH 100	CONCEPTUAL PHYSICS	
PH 101	GENERAL PHYSICS I	
PH 102	GENERAL PHYSICS II	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	
Area IV: History and Social and Behavioral Sciences*		12
History		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Sciences		6-9
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
ESS 105	WORLD REGIONAL GEOGRAPHY	
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS	
PY 101	GENERAL PSYCHOLOGY I	
PY 201	LIFE-SPAN DEVELOPMENT	
SOC 100	INTRO TO SOCIOLOGY	
SOC 102	ANALYSIS OF SOCIAL PROBLEMS	
SOC 103	INTRO TO CRIMINOLOGY	
SOC 105	INTRO CULTURAL ANTHROPOLOGY	

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). In Area V, take no more than six hours in a single discipline from Areas II, III, or IV. Area V should cover a breadth of disciplinary study.

Sciences Track

Code	Title	Semester Hours
Pre-Professional		19
WLC 101, 102, 201, or 202		
PY 101 will share between the major and Pre-Professional area. PY 101 may not also count in Area IV of the GER.		
Choose 13 credit hours from the above listed Fine Arts, Humanities, History, Mathematics, Sciences, or Social and Behavioral Sciences.		
Psychology Courses for Psychological Sciences Track		
PY 101	GENERAL PSYCHOLOGY I	3
PY 102	APPLICATIONS IN PSYCHOLOGY	3
PY 300	PSYCHOLOGICAL STATISTICS	3
PY 304	PSYCHOLOGICAL STATISTICS LAB	1
PY 302	EXPERIMENTAL PSYCHOLOGY	4
PY 498	HUMAN RESEARCH I	3
Select 2 courses from Group A		6
PY 316	PERCEPTION	
PY 414	HUMAN RESEARCH:LEARNING	
PY 436	BIOLOGICAL PSYCHOLOGY	
PY 480	COGNITION	
Select 2 courses from Group B		6
PY 301	PERSONALITY	
PY 375	SOCIAL PSYCHOLOGY	
PY 415	DEVELOPMENTAL PSYCHOLOGY	
PY 435	PSYCHOPATHOLOGY	
PY Elective 300+		3
PY Elective 200+		3
Minor Courses		18+
Elective Courses		
Elective courses vary by program, see advisor.		
Total Semester Hours		120

Services Track

Code	Title	Semester Hours
Pre-Professional Area		19
WLC 101, 102, 201, or 202		
PY 101 will share between in the major and Pre-Professional Area. PY 101 may not also count in Area IV of the GER.		
PHL 102	INTRO TO ETHICS	
SOC 100	INTRO TO SOCIOLOGY	
Choose 7 additional credit hours from the above listed Fine Arts, Humanities, Literature, Mathematics, Sciences, History, and Social and Behavioral Sciences.		
Psychology Courses for Psychological Services Track		35
PY 101	GENERAL PSYCHOLOGY I	3
PY 102	APPLICATIONS IN PSYCHOLOGY	3
PY 300	PSYCHOLOGICAL STATISTICS	3
PY 304	PSYCHOLOGICAL STATISTICS LAB	1
PY 303	PY RESEARCH METHODS	3
PY 305	PY RESEARCH METHODS LAB	1
PY 488	PY SERVICES INTERNSHIP	3
Basis of Behavior Core - Choose 3 classes from this list, one from three different rows.		9
Psychological Basis of Behavior: PY 414, PY 415, or PY 480		
Individual Basis of Behavior: PY 435 or PY 301		
Interpersonal Basis of Behavior: PY 333 or PY 316		
Social Basis of Behavior: PY 375 or SOC 319		

Psychological Services Core - Choose 2 classes from this list, one from two different rows.		6
PY 404	THEORIES OF COUNSELING	
PY 407	CROSS-CULTURAL PSYCHOLOGY	
or SOC 330	RACE AND ETHNICITY	
PY 409	PSYCHOLOGY OF AGING	
or PY 330	NONVERBAL COMMUNICATION	
PY 430	PSYCHOMETRICS	
Any Basis of Behavior Class not taken as part of that requirement		
Psychological Services Electives - Choose 1 class from this list.		3
Any Basis of Behavior Class not previously selected		
Any PY Services Core Class not previously selected		
PY 436, PY 437, PY 420, PY 405, or PY 400		
Minor Courses		18+
Elective Courses		
Elective courses vary by program, see advisor.		
Total Semester Hours		120

Psychological Sciences Track

Year 1

Fall		Semester Hours
EH 101	COLLEGE WRITING I	3
PY 101	GENERAL PSYCHOLOGY I	3
Math		3
FYE 101	CHARGER SUCCESS	1
Fine Arts		3
Term Semester Hours:		13
Spring		
PY 102	APPLICATIONS IN PSYCHOLOGY	3
EH 102	COLLEGE WRITING II	3
Science w/Lab		4
Social/Behavioral Science		3
Humanities or Fine Arts		3
Term Semester Hours:		16

Year 2

Fall		
WLC 101		3
EH 207	READINGS LITERATURE/CULTURE I	3
or EH 208	or READINGS LITERATURE/CULTURE 2	
PY 300	PSYCHOLOGICAL STATISTICS	3
PY 304	PSYCHOLOGICAL STATISTICS LAB	1
HY 103	WORLD HISTORY TO 1500	3
or HY 104	or WORLD HISTORY SINCE 1500	
Science w/Lab		4
Term Semester Hours:		17
Spring		
EH 208	READINGS LITERATURE/CULTURE 2	3
or EH 207	or READINGS LITERATURE/CULTURE I	
HY 103	WORLD HISTORY TO 1500	3
or HY 104	or WORLD HISTORY SINCE 1500	
PY 302	EXPERIMENTAL PSYCHOLOGY	4
Social/Behavioral Science		3

Area V Course		3
Term Semester Hours:		16
Year 3		
Fall		
Area V Courses		6
Minor Course		3
PY Group A Course		3
PY Group B Course		3
Term Semester Hours:		15
Spring		
PY Group B Course		3
PY 300+ Elective		3
Minor Course		3
Area V Courses		6
Term Semester Hours:		15
Year 4		
Fall		
PY Group A Course		3
Minor Courses		6
Elective		2
PY 498	HUMAN RESEARCH I	3
Term Semester Hours:		14
Spring		
PY Elective		3
Minor Courses		9
Elective		2
Term Semester Hours:		14
Total Semester Hours:		120

Psychological Services Track

Year 1		
Fall		Semester Hours
EH 101	COLLEGE WRITING I	3
PY 101	GENERAL PSYCHOLOGY I	3
Math		3
FYE 101	CHARGER SUCCESS	1
Fine Arts		3
Term Semester Hours:		13
Spring		
PY 102	APPLICATIONS IN PSYCHOLOGY	3
EH 102	COLLEGE WRITING II	3
Science w/ Lab		4
Social/Behavioral Science		3
Humanities or Fine Arts		3
Term Semester Hours:		16
Year 2		
Fall		
WLC 101		3
EH 207	READINGS LITERATURE/ CULTURE I	3
or EH 208	or READINGS LITERATURE/ CULTURE 2	

PY 300	PSYCHOLOGICAL STATISTICS	3
PY 304	PSYCHOLOGICAL STATISTICS LAB	1
HY 103 or HY 104	WORLD HISTORY TO 1500 or WORLD HISTORY SINCE 1500	3
Science w/ Lab		4
Term Semester Hours:		17
Spring		
EH 208 or EH 207	READINGS LITERATURE/ CULTURE 2 or READINGS LITERATURE/ CULTURE I	3
HY 103 or HY 104	WORLD HISTORY TO 1500 or WORLD HISTORY SINCE 1500	3
PY 303	PY RESEARCH METHODS	3
PY 305	PY RESEARCH METHODS LAB	1
Social/Behavioral Science		3
Area V Course		3
Term Semester Hours:		16
Year 3		
Fall		
Area V Courses		6
Minor Course		3
Basis of Behavior Courses		6
Term Semester Hours:		15
Spring		
Basis of Behavior Course		3
PY Services Core Course		3
Minor Course		3
Area V Courses		6
Term Semester Hours:		15
Year 4		
Fall		
PY Services Core Course		3
PY Services Elective Course		3
Minor Courses		6
Elective		2
Term Semester Hours:		14
Spring		
PY 488	PY SERVICES INTERNSHIP	3
Minor Courses		9
Elective		2
Term Semester Hours:		14
Total Semester Hours:		120

Students in the Psychology, BA program have the choice of two tracks: Psychological Services or Psychological Science. For more information on each, please see below:

- Psychology, BA - Psychological Services Track (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/psychology/psychology-ba-psychological-services-track/>)
- Psychology, BA - Psychological Science Track (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/psychology/psychology-ba-psychological-science-track/>)

Psychology Minor

A minor in psychology consists of 21 semester hours of psychology courses of which 12 semester hours must be numbered 300 or above. Course work required for the minor is specified below.

Curriculum for Minors

Code	Title	Semester Hours
PY 101	GENERAL PSYCHOLOGY I	3
PY 102	APPLICATIONS IN PSYCHOLOGY	3
Select one course from Group A:		3
Group A:		
PY 316	PERCEPTION	
PY 414	HUMAN RESEARCH:LEARNING	
PY 480	COGNITION	
PY 436	BIOLOGICAL PSYCHOLOGY	
Select one course from Group B:		3
Group B:		
PY 301	PERSONALITY	
PY 375	SOCIAL PSYCHOLOGY	
PY 415	DEVELOPMENTAL PSYCHOLOGY	
PY 435	PSYCHOPATHOLOGY	
PY electives (6 semester hours must be 300-level or above)		9
Total Semester Hours		21

Sociology

Morton Hall 206
 Telephone: 256.824.6190
 Email: soc@uah.edu

Sociology is a fascinating subject which explores patterns and trends in human behavior, society, and culture. Sociology takes a broad and holistic view of the contexts in which individuals, groups, organizations, and institutions operate. This understanding is indispensable to analysis and decision-making in a wide range of social settings and the development of thoughtful and engaged citizenship. Sociologists bring scientific tools and perspectives to understand causes and consequences of contemporary social issues and problems, and analyze the impact of social policies on groups and organizations. The best sociological analyses combine a focus on important details with analyses about how the details relate to 'the big picture.' A B.A. in Sociology provides a broad foundation for further studies in law, social work, social policy, psychology, criminology, or public health. Analytical and social science research skills prepare students for careers in market research, human services, government, health care, and law. The B.A. Sociology program at UAH emphasizes the development of both *academic* and *applied skills* that can be useful in a wide range of work settings.

The Department of Sociology offers the following degree programs:

- Sociology, BA (p. 190)
- Sociology Minor (p. 187)
- Certificate in Social Data Analysis (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/sociology/social-data-analysis/>)

Mission

We are committed to providing all students with the knowledge and skills that derive from a sociological perspective. Our curriculum encompasses core areas in the discipline with courses in sociological theory, social inequality, social institutions, social change and sociological methodology. Students may use the sociological perspective in pursuing further studies in the discipline, at work in diverse settings, and as thoughtful and involved members of their communities. Our instructional mission is enhanced by faculty with active research agendas, who explore a variety of social processes and apply to these studies a variety of research techniques. When they bring their expertise to bear on social issues, the faculty also serve the University and the community at large.

The UAH Department of Sociology offers the B.A. with a major in sociology and a minor in sociology.

For more information on the field of sociology and the UAH Sociology Department, please consult our webpage, www.uah.edu/sociology (<http://www.uah.edu/sociology/>).

Major in Sociology

- Sociology, BA (p. 190)

Minors in Sociology

- Sociology (p. 194)

Certificates in Sociology

- Social Data Analysis Certificate (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/sociology/social-data-analysis/>)

SOC 100 - INTRO TO SOCIOLOGY

Semester Hours: 3

An introduction to the critical and scientific study of society, culture, social institutions and social change. Illuminates the social and cultural context of our lives and is useful for exploring contemporary social issues, problems and change in society.

SOC 102 - ANALYSIS OF SOCIAL PROBLEMS

Semester Hours: 3

Application of the sociological perspective to understanding the 'social problems process.' Among other things, the course addresses how some troubling social conditions come to be identified as 'problems' while others do not, as well as how some 'solutions' (e.g. policies) are implemented while others are not.

SOC 103 - INTRO TO CRIMINOLOGY

Semester Hours: 3

A broad introduction to the sociological study of crime and the criminal justice system in the United States exploring sources of crime, measurement of crime, theories of crime, and the criminal justice system.

SOC 105 - INTRO CULTURAL ANTHROPOLOGY

Semester Hours: 3

Cultural anthropology is one of the four sub-fields of anthropology concerned with a deeper understanding of cultural differences. This course examines cultural diversity in human behavior, social institutions, belief systems, and cultural change from a global and comparative perspective.

SOC 206 - MARRIAGE AND FAMILY

Semester Hours: 3

Explores family forms and functions across history and across cultures. Students will learn how the family affects and is affected by other social institutions, recent trends in the American family, the contexts in which marriage and families evolve, and key inequalities within and between families. Prerequisite: SOC 100.

SOC 301 - RESEARCH METHODS

Semester Hours: 3

The object of this course is for students to be able to read, interpret, and explain scientific research in social science. Course covers key elements and process of sociological research methods, both qualitative and quantitative.

SOC 302 - SOCIOLOGICAL THEORY

Semester Hours: 3

This course traces the development of major trends of sociological theory, past and present, and major theoretical problem areas. It also addresses how the socio-historical context within which the texts were written influences the issues and ideas expressed. Prerequisite: SOC 100.

SOC 303 - STATISTICS/SOCIAL SCIENCES

Semester Hours: 3

Introduction to the basic quantitative data analysis techniques used by social scientists. Explore the ways researchers use statistics to examine and test ideas about the social world. In the lab, students learn how to use the statistical software SPSS to analyze social science datasets. Prerequisite: SOC 100 and one of the following math courses: MA 107, MA 110, MA 112, MA 113, MA 115, MA 120, MA 171.

SOC 304 - STATISTICS LAB

Semester Hour: 1

SOC 306 - SOCIOLOGY OF GENDER

Semester Hours: 3

Explores how social relationships create, structure and reinforce gender differences and inequalities. Students will learn about the social construction of gender, gender socialization, gender roles, and gender inequalities in income, poverty, occupation, and violence. Prerequisite: SOC 100.

SOC 307 - SOCIOLOGY OF LAW

Semester Hours: 3

This course examines the relationship between law and society from a variety of theoretical perspectives. Topics include the social organization of legal institutions, cultural meanings of law, and social interactions among different actors in the legal context (police, lawyers, judges, legislators, etc). Prerequisite: SOC 100.

SOC 309 - SOCIOLOGY OF SEXUALITY

Semester Hours: 3

A research based study of sexuality focusing on how it is constructed, experienced, challenged, and changed within society. Upon completion of the course students will be able to recognize, understand, and articulate how society both structures and is structured by sexuality. Prerequisite: SOC 100.

SOC 313 - QUALITATIVE RESEARCH METHODS

Semester Hours: 3

Teaches ethnography, interviewing, focus groups, and content analysis. Includes an in-class data analysis practicum. Upon completion, students will be able to understand, articulate, and assess qualitative methods as well as independently collect, analyze, and report findings from qualitative data. Prerequisite: SOC 100.

SOC 314 - DATA ANALYSIS

Semester Hours: 3

Quantitative analysis of real world data on social issues using the SPSS program. Prerequisite: SOC 303 and SOC 304 or equivalent and SOC 301 or permission of instructor.

SOC 319 - DEVIANCE & SOCIAL CONTROL

Semester Hours: 3

Examines several approaches to studying deviant behavior and its social control, with emphasis on the social construction of deviance and societal reactions to it. The focus is generally on deviation and control in the U.S. Prerequisite: SOC 100.

SOC 320 - SOCIOLOGY OF RELIGION

Semester Hours: 3

Study of religion as a social phenomenon. The course examines sociological theories of religious behavior, religious beliefs, religion as a social institution, religious organization, new religious movements, and religion and social change.

SOC 330 - RACE AND ETHNICITY

Semester Hours: 3

Examines the historical relationship between race, ethnicity and economic class/opportunity; and the social construction of ethnicity and race. The emphasis is on race and ethnicity in the U.S. with some discussion of international issues. Prerequisite: SOC 100.

SOC 340 - SPECIAL TOPICS

Semester Hours: 1-3

Nontraditional topics of current sociological interest. Title of course and number of credit hours when offered will appear in course schedule along with prerequisites necessary for admission to course. May be taken more than once for credit as long as subtitles differ. Prerequisite: SOC 100.

SOC 350 - SOCIAL STRATIFICATION

Semester Hours: 3

This course explores the causes and consequences of social stratification (focusing on economic inequality) in the United States, including: wealth and income disparities, labor markets, elites/power, impact of gender and race, privilege and oppression, and economic and social welfare policy. Prerequisite: SOC 100.

SOC 369 - ENVIRONMENTAL SOCIOLOGY

Semester Hours: 3

Examines the ways in which society and the natural environment interact and shape each other. This course engages with the major debates in the field of environmental sociology in order to better understand the challenges and options humans face as we head further into global environmental crisis. Prerequisite: SOC 100.

SOC 375 - SOCIAL PSYCHOLOGY

Semester Hours: 3

Fundamental principles of group processes, social influence, and group structure. Development of group solidarity, cohesion, intergroup conflict and cooperation, communication, leadership, opinion, propaganda, and suggestion. Prerequisites: SOC 100 or PY 101.

SOC 376 - MASS MEDIA IN AMERICA

Semester Hours: 3

Mass communication theory, history of American mass media, and criticism of contemporary forms and functions of mass media of communication in the U.S. Prerequisite: SOC 100.

SOC 382 - WHITE COLLAR CRIME

Semester Hours: 3

This course explores white collar crime in depth, considering both how it is defined and theoretical perspectives about why it occurs. Broadly, the course considers occupational crimes (e.g. embezzlement & employee theft), corporate crimes (e.g., securities fraud & price fixing), and political crimes (e.g., state corruption & repression). Students also discuss its costs to society, identifying both perpetrators and victims. Prerequisites: SOC 100 or SOC 103.

SOC 390 - READINGS & INDIVIDUAL RES

Semester Hours: 3

Supervised readings or in-depth research or both in area of specialized interest to student or instructor. May be taken twice for credit with advisor's approval. Prerequisite: SOC 100.

SOC 395 - COMMUNITY SERVICES INTERNSHIP

Semester Hours: 3

An experiential-learning course for students who envision working in social service organizations. Internship opportunity is initiated by student and course includes an academic component of readings and assignments agreed upon by student, organizational representative and the Internship Coordinator. Prerequisite: SOC 100.

SOC 425 - SOCIOLOGY OF EDUCATION

Semester Hours: 3

This course examines education systems and policies from a sociological perspective. We ask what and how students learn, the function of schools in society, results of recent policy decisions, and how educational systems interact with political, economic, cultural and family institutions. Prerequisite: SOC 100 and Junior or Senior Standing.

SOC 431 - ADVANCED SPECIAL TOPICS

Semester Hours: 3

Special topics of current sociological interest. Course title, credit hours and prerequisites will appear in course schedule. May be taken more than once for credit as long as subtitles differ. Different from SOC 340 Special Topics in terms of level of expectations and/or, prerequisites. Prerequisite: SOC 100.

SOC 435 - SOCIOLOGY OF SOCIAL MOVEMENTS

Semester Hours: 3

This course focuses on a variety of issues related to social movements, including questions about the origins and causes of social movements, the cultural, social and political contexts that impact movements, how movements mobilize people, and the use of strategies and tactics. Prerequisite: SOC 100 AND EITHER SOC 202 OR 300 OR 301.

SOC 444 - SOCIOLOGY OF CULTURE

Semester Hours: 3

Examines the cultural dimensions of important social processes including race, class, gender, power, and resistance. Theoretical and empirical analyses of both high and popular cultural forms and processes of cultural production in various social settings. Prerequisite: SOC 100.

SOC 469 - ENVIRONMENTAL JUSTICE

Semester Hours: 3

Examination of (1) how social, economic, and political processes at the local and global levels contribute the distribution of both environmental 'goods' (e.g., clean air and water) and environmental 'bad's (e.g., toxic waste and pollution); (2) the principles and strategies of the environmental justice movement; (3) the interrelations between local and global level processes and their impact upon environmental inequality and the efforts and opportunities of the environmental justice movement. Prerequisites: SOC 100.

SOC 495 - SENIOR CAPSTONE SEMINAR

Semester Hours: 3

This course allows senior sociology majors to transition from being consumers of sociological knowledge, to being producers and practitioners. Students can choose one of two tracks for this course: completing either an independent research project or an internship at a local social service organization.

Prerequisite: SOC 301.

Sociology, BA

Students who major in sociology must complete 34 semester hours of sociology courses. There are *six* required courses (SOC 100, SOC 301, SOC 302, SOC 303, SOC 304, SOC 495), and 21 of the 34 semester hours must be at the 300-level or above. Sociology majors planning their course of study should contact the department to learn about the timing and frequency of required course offerings.

- Sociology, BA requires 120 credit hours.
- 36 of 120 credit hours must be taken at 300 level or higher.
- Must have a 2.0 GPA in major, minor, and overall.
- No more than 6 credit hours of HPE may count in degree requirements.
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- No more than 60 credit hours from a two-year school can be applied toward a UAH degree.
- All double counting of classes must be approved through the CAHS Advising Office.
- For graduation application instructions, see here (p. 812).

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S or WLC 101A or WLC 101F or WLC 101G or WLC 101J or WLC 101R	INTRO FOREIGN LANG I: SPANISH INTRO FOREIGN LANG I: ARABIC INTRO FOREIGN LANG I:FRENCH INTRO FOREIGN LANG I:GERMAN INTRO FOREIGN LANG I:JAPANESE INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S or WLC 102A	INTRO FOREIGN LANG II:SPANISH INTRO FOREIGN LANG II: ARABIC	

or WLC 102F	INTRO FOREIGN LANG II:FRENCH
or WLC 102G	INTRO FOREIGN LANG II:GERMAN
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN
WLC 201S	INTERM FOREIGN LANG:SPANISH
or WLC 201A	INTERM FOREIGN LANG I: ARABIC
or WLC 201F	INTERM FOREIGN LANG:FRENCH
or WLC 201G	INTERM FOREIGN LANG:GERMAN
or WLC 201J	INTERM FOREIGN LANG: JAPANESE
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN
WLC 202S	INTERM FOREIGN LANG II:SPANISH
or WLC 202A	INTERM FOREIGN LANG II: ARABIC
or WLC 202F	INTERM FOREIGN LANG II:FRENCH
or WLC 202G	INTERM FOREIGN LANG II:GERMAN
or WLC 202J	INTERM FORGN LANG II:JAPANESE
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN
WLC 204	INTERNATIONAL CINEMA
PHL 101	INTRODUCTION TO PHILOSOPHY
PHL 102	INTRO TO ETHICS
PHL 103	INTRODUCTION TO LOGIC
PHL 150	TECH, SCIENCE & HUMAN VALUES
WGS 200	INTRO WOMEN'S & GENDER STUDIES
AMS 229	ANCIENT & MEDIEVAL WORLDS
ARH 100	ARH SURV:ANCIENT-MEDIEVAL
ARH 101	ARH SURV:RENAISSANCE-MODERN
ARH 103	ARH SUR:NON-WESTERN TRADITIONS
ARS 160	DRAWING: FOUNDATIONS
TH 122	THEATRE APPRECIATION
TH 123	INTRO TO FILM STUDIES
MU 100	INTRO TO MUSIC LITERATURE
Area III: Mathematics and Sciences	
Mathematics	
MA 105	NATURE OF MATHEMATICS
MA 107	ALGEBRA WITH APPLICATIONS
MA 110	FINITE MATHEMATICS
MA 112	PRECALCULUS ALGEBRA
MA 113	PRECALCULUS TRIGONOMETRY
MA 115	PRECALCULUS ALGEBRA & TRIG
MA 120	MATH PROFESSIONAL APPLICATIONS
MA 171	CALCULUS A
Natural Sciences (Lab)	
AST 100	SURVEY OF ASTRONOMY
AST 106	EXPLORING THE COSMOS I
AST 107	EXPLORING THE COSMOS II
BYS 109	FUNDAMENTALS OF BIOLOGY
BYS 119	PRINCIPLES OF BIOLOGY
BYS 120	ORGANISMAL BIOLOGY
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I

11-12

3-4

8

CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB
ESS 103	ENVIRONMENTAL EARTH SCIENCE
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG
PH 100	CONCEPTUAL PHYSICS
PH 101	GENERAL PHYSICS I
PH 102	GENERAL PHYSICS II
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III

Area IV: History and Social and Behavioral Sciences* **12**

History **3-6**

HY 103	WORLD HISTORY TO 1500
HY 104	WORLD HISTORY SINCE 1500
HY 221	UNITED STATES TO 1877
HY 222	UNITED STATES SINCE 1877

Social and Behavioral Sciences **6-9**

ECN 142	PRINC OF MACROECONOMICS
ECN 143	PRINC OF MICROECONOMICS
GS 200	GLOBAL SYSTEMS AND CULTURES
ESS 105	WORLD REGIONAL GEOGRAPHY
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY
PSC 101	INTRO TO AMERICAN GOVERNMENT
PSC 102	INTRO TO COMPARATIVE POLITICS
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS
PY 101	GENERAL PSYCHOLOGY I
PY 201	LIFE-SPAN DEVELOPMENT
SOC 100	INTRO TO SOCIOLOGY
SOC 102	ANALYSIS OF SOCIAL PROBLEMS
SOC 103	INTRO TO CRIMINOLOGY
SOC 105	INTRO CULTURAL ANTHROPOLOGY

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). In Area V, take no more than six hours in a single discipline from Areas II, III, or IV. Area V should cover a breadth of disciplinary study.

Code	Title	Semester Hours
Pre-Professional		19
WLC 101, 102, 201, or 202		
Choose 16 additional hours from the categories above Literature, Humanities, Fine Arts, Mathematics, Lab Science, and Social and Behavioral Sciences.		
Sociology Major Requirements		34
SOC 100	INTRO TO SOCIOLOGY	3
SOC 301	RESEARCH METHODS (Offered Fall Only)	3
SOC 302	SOCIOLOGICAL THEORY (Offered Spring only)	3
SOC 303	STATISTICS/SOCIAL SCIENCES	3
SOC 304	STATISTICS LAB	1
SOC 495	SENIOR CAPSTONE SEMINAR (SOC 301 is a pre-requisite)	3
SOC Electives 300+		9

SOC Electives Any Level	9
Minor Courses	18+
Elective Courses	
Elective hours vary by program, please see advisor.	
Total Semester Hours	120

Additional Information

As with all students in the College of Arts, Humanities, and Social Sciences, our students will initiate a Program of Study through the College of Arts, Humanities, and Social Sciences Academic Advising Office but they are encouraged to consult with the Sociology Department Chair or any member of our faculty.

Year 1

Fall		Semester Hours
EH 101	COLLEGE WRITING I	3
Math		3
SOC 100	INTRO TO SOCIOLOGY	3
Fine Arts		3
FYE 101	CHARGER SUCCESS	1
Term Semester Hours:		13
Spring		
EH 102	COLLEGE WRITING II	3
SOC 102	ANALYSIS OF SOCIAL PROBLEMS	3
Humanities and Fine Arts		3
Science w/Lab		4
Area V Course		3
Term Semester Hours:		16

Year 2

Fall		
SOC 206	MARRIAGE AND FAMILY	3
Literature		3
History		3
Science w/Lab		4
Humanities and Fine Arts		3
Term Semester Hours:		16
Spring		
Science w/Lab		4
EH 207 or EH 208	READINGS LITERATURE/CULTURE I or READINGS LITERATURE/CULTURE 2	3
WLC 101		3
SOC 105	INTRO CULTURAL ANTHROPOLOGY	3
Social/Behavioral Science		3
Term Semester Hours:		16

Year 3

Fall		
HY 103 or HY 104	WORLD HISTORY TO 1500 or WORLD HISTORY SINCE 1500	3
Area V Course		3
SOC 301	RESEARCH METHODS (Offered Fall Only)	3
SOC 300+		3
Minor Courses		3
Term Semester Hours:		15
Spring		
SOC 302	SOCIOLOGICAL THEORY (Offered Spring Only)	3

SOC 303	STATISTICS/SOCIAL SCIENCES	3
SOC 304	STATISTICS LAB	1
Minor Courses		6
Elective		3
Term Semester Hours:		16
Year 4		
Fall		
SOC 300+		3
SOC 300+		3
Minor Courses		6
Elective		3
Term Semester Hours:		15
Spring		
SOC 495	SENIOR CAPSTONE SEMINAR (SOC 301 is a pre-requisite)	3
Minor Courses		6
Electives		4
Term Semester Hours:		13
Total Semester Hours:		120

Sociology Minor

A student developing a minor in sociology with a major in another discipline must complete 21 semester hours of sociology courses:

Code	Title	Semester Hours
SOC 100	INTRO TO SOCIOLOGY	3
Select 6 semester hours of courses at any level in Sociology		6
Select 12 semester hours of courses at level 300 or above in Sociology		12
Total Semester Hours		21

Note(s):

Sociology courses may also be used in conjunction with courses from other disciplines to form a cognate area of study. Such a program should be developed with the advice of the sociology faculty and must be approved by the chair of the student's major department.

Women's and Gender Studies Minor

Morton Hall 278M
256.824.6190
Dr. Chad Thomas, Director

The Women's and Gender Studies program brings together courses and faculty from several colleges of the university to provide an interdisciplinary experience leading to a minor in Women's and Gender Studies. As an area of scholarship, the principal focus is on the contributions, perspectives, and experiences of women in all areas of human endeavor, including the status, portrayal, or achievements of women in areas such as art, history, literature, science, business, engineering, and medicine. It also promotes greater understanding of gender as a fundamental category of meaning, examining the pervasive and often unacknowledged ways that gender shapes and changes our social institutions, individual knowledge, and interpersonal relationships. While the classes included as Women's and Gender Studies courses may be offered in various departments, the minor organizes these courses in a coherent structure such that the sum of the experiences offers a more comprehensive insight into the discipline of Women's and Gender Studies than the individual courses provide on their own.

A minor in Women's and Gender Studies consists of 21 semester hours, including one required course (WGS 200), three core courses, and three additional core or elective courses as shown in the following table. Core courses must include at least 3 semester hours of humanities and 3 semester hours of social sciences classes listed below. Note that 12 of the 21 semester hours must be at the 300-level or higher. Students must also complete a portfolio and portfolio conference during their final semester at UAH. A student interested in minoring in Women's and Gender Studies should contact the director of the program for advising.

Code	Title	Semester Hours
Required Course		
WGS 200	INTRO WOMEN'S & GENDER STUDIES	3
Core Courses 3 courses required from the following, at least 3 hours in each category: ^{1,2,3}		9
Humanities (at least 3 hours)		3-6
ARH 320	SPECIAL TOPICS IN ART HY (Women in Antiquity OR Modern Women Artists) ³	
EH 414	CREATIVE NONFICTION WRITING	
EH 418	REP TEXTS-WOMEN WRITERS	
EH 440	SPECIAL TOPICS ENGLISH STUDIES (Native Women's Literature) ³	
EH 461	SHAKESPEARE I	
EH 462	SHAKESPEARE II	
EH 465	DRAMATIC LITERATURE	
HY 367	WOMEN IN U.S. HISTORY	
HY 390	WOMEN IN MODERN EUROPEAN HIS	
HY 483	WOMEN & GENDER LATIN AMERICA	
PHL 335	FEMINIST PHILOSOPHY	
TH 323	THEATRE HISTORY II	
TH 324	MODERN AMERICAN THEATRE	
WLC 204	INTERNATIONAL CINEMA (Performing Gender & Sexuality) ³	
Social Sciences (at least 3 hours)		3-6
PSC 440	REGIONAL STUDIES (African Politics OR Latin American Politics) ³	
PY 406	PSYCHOLOGY OF WOMEN	
SOC 206	MARRIAGE AND FAMILY	
SOC 306	SOCIOLOGY OF GENDER	
SOC 309	SOCIOLOGY OF SEXUALITY	
WGS Advanced Courses (may substitute for Core courses)		
WGS 340	SPECIAL TOPICS ⁵	
WGS 499	INDEPENDENT STUDY ⁵	
Elective Course ⁴		
Select up to 3 additional core courses or up to 3 elective courses from the following:		
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARH 309	CONTEMPORARY ART & ISSUES	
ARH 310	NINETEENTH CENTURY ART	
BYS 437	PSYCHOBIOLOGY STRESS & ILLNESS	
CM 330	NONVERBAL COMMUNICATION	
or PY 330	NONVERBAL COMMUNICATION	
CM 333	INTERPERSONAL COMMUNICATION	
CM 433	DARK SIDE INTERPERSONAL COMM	
CM 455	COMMUNICATION & CULTURE	
EH 242	MYTHOLOGY	
EH 403	LITERARY CRITICISM & THEORY	
EH 430	THE AMERICAN NOVEL	
EH 434	SCIENCE FICTION	
EH 438	AFRICAN AMERICAN LITERATURE	
EH 451	ARTHURIAN ROMANCE	
HY 370	TECHNOLOGY IN AMERICAN HISTORY	
HY 383	FOOD AND WORLD HISTORY	
HY 473	U.S.-LATIN AMERICAN RELATIONS	
HY 482	COMPTV SLAVERY & ABOLITION	
HY 484	LATIN AMERICAN HIST THRU FILM	
HY 485	NAZI GERMANY AND THE HOLOCAUST	

PHL 102	INTRO TO ETHICS
PHL 303	CONTINENTAL PHILOSOPHY
PHL 337	PHILOSOPHY OF RACE
PHL 403	ADV MORAL PHILOSOPHY (Care Ethics) ⁴
PSC 438	CONTEMPORARY POLITICAL THOUGHT
or PHL 438	CONTEMPORARY POLITICAL THOUGHT
PY 375	SOCIAL PSYCHOLOGY
or SOC 375	SOCIAL PSYCHOLOGY
PY 437	PSYCHOBIOLOGY STRESS & ILLNESS
or BYS 437	PSYCHOBIOLOGY STRESS & ILLNESS
SOC 105	INTRO CULTURAL ANTHROPOLOGY
SOC 330	RACE AND ETHNICITY
SOC 435	SOCIOLOGY OF SOCIAL MOVEMENTS
TH 322	THEATRE HISTORY I

¹ No more than 6 semester hours within a single subject area.

² No more than two of the courses applied to the minor can be from the student's major field of study. One course may count towards both the major and the minor.

³ Approved Special Topics courses may count as 'Core' courses toward the minor. Current approved Special Topics 'Core' courses are: ARH 320, ARH 320, EH 440, PSC 440, SOC 340, and WLC 204.

⁴ Approved Special Topics courses may count as 'Elective' courses toward the minor. Current approved Special Topics 'Elective' courses are: PHL 403

⁵ WGS 340 or WGS 499 may count as core courses in various subject areas if these courses carry 3 semester hours credit.

Note:

New courses may be added to this list when approved for inclusion by the Women's and Gender Studies Program Advisory Committee. For current listing of approved Women's and Gender Studies courses and for additional information on the Women's and Gender Studies program, please see our website at www.uah.edu/la/departments/womens-studies/programs/minor (<http://www.uah.edu/la/departments/womens-studies/programs/minor/>)

Theatre

151 ELC

Telephone: 256.824.6871

Email: theatre@uah.edu

Merge your academic interests and your passion for the creative arts with a degree in theatre from UAH! We have four areas of specialization: Performance, Technical, Dramaturgy, and Video. Each is designed to prepare you for a smooth transition into the world of professional theatre – something our successful, active theatre alumni can attest to!

Whether you choose to focus solely on theatre or combine it with a second major, you'll enjoy all the benefits that our dynamic Theatre Program has to offer, including:

- Personalized attention, thanks to our low student-to-faculty ratio and our nurturing, progressive environment
- Hands-on learning, whether it's performing in a mainstage production or interning with a professional theatre company
- Networking opportunities, as a result of the strong relationships UAH Theatre has with community partners
- Extracurricular activities, like participating in improv and reader's theatre and attending local and regional festivals

But most important of all, your theatre degree will help you master the skills that employers value most, from public speaking and problem solving to creative thinking and collaboration. The end result is a diverse, well-rounded educational foundation that will give you a competitive edge no matter what career path you choose to pursue.

The Department of Theatre offers the following degree programs:

- Theatre, BA (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/communication-arts/theatre/>)
- Theatre Minor (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/communication-arts/theatre-minor/>)
- Theatre, BA (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/communication-arts/theatre/>)

- Film and Media Arts Minor (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/music/film-and-media-arts-minor/>)
- Theatre Minor (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/communication-arts/theatre-minor/>)

TH 100 - STAGECRAFT

Semester Hours: 3

This course will provide students with the basic knowledge of stage construction, its practices, and implementation. Additional hands-on experience will be gained by working outside of class hours in the scene shop assisting in the construction and installation of main-stage productions.

TH 101 - THEATRE PRACTICUM

Semester Hour: 1

TH 110 - VOICE AND DICTION

Semester Hours: 3

Examines and practices methods of adjusting vocal articulation, tone, pitch, pace, volume, resonance, and pronunciation for improving or changing voice quality and accents. Understanding the vocal instrument prepares students for acting and for positive self-presentation in the real world.

TH 122 - THEATRE APPRECIATION

Semester Hours: 3

Introductory survey of theater art focusing on understanding performance components and genres. Satisfies fine arts elective. Offered every term.

TH 123 - INTRO TO FILM STUDIES

Semester Hours: 3

Students develop a critical understanding of how the 'language' of film uses image and sound to produce meaning and pleasure, and to elicit audience response in order to generate what constitutes meaning. Concentrating on film form and style, the course teaches students to engage cinema in relation to narrative, mise-en-scene, cinematography, editing, sound, and genre.

TH 150 - SCRIPT ANALYSIS

Semester Hours: 3

This course is a hands-on look into script analysis, using plays from the western theatre canon, some of which will be produced by UAH Theatre during the school year. There will be individual and group work in script analysis, culminating in a full script analysis project at the end of the semester.

TH 180 - READER'S THEATRE

Semester Hours: 3

This course is designed to explore play text within the theatre. Students will work first hand with plays and present staged readings. This course is open to all majors.

TH 200 - PLAYWRITING

Semester Hours: 3

Students will create original short, theatrical works as they examine and experiment with multiple narrative techniques. Students will work independently and collaboratively to experience the full process of drafting, hearing the words aloud, and revising original works. Works will be read aloud; student and faculty feedback will be given.

TH 201 - THEATRE PRACTICUM

Semester Hour: 1

UAH Theatre offers students a number of opportunities to work on and crew productions. Practicum allows students to earn required class credit while engaged in these activities.

TH 210 - WRITING FOR VISUAL MEDIA

Semester Hours: 3

This course offers an introduction to scriptwriting for a variety of media: commercials, PSAs, fiction films, documentaries, and the web. The art of 'visual writing' is emphasized. Students produce scripts on their own while contributing to and critiquing the work of their fellow classmates. ed, communication medium. Prerequisites: EH 101, EH 102.

TH 221 - ACTING

Semester Hours: 3

This course explores the foundations of acting through an understanding of basic techniques including scene study, script analysis, improvisation, and physical and vocal work. Offered every semester.

TH 225 - ELEMENTS OF THEATRE PRODUCTION

Semester Hours: 3

This course is designed to give students the opportunity to explore the design components of theatre including scenery, costumes, lighting and sound through class projects and practical application. Offered every Spring. Prerequisite: TH 122 or permission of instructor.

TH 250 - STAGE MAKEUP

Semester Hours: 3

Course will cover basic stage makeup application techniques for both the actor and the makeup artist. Course will also explore 3D makeup techniques and character analysis for makeup design. Theatre Majors only, or permission of instructor.

TH 251 - COSTUME FUNDAMENTALS

Semester Hours: 3

The purpose of this course is to learn how to function in the costume shop. Students will learn basic hand and machine sewing skills for constructing and completing a costume. Students will also gain an understanding of basic pattern making skills and how costumes are created for Theatre.

TH 260 - VIDEO PRODUCTION

Semester Hours: 3

This course provides students with an opportunity to experience the process of video production through creative projects designed to stimulate the visual artist, summon the storyteller and create the video editor.

TH 275 - DOCUMENTARY FILM

Semester Hours: 3

Through readings, screenings, discussion, and practice, students will become acquainted with various approaches to documentary film and video in theory and practice. Focus will be on the ethical, rhetorical, and creative choices that form conventions and modes documentary filmmakers have developed in their practice and critics have used to describe and analyze how documentaries communicate. Students will experiment with some of these choices by working on their own short documentary projects.

TH 301 - THEATRE PRACTICUM

Semester Hour: 1

UAH Theatre offers students a number of opportunities to work on and crew productions. Practicum allows students to earn required class credit while engaged in these activities.

TH 321 - ACTING II

Semester Hours: 3

Acting II is a Stanislavsky-based class which will further the growth of skills learned in Acting I, as it applies to more complex characterization. Class work will include sensory exercises, relaxation, concentration, imagination, improvisation, character analysis, and scene work. Prerequisite: TH 221.

TH 322 - THEATRE HISTORY I

Semester Hours: 3

Explores the development of theater art from its origins to French neoclassicism and Moliere with particular emphasis on the Greeks, Shakespeare, and his contemporaries. Offered every two years.

TH 323 - THEATRE HISTORY II

Semester Hours: 3

Explores the development of theatre art from the 17th to the 20th century, with particular emphasis on the English Restoration, early Realism and the American masters. Offered every two years.

TH 324 - MODERN AMERICAN THEATRE

Semester Hours: 3

This course is a seminar-style study of current American theatre and plays written in the 21st century. To that end, we will read and write about 8 current American plays, and other articles from theatre journals. At the end of the class, students will understand and be able to explicate in writing, spoken presentation, and/or through creative activity, the present, and possible future impacts of current American theatre on American society.

TH 330 - STAGE MANAGEMENT

Semester Hours: 3

This course concerns the role of the Stage Manager in theatrical productions. It focuses on the stage manager's duties, responsibilities, and procedures from pre-production to post-production. It explores the functions of various members of the production team and how the stage manager's interaction with each member of this team varies. It considers the role of the stage manager as the hub of communication for a production. Prerequisites: TH 122 and TH 225.

TH 334 - HISTORY OF AMERICAN CINEMA**Semester Hours: 3**

Investigates the American cinema as a cultural artifact by studying cultural and historical context of representations, audiences, aesthetics and industry practices in American cinema from its beginning (1895) to present.

TH 340 - SPECIAL TOPICS IN THEATRE**Semester Hours: 3**

Topics announced in advance. Representative topics include playwriting, directing, and ancient Greek theatre. May be repeated twice for credit.

TH 355 - SCENE DESIGN**Semester Hours: 3**

This class introduces students to the many facets, both artistic and engineering-based, of scene design for the theatre including: history, research, design, stage, direction, technical direction, scenic art and props. Prerequisites: TH 100 and TH 225.

TH 360 - VIDEO PRODUCTION II**Semester Hours: 3**

Advanced Video Production is an intensive video production course designed to integrate film theory and practice. Students will learn the technical and artistic necessities of the film and video medium. Through immersive lectures, workshops, projects, and exercises, students will gain valuable experience and know-how in this exciting, fast-paced, communication medium. Prerequisite: TH 260.

TH 365 - COSTUME DESIGN**Semester Hours: 3**

The purpose of this course is to learn the intricacies of costume design and how it fits in the full vision of a Theatrical Production. The importance of the artist's vision and the practical use must all be addressed when designing a show. Each student will learn to develop their own style and voice as an artist and how to work in the theatre. Prerequisite: TH 225.

TH 375 - SOUND DESIGN**Semester Hours: 3**

This course offers an exploration of the sound design process for the theatre. Script analysis and creating a design concept will underline the structure of the course. The students will have the opportunity to use a DAW (digital audio workstation) and various computer software programs including QLab. The course includes an overview of digital audio data structures, 'plug-ins', processing, equalization and standard solutions for interfacing external devices with a computer. The students will participate in two productions and gain valuable hands-on experience. There will be an emphasis on the creative possibilities of sound design for the theatre and multimedia. Prerequisites: TH 225.

TH 390 - TEACHING THEATRE**Semester Hours: 3**

This course is designed to help students develop the skills required to coach and direct student actors, focusing on best practices in teaching the fundamentals of directing, including various assessment rubrics and adapting activities to different age groups. The course emphasizes learning by doing. Prerequisite: TH 221.

TH 400 - INTERNSHIP IN THEATRE**Semester Hours: 0.5-3**

Practical experience in the workplace allows the student to apply principles, theories, and skills learned in Theatre Program courses. Arranged by the student with consent of the director of the Theatre Program, the student meets regularly with a faculty advisor, keeps a log of activities, and submits a report on the internship. Prerequisite: Senior Standing with TH major, and permission of instructor.

TH 401 - INTERNSHIP IN VIDEO**Semester Hours: 3**

Students receive practical, production experience in the engagement of a creative project where they are able to apply principles, theories, and production skills learned from previous video courses and/or other course work.

TH 421 - ACTING III**Semester Hours: 3**

This class explores non-realist acting techniques, as a way to expand understanding of different performance and period styles. Students will work in historical periods from the Italian and Elizabethan renaissances and more contemporary styles. Prerequisite: TH 321.

TH 425 - THEATRE MAINSTAGE

Semester Hours: 1-3

This course provides students with an opportunity to experience the complete process of theatre including such elements as: direction, acting, design, tech and management. The class will produce two full length plays. Students will be auditioned to determine role in each production. Some will serve critical production roles such as design, direction, and management while others will act in one or both productions. In certain instances, a student actor may appear in both plays. Offered every semester. Can be taken two semesters for maximum credit of 6 hours.

TH 431 - SENIOR CAPSTONE THEATRE

Semester Hours: 3

Senior capstone course involving either a scholarly project or an approved communication-intensive internship combined with a comprehensive examination. Prerequisites: senior standing with TH major, and approval of instructor.

TH 465 - DIRECTING

Semester Hours: 3

In this course, students will develop their skills in theatrical directing and production using script analysis, visual composition, design, and communication. Students will complete hands-on directing scene projects, supplemented with written analysis, dramaturgical research, and design images. Prerequisites: TH 150, and TH 322 or TH 323.

TH 475 - PORTFOLIO

Semester Hours: 3

This course explores the current state of the entertainment industry's job market. Students from design, performance, video production, and dramaturgy build and refine the materials they will need to be employed within the entertainment industry. Prerequisites: TH 421, or TH 390, or TH 355, or TH 322 & TH 323.

TH 480 - DRAMATURGY

Semester Hours: 3

Study of the fundamental skills and practical collaborative processes needed to dramaturg a work of theater. Prerequisites: TH 150 and either TH 322 or TH 323.

User Experience Minor

User experience (UX) refers to a user's engagement with a product, technology, or service. According to usability.gov (<http://usability.gov/>), "User experience (UX) focuses on having a deep understanding of users, what they need, what they value, their abilities, and also their limitations." For a product to develop a positive user experience, it must meet actual users' needs, help users fulfill their goals, provide a usable interface, and evoke positive emotions. In the past two decades, UX has become increasingly central to the success of businesses and organizations.

The UX minor aims to bring together several different disciplines to create a robust, rigorous, and multifaceted program. These various disciplines and courses will come together in service of providing students a broad, applicable UX education. Students in the UX minor will meet the following learning objectives:

- Identify core theoretical principles and research methods of user experience.
- Apply UX research methods to analyze the behavior, needs, goals, frustrations, and emotions of real-world users.
- Design and prototype solutions for the problems identified through user experience research.
- Evaluate the effectiveness of products, technologies, and services in meeting user needs and providing a satisfying experience.
- Develop recommendations for improving the UX of new products, prototypes, and existing products, technologies, and services.

Code	Title	Semester Hours
Technical Course (one of the following):		3
IS 210	INTRO COMP PROG IN BUS	
ARS 332	GRAPHIC DESIGN: WEB DESIGN	
CS 100 Level		
Statistics Course (one of the following):		3-4
SOC 303 & SOC 304	STATISTICS/SOCIAL SCIENCES and STATISTICS LAB	
ISE 390	PROB & ENGR STATISTICS I	
MA 385	INTRO TO PROBABILITY & STATIST	
MSC 288	BUSINESS STATISTICS II	

PY 300 & PY 304	PSYCHOLOGICAL STATISTICS and PSYCHOLOGICAL STATISTICS LAB	
All of the following courses:		
ARS 230	GRAPHIC DESIGN: INTRODUCTION	3
EH 301	TECHNICAL WRITING	3
PY 403 or ISE 403	HUMAN FACTORS PSYCHOLOGY HUMAN FACTORS PSYCHOLOGY	3
CM 452 or EH 452	USER CENTERED DESIGN USER CENTERED DESIGN	3
PY 410	TASK ANALYSIS & PROTOTYPING	3
EH 442 or CM 542	USABILITY STUDIES USABILITY STUDIES	3
Total Hours:		24-25

Women's and Gender Studies Minor

Morton Hall 278M
256.824.6190
Dr. Chad Thomas, Director

The Women's and Gender Studies program brings together courses and faculty from several colleges of the university to provide an interdisciplinary experience leading to a minor in Women's and Gender Studies. As an area of scholarship, the principal focus is on the contributions, perspectives, and experiences of women in all areas of human endeavor, including the status, portrayal, or achievements of women in areas such as art, history, literature, science, business, engineering, and medicine. It also promotes greater understanding of gender as a fundamental category of meaning, examining the pervasive and often unacknowledged ways that gender shapes and changes our social institutions, individual knowledge, and interpersonal relationships. While the classes included as Women's and Gender Studies courses may be offered in various departments, the minor organizes these courses in a coherent structure such that the sum of the experiences offers a more comprehensive insight into the discipline of Women's and Gender Studies than the individual courses provide on their own.

A minor in Women's and Gender Studies consists of 21 semester hours, including one required course (WGS 200), three core courses, and three additional core or elective courses as shown in the following table. Core courses must include at least 3 semester hours of humanities and 3 semester hours of social sciences classes listed below. Note that 12 of the 21 semester hours must be at the 300-level or higher. Students must also complete a portfolio and portfolio conference during their final semester at UAH. A student interested in minoring in Women's and Gender Studies should contact the director of the program for advising.

Code	Title	Semester Hours
Required Course		
WGS 200	INTRO WOMEN'S & GENDER STUDIES	3
Core Courses 3 courses required from the following, at least 3 hours in each category: ^{1,2,3}		9
Humanities (at least 3 hours)		3-6
ARH 320	SPECIAL TOPICS IN ART HY (Women in Antiquity OR Modern Women Artists) ³	
EH 414	CREATIVE NONFICTION WRITING	
EH 418	REP TEXTS-WOMEN WRITERS	
EH 440	SPECIAL TOPICS ENGLISH STUDIES (Native Women's Literature) ³	
EH 461	SHAKESPEARE I	
EH 462	SHAKESPEARE II	
EH 465	DRAMATIC LITERATURE	
HY 367	WOMEN IN U.S. HISTORY	
HY 390	WOMEN IN MODERN EUROPEAN HIS	
HY 483	WOMEN & GENDER LATIN AMERICA	
PHL 335	FEMINIST PHILOSOPHY	
TH 323	THEATRE HISTORY II	
TH 324	MODERN AMERICAN THEATRE	
WLC 204	INTERNATIONAL CINEMA (Performing Gender & Sexuality) ³	
Social Sciences (at least 3 hours)		3-6

PSC 440	REGIONAL STUDIES (African Politics OR Latin American Politics) ³
PY 406	PSYCHOLOGY OF WOMEN
SOC 206	MARRIAGE AND FAMILY
SOC 306	SOCIOLOGY OF GENDER
SOC 309	SOCIOLOGY OF SEXUALITY
WGS Advanced Courses (may substitute for Core courses)	
WGS 340	SPECIAL TOPICS ⁵
WGS 499	INDEPENDENT STUDY ⁵
Elective Course ⁴	
Select up to 3 additional core courses or up to 3 elective courses from the following:	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS
ARH 309	CONTEMPORARY ART & ISSUES
ARH 310	NINETEENTH CENTURY ART
BYS 437	PSYCHOBIOLOGY STRESS & ILLNESS
CM 330	NONVERBAL COMMUNICATION
or PY 330	NONVERBAL COMMUNICATION
CM 333	INTERPERSONAL COMMUNICATION
CM 433	DARK SIDE INTERPERSONAL COMM
CM 455	COMMUNICATION & CULTURE
EH 242	MYTHOLOGY
EH 403	LITERARY CRITICISM & THEORY
EH 430	THE AMERICAN NOVEL
EH 434	SCIENCE FICTION
EH 438	AFRICAN AMERICAN LITERATURE
EH 451	ARTHURIAN ROMANCE
HY 370	TECHNOLOGY IN AMERICAN HISTORY
HY 383	FOOD AND WORLD HISTORY
HY 473	U.S.-LATIN AMERICAN RELATIONS
HY 482	COMPTV SLAVERY & ABOLITION
HY 484	LATIN AMERICAN HIST THRU FILM
HY 485	NAZI GERMANY AND THE HOLOCAUST
PHL 102	INTRO TO ETHICS
PHL 303	CONTINENTIAL PHILOSOPHY
PHL 337	PHILOSOPHY OF RACE
PHL 403	ADV MORAL PHILOSOPHY (Care Ethics) ⁴
PSC 438	CONTEMPORARY POLITICAL THOUGHT
or PHL 438	CONTEMPORARY POLITICAL THOUGHT
PY 375	SOCIAL PSYCHOLOGY
or SOC 375	SOCIAL PSYCHOLOGY
PY 437	PSYCHOBIOLOGY STRESS & ILLNESS
or BYS 437	PSYCHOBIOLOGY STRESS & ILLNESS
SOC 105	INTRO CULTURAL ANTHROPOLOGY
SOC 330	RACE AND ETHNICITY
SOC 435	SOCIOLOGY OF SOCIAL MOVEMENTS
TH 322	THEATRE HISTORY I

¹ No more than 6 semester hours within a single subject area.

² No more than two of the courses applied to the minor can be from the student's major field of study. One course may count towards both the major and the minor.

³ Approved Special Topics courses may count as 'Core' courses toward the minor. Current approved Special Topics 'Core' courses are: ARH 320, ARH 320, EH 440, PSC 440, SOC 340, and WLC 204.

- 4 Approved Special Topics courses may count as 'Elective' courses toward the minor. Current approved Special Topics 'Elective' courses are: PHL 403
- 5 WGS 340 or WGS 499 may count as core courses in various subject areas if these courses carry 3 semester hours credit.

Note:

New courses may be added to this list when approved for inclusion by the Women's and Gender Studies Program Advisory Committee. For current listing of approved Women's and Gender Studies courses and for additional information on the Women's and Gender Studies program, please see our website at www.uah.edu/la/departments/womens-studies/programs/minor (<http://www.uah.edu/la/departments/womens-studies/programs/minor/>)

World Languages and Cultures

Morton Hall 278
Telephone: 256.824.1022
Email: wlc@uah.edu

The World Languages and Cultures Department offers the following degree programs:

- Foreign Languages, BA (p. 210)
- Foreign Languages, BA - Foreign Language and International Trade Concentration (p. 215)
- Foreign Language and Global Engagement Certificate (p. 223)
- Global Professional Pathways Certificate (<https://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/foreign-languages-literatures/global-professional-pathways/>)

Introduction

The acquisition of a second language, and through it an understanding of another country's culture, is a rich academic experience for all students, not only in the arts, humanities, and social sciences, but also in business, education, nursing, the natural sciences, and engineering. Knowing how to communicate effectively in another language significantly enhances one's career opportunities and contributions as a citizen. This page provides an overview of the academic offerings of the Department of World Languages and Cultures.

Mission Statement

The Department of World Languages and Cultures is dedicated to teaching students the language skills and cultural knowledge necessary for succeeding in today's multilingual world of cultural diversity, global markets, political interdependence, and international scientific and cultural collaboration.

Within the B.A. in Foreign Languages, students may choose French, German, Russian, or Spanish as a focus language, and may also concentrate in Foreign Language and International Trade in cooperation with the College of Business. Students can pursue foreign language teacher certification (<http://catalog.uah.edu/undergrad/colleges-departments/education/curriculum-instruction/foreign-language/>) in French, German, or Spanish in conjunction with the College of Education, and they may minor in any of the four focus languages, or take Arabic or Japanese at the introductory and intermediate levels. The department also offers the Certificate in Foreign Language and Global Engagement, which focuses on language acquisition and Global Studies, and the Global Professional Pathways Certificate, which allows students to explore language and careers through study or internship abroad and a professional portfolio. The department also serves nursing and pre-health students by offering Spanish for Medical Professionals at the introductory level.

In addition, the department assists students in identifying study abroad opportunities and domestic and international internships that give students cultural and professional experience that greatly enhances their career opportunities after graduation. World Languages and Cultures also sponsors language clubs and extracurricular activities that contribute to the university's rich campus life.

The department offers an integrated curriculum comprising the teaching of linguistic proficiency and the promotion of a critical awareness of other cultures. Faculty use traditional methods as well as varied media and new technologies to engage students with world languages, literature, and film in their historical, social, and interdisciplinary contexts. World Languages and Cultures faculty promote academic pluralism by fostering a variety of interpretive and pedagogical approaches, and by virtue of their commitment to the highest standards in teaching, research, and service, they aim to uphold and further strengthen the national and international standing of UAH.

Languages Offered

Arabic, French, German, Japanese, Russian, Spanish

The Department of World Languages and Cultures offers a B.A. in Foreign Languages. A student may choose a focus language of French, German, Russian, or Spanish, and may also concentrate in Foreign Language and International Trade or pursue teaching certification. Arabic and Japanese

cannot be taken as majors or minors, but can be taken to satisfy the language requirement for the B.A. degree or as electives. Certificate programs are available in our four major languages and may also be available in Arabic and Japanese depending on current course offerings.

General Education Requirements and Placement Procedures

Three semester hours of credit in one foreign language are required for the B.A. degree. Most introductory language sequences begin in the fall semester, but more limited offerings of 101 level courses are available in spring and summer for students who need to complete their requirements.

Placement Procedures

Placement procedures vary based on each student's level of experience with a language. Students with no previous instruction or experience are placed into WLC 101, while students with some level of instruction or experience are placed in a variety of ways depending on their previous coursework or skill level. Since placement procedures vary, all students are encouraged to contact the WLC department chair or a WLC faculty member in their language of interest to ask about placement. Read below for placement information related to various populations of students.

Native or Near-Native Speakers: Native or near-native speakers of a foreign language may not take introductory and intermediate courses in that language, but are welcome to take upper level courses in their language or introductory level courses in another language. Native and near-native speakers are those who have achieved fluency in a language and who have had formal education in that language. Students in this category should make an appointment with the department to take the standardized Web Cape International Foreign Language Placement Exam. Native or near-native speakers pursuing a major or minor in their language may earn up to six (6) hours of departmental credit that will satisfy the Charger Foundations language requirement for the B.A. Students in this category who are only interested in taking one lower-level language course to complete the Charger Foundations language requirement should enroll in a language other than the one(s) in which they are fluent.

Heritage Speakers: Heritage speakers are classified as individuals who have grown up speaking a language, but who have little or no formal education in that language. These students must still take a minimum of three (3) additional semester hours of foreign language course work to complete Charger Foundations requirements for the B.A. Heritage speakers pursuing a major or minor in their heritage language and who place above the WLC 202 level may earn up to six (6) hours of departmental credit that will satisfy the Charger Foundations language requirement for the B.A.

Transfer Students with College Language Credits: Students who have earned language credits at another college or university will be placed into the next logical course in the language sequence. If students have questions about whether they are prepared for the level of language courses at UAH, they are encouraged to contact a faculty member in their language of interest for guidance, or to take the Web Cape International Foreign Language Placement Exam to help confirm their level.

High School Experience: All students with high school language experience below the Advanced Placement level are encouraged to take the Web Cape exam to confirm placement. Typically, students with 0-2 units of high school foreign language study will be placed in WLC 101, while students with 3-4 units will be placed in WLC 102 or 201. A minimum grade of C is required for a unit to be counted. Regardless of placement, students must take a minimum of three (3) additional semester hours of foreign language course work to complete Charger Foundations requirements for the B.A. If an interval of two years or more occurs between the study of a language in high school and continuation of that language in college, placement levels may be adjusted downward to entry level.

Advanced Placement, International Baccalaureate (IB), and CLEP Examinations: The Department will award credit to students who have earned a score of three or higher on Advanced Placement (AP) Program examinations of the College Entrance Examination Board according to the following scale:

- Score of 3: 6 semester hours credit (i.e. through 102, 3 semester hours each course)
- Score of 4: 9 semester hours credit (through 201)
- Score of 5: 12 semester hours credit (through 202)

The credit thus awarded will satisfy Charger Foundations Requirements for the B.A. and count toward a major, minor, or certificate. However, it will be recorded without grades or quality points and will not be included in the calculation of the grade point average.

Students scoring 5-7 on the Higher Level IB exam will be awarded 15 hours of credit (through WLC 301). Currently, there is no placement procedure for students who have completed the Standard Level IB exam. Those students should take the Web Cape International Foreign Language Placement Exam and consult with a faculty member to determine placement.

Students with CLEP examination scores in French, German, or Spanish will be granted credit for WLC 101 or 101 and 102 depending on their score, following the UAH course placement guidelines (<https://catalog.uah.edu/undergrad/policies-procedures/course-placement-credit-examination/>) for CLEP exams.

Students Planning to Earn a WLC Major, Minor, or Certificate: If students wish to major or minor in French, German, Russian, or Spanish, they may take the Web Cape placement exam to test out of a maximum of twelve (12) hours of course work (WLC 101, 102, 201, 202).

After taking the Web Cape exam, students majoring or minoring in a world language will be placed in an appropriate higher level language course. They will receive credit hours, without grade/quality points, for the two (2) highest elementary/intermediate language courses as is appropriate. If students test out of more than six (6) hours, the remaining courses will be waived from the major or minor requirements with no credit hours granted.

Students pursuing a WLC certificate may also test out of language courses, but no courses may be waived from certificate requirements. This means that if a student tests out of more than the six (6) hours allowed for department credit, the remaining hours must be fulfilled by substituting other relevant courses to be determined in consultation with an advisor.

All students, irrespective of language background and placement, must take all remaining upper-level coursework to complete the major, minor, or certificate.

Majors in World Languages and Cultures

- Foreign Languages, BA (p. 210)
- Foreign Languages, BA - Foreign Language and International Trade Concentration (p. 215)

Minors in Foreign Languages and Literatures

- Foreign Language (p. 222)
- Latin American Studies (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/foreign-languages-literatures/latin-american-studies-minor/>) (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/foreign-languages-literatures/latin-american-studies-minor/>)
- Foreign Language and Global Engagement Certificate (p. 223)
- Global Professional Pathways Certificate (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/foreign-languages-literatures/global-professional-pathways/>)

WLC 101A - INTRO FOREIGN LANG I: ARABIC

Semester Hours: 3

Teaches beginning listening, speaking, reading and writing within cultural contexts. Conducted in the target language. No prerequisites.

WLC 101F - INTRO FOREIGN LANG I:FRENCH

Semester Hours: 3

Teaches beginning listening, speaking, reading and writing within cultural contexts. Conducted in the target language. No prerequisites.

WLC 101G - INTRO FOREIGN LANG I:GERMAN

Semester Hours: 3

Teaches beginning listening, speaking, reading and writing within cultural contexts. Conducted in the target language. No prerequisites.

WLC 101J - INTRO FOREIGN LANG I:JAPANESE

Semester Hours: 3

Teaches beginning listening, speaking, reading and writing within cultural contexts. Conducted in the target language. No prerequisites.

WLC 101MS - INTRO TO MEDICAL SPANISH

Semester Hours: 3

Teaches beginning listening, speaking, reading and writing within cultural contexts with special emphasis on medical terminology and tasks. Conducted in the target language. No prerequisites.

WLC 101R - INTRO FOREIGN LANG I:RUSSIAN

Semester Hours: 3

Teaches beginning listening, speaking, reading and writing within cultural contexts. Conducted in the target language. No prerequisites.

WLC 101S - INTRO FOREIGN LANG I: SPANISH

Semester Hours: 3

Teaches beginning listening, speaking, reading and writing within cultural contexts. Conducted in the target language. No prerequisites.

WLC 102A - INTRO FOREIGN LANG II: ARABIC

Semester Hours: 3

Teaches beginning listening, speaking, reading, and writing within cultural contexts. Conducted in the target language. Prerequisites: WLC 101A or placement by exam.

WLC 102F - INTRO FOREIGN LANG II:FRENCH

Semester Hours: 3

Teaches beginning listening, speaking, reading, and writing within cultural contexts. Conducted in the target language. Prerequisites: WLC 101F or placement by exam.

WLC 102G - INTRO FOREIGN LANG II:GERMAN

Semester Hours: 3

Teaches beginning listening, speaking, reading, and writing within cultural contexts. Conducted in the target language. Prerequisites: WLC 101G or placement by exam.

WLC 102J - INTRO FOREIGN LANG II:JAPANESE

Semester Hours: 3

Teaches beginning listening, speaking, reading, and writing within cultural contexts. Conducted in the target language. Prerequisites: WLC 101J or placement by exam.

WLC 102MS - INTRO TO MEDICAL SPANISH II

Semester Hours: 3

Teaches beginning listening, speaking, reading, and writing within cultural contexts with special emphasis on medical terminology and tasks. Conducted in the target language. Prerequisites: WLC 101MS.

WLC 102R - INTRO FOREIGN LANG II:RUSSIAN

Semester Hours: 3

Teaches beginning listening, speaking, reading, and writing within cultural contexts. Conducted in the target language. Prerequisites: WLC 101R or placement by exam.

WLC 102S - INTRO FOREIGN LANG II:SPANISH

Semester Hours: 3

Teaches beginning listening, speaking, reading, and writing within cultural contexts. Conducted in the target language. Prerequisites: WLC 101S or placement by exam.

WLC 199A - SPECIAL TOPICS

Semester Hours: 3

Study of special topics in world languages, literature, or culture on campus or abroad. Prerequisites: Placement by exam.

WLC 199F - SPECIAL TOPICS

Semester Hours: 3

Study of special topics in foreign language, literature, or culture on campus or abroad. Prerequisites: Placement by exam.

WLC 199G - SPECIAL TOPICS

Semester Hours: 3

Study of special topics in foreign language, literature, or culture on campus or abroad. Prerequisites: Placement by exam.

WLC 199J - SPECIAL TOPICS

Semester Hours: 3

Study of special topics in world languages, literature, or culture on campus or abroad. Prerequisites: Placement by exam.

WLC 199R - SPECIAL TOPICS

Semester Hours: 3

Study of special topics in foreign language, literature, or culture on campus or abroad. Prerequisites: Placement by exam.

WLC 199S - SPECIAL TOPICS

Semester Hours: 3

Study of special topics in foreign language, literature, or culture on campus or abroad. Prerequisites: Placement by exam.

WLC 201A - INTERM FOREIGN LANG I: ARABIC

Semester Hours: 3

Teaches intermediate listening, speaking, reading, and writing within cultural contexts. Conducted in the target language. Prerequisite: WLC 102A or placement by exam.

WLC 201F - INTERM FOREIGN LANG:FRENCH

Semester Hours: 3

Teaches intermediate listening, speaking, reading, and writing within cultural contexts. Conducted in the target language. Prerequisite: WLC 102F or placement by exam.

WLC 201G - INTERM FOREIGN LANG:GERMAN

Semester Hours: 3

Teaches intermediate listening, speaking, reading, and writing within cultural contexts. Conducted in the target language. Prerequisite: WLC 102G or placement by exam.

WLC 201J - INTERM FOREIGN LANG: JAPANESE

Semester Hours: 3

Teaches intermediate listening, speaking, reading, and writing within cultural contexts. Conducted in the target language. Prerequisite: WLC 102J or placement by exam.

WLC 201R - INTERM FOREIGN LANG:RUSSIAN

Semester Hours: 3

Teaches intermediate listening, speaking, reading, and writing within cultural contexts. Conducted in the target language. Prerequisite: WLC 102R or placement by exam.

WLC 201S - INTERM FOREIGN LANG:SPANISH

Semester Hours: 3

Teaches intermediate listening, speaking, reading, and writing within cultural contexts. Conducted in the target language. Prerequisite: WLC 102S or placement by exam.

WLC 202A - INTERM FOREIGN LANG II: ARABIC

Semester Hours: 3

Teaches listening, speaking, reading and writing within cultural contexts. Conducted in the target language. Prerequisites: WLC 201A or placement by exam.

WLC 202F - INTERM FOREIGN LANG II:FRENCH

Semester Hours: 3

Teaches listening, speaking, reading and writing within cultural contexts. Conducted in the target language. Prerequisites: WLC 201F or placement by exam.

WLC 202G - INTERM FOREIGN LANG II:GERMAN

Semester Hours: 3

Teaches listening, speaking, reading and writing within cultural contexts. Conducted in the target language. Prerequisites: WLC 201G or placement by exam.

WLC 202J - INTERM FORGN LANG II:JAPANESE

Semester Hours: 3

Teaches listening, speaking, reading and writing within cultural contexts. Conducted in the target language. Prerequisites: WLC 201J or placement by exam.

WLC 202R - INTERM FOREIGN LANG II:RUSSIAN

Semester Hours: 3

Teaches listening, speaking, reading and writing within cultural contexts. Conducted in the target language. Prerequisites: WLC 201R or placement by exam.

WLC 202S - INTERM FOREIGN LANG II:SPANISH

Semester Hours: 3

Teaches listening, speaking, reading and writing within cultural contexts. Conducted in the target language. Prerequisites: WLC 201S or placement by exam.

WLC 204 - INTERNATIONAL CINEMA

Semester Hours: 3

Analyzes foreign language films centered on changing themes, such as gender issues, family, religion, children and society, the arts. Conducted in English. No prerequisite.

WLC 301A - CONVERSATION: ARABIC

Semester Hours: 3

Teaches conversational communication through cultural texts and media. Conducted in the target language. Prerequisite: WLC 202A or placement by instructor. Prerequisite: WLC 202A.

WLC 301F - CONVERSATION:FRENCH

Semester Hours: 3

Teaches conversational communication through cultural texts and media. Conducted in the target language. Prerequisite: WLC 202F or placement by exam.

WLC 301G - CONVERSATION:GERMAN

Semester Hours: 3

Teaches conversational communication through cultural texts and media. Conducted in the target language. Prerequisite: WLC 202G or placement by exam.

WLC 301J - CONVERSATION:JAPANESE

Semester Hours: 3

Teaches conversational communication through cultural texts and media. Conducted in the target language. Prerequisite: WLC 202J or placement by exam.

WLC 301R - CONVERSATION:RUSSIAN

Semester Hours: 3

Teaches conversational communication through cultural texts and media. Conducted in the target language. Prerequisite: WLC 202R or placement by exam.

WLC 301S - CONVERSATION:SPANISH

Semester Hours: 3

Teaches conversational communication through cultural texts and media. Conducted in the target language. Prerequisite: WLC 202S or placement by exam.

WLC 302F - COMPOSITION:FRENCH

Semester Hours: 3

Teaches writing skills through cultural texts and media. Conducted in the target language. Prerequisite: WLC 202F or placement by exam.

WLC 302G - COMPOSITION:GERMAN

Semester Hours: 3

Teaches writing skills through cultural texts and media. Conducted in the target language. Prerequisite: WLC 202G or placement by exam.

WLC 302R - COMPOSITION:RUSSIAN

Semester Hours: 3

Teaches writing skills through cultural texts and media. Conducted in the target language. Prerequisite: WLC 202R or placement by exam.

WLC 302S - COMPOSITION:SPANISH

Semester Hours: 3

Teaches writing skills through cultural texts and media. Conducted in the target language. Prerequisite: WLC 202S or placement by exam.

WLC 303F - FOREIGN LANG LIFE & PROF:FRENC

Semester Hours: 3

Teaches foreign language skills for careers in business, technology, politics, etc. Conducted in the target language. Prerequisite: WLC 202F or by placement.

WLC 303G - FOREIGN LANG LIFE & PROF:GERMA

Semester Hours: 3

Teaches foreign language skills for careers in business, technology, politics, etc. Conducted in the target language. Prerequisite: WLC 202G or by placement.

WLC 303R - FOREIGN LANG LIFE & PROF:RUSSI

Semester Hours: 3

Teaches foreign language skills for careers in business, technology, politics, etc. Conducted in the target language. Prerequisite: WLC 202R or by placement.

WLC 303S - FOREIGN LANG LIFE & PROF:SPANI

Semester Hours: 3

Teaches foreign language skills for careers in business, technology, politics, etc. Conducted in the target language. Prerequisite: WLC 202S or by placement.

WLC 304F - CULTURE:FRENCH

Semester Hours: 3

Teaches the arts, histories, social customs, and values of the target culture. Conducted in the target language. Prerequisites: WLC 301F or WLC 302F.

WLC 304G - CULTURE:GERMAN

Semester Hours: 3

Teaches the arts, histories, social customs, and values of the target culture. Conducted in the target language. Prerequisites: WLC 301G or WLC 302G.

WLC 304R - CULTURE:RUSSIAN

Semester Hours: 3

Teaches the arts, histories, social customs, and values of the target culture. Conducted in the target language. Prerequisites: WLC 301R or WLC 302R.

WLC 304S - CULTURE:SPANISH

Semester Hours: 3

Teaches the arts, histories, social customs, and values of the target culture. Conducted in the target language. Prerequisites: WLC 301S or WLC 302S.

WLC 305F - INTRO TO LITERATURE:FRENCH

Semester Hours: 3

Introduces the literature of the target language in cultural contexts. Conducted in the target language. Prerequisite: WLC 301F or WLC 302F.

WLC 305G - INTRO TO LITERATURE:GERMAN

Semester Hours: 3

Introduces the literature of the target language in cultural contexts. Conducted in the target language. Prerequisite: WLC 301G or WLC 302G.

WLC 305R - INTRO TO LITERATURE:RUSSIAN

Semester Hours: 3

Introduces the literature of the target language in cultural contexts. Conducted in the target language. Prerequisite: WLC 301R or WLC 302R.

WLC 305S - INTRO TO LITERATURE:SPANISH

Semester Hours: 3

Introduces the literature of the target language in cultural contexts. Conducted in the target language. Prerequisite: WLC 301S or WLC 302S.

WLC 404F - TEXTS & CONTEXTS:SEM LIT:FRENC

Semester Hours: 3

In-depth study of authors, genres, or movements in cultural contexts. Conducted in the target language. May be repeated when taught with a different topic. Prerequisite: WLC 301F or WLC 302F.

WLC 404G - TEXTS & CONTEXTS:SEM LIT/GERMA

Semester Hours: 3

In-depth study of authors, genres, or movements in cultural contexts. Conducted in the target language. May be repeated when taught with a different topic. Prerequisite: WLC 301G or WLC 302G.

WLC 404R - TEXTS & CONTEXTS:SEM LIT:RUSSI

Semester Hours: 3

In-depth study of authors, genres, or movements in cultural contexts. Conducted in the target language. May be repeated when taught with a different topic. Prerequisite: WLC 301R or WLC 302R.

WLC 404S - TEXTS & CONTEXTS:SEM LIT:SPANI

Semester Hours: 3

In-depth study of authors, genres, or movements in cultural contexts. Conducted in the target language. May be repeated when taught with a different topic. Prerequisite: WLC 301S or WLC 302S.

WLC 409 - SR SEM: COMPARATIVE LANG & CUL

Semester Hours: 3

The senior seminar will explore a special topic relevant to all world languages and cultures; examples include but are not limited to education, family, fine arts and music, food, politics. Students will compare their own language and culture to other languages and cultures, develop connections to other languages and disciplines, and cultivate an understanding of and appreciation for world cultures and communities with the aim of understanding that there are multiple ways of viewing the world. This is the capstone course for majors who opt out of completing an international internship (WLC 410). Prerequisites: Two 300-level WLC courses and senior standing.

WLC 410 - INT'L INTERN:COMP LANG/CULT

Semester Hours: 3-6

Capstone for majors, offering practical experience in commercial or public organizations domestically or abroad. Conducted in English. Prerequisite: WLC 303.

WLC 499F - INDEPENDENT STUDY:FRENCH

Semester Hours: 3

Independent study and/or study abroad. Prerequisite: WLC 202F.

WLC 499G - INDEPENDENT STUDY:GERMAN

Semester Hours: 3

Independent study and/or study abroad. Prerequisite: WLC 202G.

WLC 499R - INDEPENDENT STUDY:RUSSIAN

Semester Hours: 3

Independent study and/or study abroad. Prerequisite: WLC 202R.

WLC 499S - INDEPENDENT STUDY:SPANISH

Semester Hours: 3

Independent study and/or study abroad. Prerequisite: WLC 202S.

Foreign Language, BA

The major is comprised of twelve courses of which ten will be taught in the focus language (French, German, Russian, Spanish) and two (WLC 204 and WLC 409/WLC 410) will utilize English for in-class discussions.

- Foreign Language, BA requires 120 credit hours.
- 36 of 120 credit hours must be taken at 300 level or higher.
- Must have a 2.0 GPA in major, minor, and overall.
- No more than 6 credit hours of HPE may count in degree requirements.
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- No more than 60 credit hours from a two-year school can be applied toward a UAH degree.
- All double counting of classes must be approved through the CAHS Advising Office.
- All double counting of classes must be approved through the CAHS Academic Advising Office.
- For graduation application instructions, see here (p. 812).

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	

EH 209	HONORS SEM READINGS LIT/CUL I
EH 210	HONORS SEM READINGS LIT/CUL 2
EH 242	MYTHOLOGY
Humanities and Fine Arts	
3-6	
CM 113	Intro to Rhetorical Communication
WLC 101S	INTRO FOREIGN LANG I: SPANISH
or WLC 101A	INTRO FOREIGN LANG I: ARABIC
or WLC 101F	INTRO FOREIGN LANG I:FRENCH
or WLC 101G	INTRO FOREIGN LANG I:GERMAN
or WLC 101J	INTRO FOREIGN LANG I:JAPANESE
or WLC 101R	INTRO FOREIGN LANG I:RUSSIAN
WLC 102S	INTRO FOREIGN LANG II:SPANISH
or WLC 102A	INTRO FOREIGN LANG II: ARABIC
or WLC 102F	INTRO FOREIGN LANG II:FRENCH
or WLC 102G	INTRO FOREIGN LANG II:GERMAN
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN
WLC 201S	INTERM FOREIGN LANG:SPANISH
or WLC 201A	INTERM FOREIGN LANG I: ARABIC
or WLC 201F	INTERM FOREIGN LANG:FRENCH
or WLC 201G	INTERM FOREIGN LANG:GERMAN
or WLC 201J	INTERM FOREIGN LANG: JAPANESE
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN
WLC 202S	INTERM FOREIGN LANG II:SPANISH
or WLC 202A	INTERM FOREIGN LANG II: ARABIC
or WLC 202F	INTERM FOREIGN LANG II:FRENCH
or WLC 202G	INTERM FOREIGN LANG II:GERMAN
or WLC 202J	INTERM FORGN LANG II:JAPANESE
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN
WLC 204	INTERNATIONAL CINEMA
PHL 101	INTRODUCTION TO PHILOSOPHY
PHL 102	INTRO TO ETHICS
PHL 103	INTRODUCTION TO LOGIC
PHL 150	TECH, SCIENCE & HUMAN VALUES
WGS 200	INTRO WOMEN'S & GENDER STUDIES
AMS 229	ANCIENT & MEDIEVAL WORLDS
ARH 100	ARH SURV:ANCIENT-MEDIEVAL
ARH 101	ARH SURV:RENAISSANCE-MODERN
ARH 103	ARH SUR:NON-WESTERN TRADITIONS
ARS 160	DRAWING: FOUNDATIONS
TH 122	THEATRE APPRECIATION
TH 123	INTRO TO FILM STUDIES
MU 100	INTRO TO MUSIC LITERATURE
Area III: Mathematics and Sciences	
11-12	
Mathematics	
3-4	
MA 105	NATURE OF MATHEMATICS
MA 107	ALGEBRA WITH APPLICATIONS
MA 110	FINITE MATHEMATICS
MA 112	PRECALCULUS ALGEBRA
MA 113	PRECALCULUS TRIGONOMETRY
MA 115	PRECALCULUS ALGEBRA & TRIG
MA 120	MATH PROFESSIONAL APPLICATIONS

MA 171	CALCULUS A	
Natural Sciences (Lab)		8
AST 100	SURVEY OF ASTRONOMY	
AST 106	EXPLORING THE COSMOS I	
AST 107	EXPLORING THE COSMOS II	
BYS 109	FUNDAMENTALS OF BIOLOGY	
BYS 119	PRINCIPLES OF BIOLOGY	
BYS 120	ORGANISMAL BIOLOGY	
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I	
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB	
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB	
ESS 103	ENVIRONMENTAL EARTH SCIENCE	
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG	
PH 100	CONCEPTUAL PHYSICS	
PH 101	GENERAL PHYSICS I	
PH 102	GENERAL PHYSICS II	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	
Area IV: History and Social and Behavioral Sciences*		12
History		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Sciences		6-9
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
ESS 105	WORLD REGIONAL GEOGRAPHY	
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS	
PY 101	GENERAL PSYCHOLOGY I	
PY 201	LIFE-SPAN DEVELOPMENT	
SOC 100	INTRO TO SOCIOLOGY	
SOC 102	ANALYSIS OF SOCIAL PROBLEMS	
SOC 103	INTRO TO CRIMINOLOGY	
SOC 105	INTRO CULTURAL ANTHROPOLOGY	

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). In Area V, take no more than six hours in a single discipline from Areas II, III, or IV. Area V should cover a breadth of disciplinary study.

Code	Title	Semester Hours
Pre-Professional		19
WLC 101, 102, 201, and 202 will be shared between Area V and the WLC major. These classes can not also count in Area II of the GER.		
Choose 7 additional credit hours from the above listed Fine Arts, Humanities, Literature, Mathematics, Sciences, History, and Social and Behavioral Sciences.		
Foreign Language Courses		36
WLC 101F	INTRO FOREIGN LANG I:FRENCH	3
or WLC 101G	INTRO FOREIGN LANG I:GERMAN	
or WLC 101R	INTRO FOREIGN LANG I:RUSSIAN	
or WLC 101S	INTRO FOREIGN LANG I: SPANISH	
or WLC 101MS	INTRO TO MEDICAL SPANISH	
WLC 102F	INTRO FOREIGN LANG II:FRENCH	3
or WLC 102G	INTRO FOREIGN LANG II:GERMAN	
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN	
or WLC 102S	INTRO FOREIGN LANG II:SPANISH	
or WLC 102MS	INTRO TO MEDICAL SPANISH II	
WLC 201F	INTERM FOREIGN LANG:FRENCH	3
or WLC 201G	INTERM FOREIGN LANG:GERMAN	
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN	
or WLC 201S	INTERM FOREIGN LANG:SPANISH	
WLC 202F	INTERM FOREIGN LANG II:FRENCH	3
or WLC 202G	INTERM FOREIGN LANG II:GERMAN	
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN	
or WLC 202S	INTERM FOREIGN LANG II:SPANISH	
WLC 204	INTERNATIONAL CINEMA	3
WLC 301F	CONVERSATION:FRENCH	3
or WLC 301G	CONVERSATION:GERMAN	
or WLC 301R	CONVERSATION:RUSSIAN	
or WLC 301S	CONVERSATION:SPANISH	
WLC 302F	COMPOSITION:FRENCH	3
or WLC 302G	COMPOSITION:GERMAN	
or WLC 302R	COMPOSITION:RUSSIAN	
or WLC 302S	COMPOSITION:SPANISH	
WLC 303F	FOREIGN LANG LIFE & PROF:FRENC	3
or WLC 303G	FOREIGN LANG LIFE & PROF:GERMA	
or WLC 303R	FOREIGN LANG LIFE & PROF:RUSSI	
or WLC 303S	FOREIGN LANG LIFE & PROF:SPANI	
WLC 304F	CULTURE:FRENCH	3
or WLC 304G	CULTURE:GERMAN	
or WLC 304R	CULTURE:RUSSIAN	
or WLC 304S	CULTURE:SPANISH	
WLC 305F	INTRO TO LITERATURE:FRENCH	3
or WLC 305G	INTRO TO LITERATURE:GERMAN	
or WLC 305R	INTRO TO LITERATURE:RUSSIAN	
or WLC 305S	INTRO TO LITERATURE:SPANISH	
WLC 404F	TEXTS & CONTEXTS:SEM LIT:FRENC	3
or WLC 404G	TEXTS & CONTEXTS:SEM LIT/GERMA	
or WLC 404R	TEXTS & CONTEXTS:SEM LIT:RUSSI	
or WLC 404S	TEXTS & CONTEXTS:SEM LIT:SPANI	
WLC 409	SR SEM: COMPARATIVE LANG & CUL	3-6
or WLC 410	INT'L INTERN:COMP LANG/CULT	

Minor Courses	18+
Elective Courses	
Elective hours vary by program, see advisor.	
Total Semester Hours	120

Year 1

Fall		Semester Hours
WLC 101F	INTRO FOREIGN LANG I:FRENCH	3
or WLC 101G	or INTRO FOREIGN LANG I:GERMAN	
or WLC 101R	or INTRO FOREIGN LANG I:RUSSIAN	
or WLC 101S	or INTRO FOREIGN LANG I: SPANISH	
or WLC 101MS	or INTRO TO MEDICAL SPANISH	
EH 101	COLLEGE WRITING I	3
FYE 101	CHARGER SUCCESS	1
Math		3
Fine Arts		3

Term Semester Hours: 13

Spring

WLC 102F	INTRO FOREIGN LANG II:FRENCH	3
or WLC 102G	or INTRO FOREIGN LANG II:GERMAN	
or WLC 102R	or INTRO FOREIGN LANG II:RUSSIAN	
or WLC 102S	or INTRO FOREIGN LANG II:SPANISH	
or WLC 102MS	or INTRO TO MEDICAL SPANISH II	
EH 102	COLLEGE WRITING II	3
Humanities		3
Social/Behavioral Science		3
Science w/Lab		4

Term Semester Hours: 16

Year 2

Fall		
WLC 201F	INTERM FOREIGN LANG:FRENCH	3
or WLC 201G	or INTERM FOREIGN LANG:GERMAN	
or WLC 201R	or INTERM FOREIGN LANG:RUSSIAN	
or WLC 201S	or INTERM FOREIGN LANG:SPANISH	
Science w/Lab		4
Social/Behavioral Science		3
EH 207	READINGS LITERATURE/CULTURE I	3
or EH 208	or READINGS LITERATURE/CULTURE 2	
HY 103	WORLD HISTORY TO 1500	3
or HY 104	or WORLD HISTORY SINCE 1500	

Term Semester Hours: 16

Spring

WLC 202F	INTERM FOREIGN LANG II:FRENCH	3
or WLC 202G	or INTERM FOREIGN LANG II:GERMAN	
or WLC 202R	or INTERM FOREIGN LANG II:RUSSIAN	
or WLC 202S	or INTERM FOREIGN LANG II:SPANISH	
WLC 204	INTERNATIONAL CINEMA	3
HY 104	WORLD HISTORY SINCE 1500	3
or HY 103	or WORLD HISTORY TO 1500	
Area V Course		3
Literature or Humanities		3

Term Semester Hours: 15

Year 3**Fall**

WLC 301F	CONVERSATION:FRENCH	3
or WLC 301G	or CONVERSATION:GERMAN	
or WLC 301R	or CONVERSATION:RUSSIAN	
or WLC 301S	or CONVERSATION:SPANISH	
WLC 303F	FOREIGN LANG LIFE PROF:FRENC	3
or WLC 303G	or FOREIGN LANG LIFE & PROF:GERMA	
or WLC 303R	or FOREIGN LANG LIFE & PROF:RUSSI	
or WLC 303S	or FOREIGN LANG LIFE & PROF:SPANI	
Minor Courses		6
Area V Course		3

Term Semester Hours: 15

Spring

WLC 302F	COMPOSITION:FRENCH	3
or WLC 302G	or COMPOSITION:GERMAN	
or WLC 302R	or COMPOSITION:RUSSIAN	
or WLC 302S	or COMPOSITION:SPANISH	
WLC 304F	CULTURE:FRENCH	3
or WLC 304G	or CULTURE:GERMAN	
or WLC 304R	or CULTURE:RUSSIAN	
or WLC 304S	or CULTURE:SPANISH	
Minor Courses		6
Area V Course		3

Term Semester Hours: 15

Year 4**Fall**

WLC 305F	INTRO TO LITERATURE:FRENCH	3
or WLC 305G	or INTRO TO LITERATURE:GERMAN	
or WLC 305R	or INTRO TO LITERATURE:RUSSIAN	
or WLC 305S	or INTRO TO LITERATURE:SPANISH	
Minor Courses		6
Electives		6

Term Semester Hours: 15

Spring

WLC 404F	TEXTS CONTEXTS:SEM LIT:FRENC	3
or WLC 404G	or TEXTS & CONTEXTS:SEM LIT/GERMA	
or WLC 404R	or TEXTS & CONTEXTS:SEM LIT:RUSSI	
or WLC 404S	or TEXTS & CONTEXTS:SEM LIT:SPANI	
WLC 409	SR SEM: COMPARATIVE LANG CUL	3-6
or WLC 410	or INT'L INTERN:COMP LANG/CULT	
Electives		6
Minor Course		3

Term Semester Hours: 15-18

Total Semester Hours: 120-123

Foreign Languages, BA - Foreign Language and International Trade Concentration

World Languages majors interested in enhancing their preparation for participation in the global economy may wish to consider a focus in international trade, which combines language courses with a study of business and international politics. The Foreign Language and International Trade Program includes the following courses. No minor is required for students who major in foreign languages with the international trade focus.

- Foreign Language, BA requires 120 credit hours.
- 36 of 120 credit hours must be taken at 300 level or higher.
- Must have a 2.0 GPA in major, minor, and overall.
- No more than 6 credit hours of HPE may count in degree requirements.
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- No more than 60 credit hours from a two-year school can be applied toward a UAH degree.
- All double counting of classes must be approved through the CAHS Academic Advising Office.
- For graduation application instructions, see here (p. 812).

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S or WLC 101A or WLC 101F or WLC 101G or WLC 101J or WLC 101R	INTRO FOREIGN LANG I: SPANISH INTRO FOREIGN LANG I: ARABIC INTRO FOREIGN LANG I:FRENCH INTRO FOREIGN LANG I:GERMAN INTRO FOREIGN LANG I:JAPANESE INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S or WLC 102A or WLC 102F or WLC 102G or WLC 102J or WLC 102R	INTRO FOREIGN LANG II:SPANISH INTRO FOREIGN LANG II: ARABIC INTRO FOREIGN LANG II:FRENCH INTRO FOREIGN LANG II:GERMAN INTRO FOREIGN LANG II:JAPANESE INTRO FOREIGN LANG II:RUSSIAN	
WLC 201S or WLC 201A or WLC 201F or WLC 201G or WLC 201J or WLC 201R	INTERM FOREIGN LANG:SPANISH INTERM FOREIGN LANG I: ARABIC INTERM FOREIGN LANG:FRENCH INTERM FOREIGN LANG:GERMAN INTERM FOREIGN LANG: JAPANESE INTERM FOREIGN LANG:RUSSIAN	
WLC 202S	INTERM FOREIGN LANG II:SPANISH	

or WLC 202A	INTERM FOREIGN LANG II: ARABIC	
or WLC 202F	INTERM FOREIGN LANG II:FRENCH	
or WLC 202G	INTERM FOREIGN LANG II:GERMAN	
or WLC 202J	INTERM FORGN LANG II:JAPANESE	
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN	
WLC 204	INTERNATIONAL CINEMA	
PHL 101	INTRODUCTION TO PHILOSOPHY	
PHL 102	INTRO TO ETHICS	
PHL 103	INTRODUCTION TO LOGIC	
PHL 150	TECH, SCIENCE & HUMAN VALUES	
WGS 200	INTRO WOMEN'S & GENDER STUDIES	
AMS 229	ANCIENT & MEDIEVAL WORLDS	
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Area III: Mathematics and Sciences		11-12
Mathematics		3-4
MA 105	NATURE OF MATHEMATICS	
MA 107	ALGEBRA WITH APPLICATIONS	
MA 110	FINITE MATHEMATICS	
MA 112	PRECALCULUS ALGEBRA	
MA 113	PRECALCULUS TRIGONOMETRY	
MA 115	PRECALCULUS ALGEBRA & TRIG	
MA 120	MATH PROFESSIONAL APPLICATIONS	
MA 171	CALCULUS A	
Natural Sciences (Lab)		8
AST 100	SURVEY OF ASTRONOMY	
AST 106	EXPLORING THE COSMOS I	
AST 107	EXPLORING THE COSMOS II	
BYS 109	FUNDAMENTALS OF BIOLOGY	
BYS 119	PRINCIPLES OF BIOLOGY	
BYS 120	ORGANISMAL BIOLOGY	
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I	
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB	
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB	
ESS 103	ENVIRONMENTAL EARTH SCIENCE	
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG	
PH 100	CONCEPTUAL PHYSICS	
PH 101	GENERAL PHYSICS I	
PH 102	GENERAL PHYSICS II	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	

PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	
Area IV: History and Social and Behavioral Sciences*		12
History		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Sciences		6-9
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
ESS 105	WORLD REGIONAL GEOGRAPHY	
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS	
PY 101	GENERAL PSYCHOLOGY I	
PY 201	LIFE-SPAN DEVELOPMENT	
SOC 100	INTRO TO SOCIOLOGY	
SOC 102	ANALYSIS OF SOCIAL PROBLEMS	
SOC 103	INTRO TO CRIMINOLOGY	
SOC 105	INTRO CULTURAL ANTHROPOLOGY	

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). In Area V, take no more than six hours in a single discipline from Areas II, III, or IV. Area V should cover a breadth of disciplinary study.

Code	Title	Semester Hours
Pre-Professional		19
WLC 101, 102, 201, and 202 will share between the WLC major and Pre-Professional area. These classes may not also count in Area II of the GER.		
Choose 7 additional credit hours from the above listed Fine Arts, Humanities, Literature, Mathematics, Sciences, History, and Social and Behavioral Sciences.		
Foreign Language and International Trade Courses		64
WLC 101F or WLC 101G or WLC 101R or WLC 101S or WLC 101MS	INTRO FOREIGN LANG I:FRENCH INTRO FOREIGN LANG I:GERMAN INTRO FOREIGN LANG I:RUSSIAN INTRO FOREIGN LANG I: SPANISH INTRO TO MEDICAL SPANISH	3
WLC 102F or WLC 102G or WLC 102R or WLC 102S or WLC 102MS	INTRO FOREIGN LANG II:FRENCH INTRO FOREIGN LANG II:GERMAN INTRO FOREIGN LANG II:RUSSIAN INTRO FOREIGN LANG II:SPANISH INTRO TO MEDICAL SPANISH II	3
WLC 201F or WLC 201G or WLC 201R or WLC 201S	INTERM FOREIGN LANG:FRENCH INTERM FOREIGN LANG:GERMAN INTERM FOREIGN LANG:RUSSIAN INTERM FOREIGN LANG:SPANISH	3
WLC 202F or WLC 202G or WLC 202R	INTERM FOREIGN LANG II:FRENCH INTERM FOREIGN LANG II:GERMAN INTERM FOREIGN LANG II:RUSSIAN	3

or WLC 202S	INTERM FOREIGN LANG II:SPANISH	
WLC 204	INTERNATIONAL CINEMA	3
WLC 301F	CONVERSATION:FRENCH	3
or WLC 301G	CONVERSATION:GERMAN	
or WLC 301R	CONVERSATION:RUSSIAN	
or WLC 301S	CONVERSATION:SPANISH	
WLC 302F	COMPOSITION:FRENCH	3
or WLC 302G	COMPOSITION:GERMAN	
or WLC 302R	COMPOSITION:RUSSIAN	
or WLC 302S	COMPOSITION:SPANISH	
WLC 303F	FOREIGN LANG LIFE & PROF:FRENC	3
or WLC 303G	FOREIGN LANG LIFE & PROF:GERMA	
or WLC 303R	FOREIGN LANG LIFE & PROF:RUSSI	
or WLC 303S	FOREIGN LANG LIFE & PROF:SPANI	
WLC 304F	CULTURE:FRENCH	3
or WLC 304G	CULTURE:GERMAN	
or WLC 304R	CULTURE:RUSSIAN	
or WLC 304S	CULTURE:SPANISH	
WLC 305F	INTRO TO LITERATURE:FRENCH	3
or WLC 305G	INTRO TO LITERATURE:GERMAN	
or WLC 305R	INTRO TO LITERATURE:RUSSIAN	
or WLC 305S	INTRO TO LITERATURE:SPANISH	
WLC 404F	TEXTS & CONTEXTS:SEM LIT:FRENC	3
or WLC 404G	TEXTS & CONTEXTS:SEM LIT/GERMA	
or WLC 404R	TEXTS & CONTEXTS:SEM LIT:RUSSI	
or WLC 404S	TEXTS & CONTEXTS:SEM LIT:SPANI	
WLC 409	SR SEM: COMPARATIVE LANG & CUL ²	3-6
or WLC 410	INT'L INTERN:COMP LANG/CULT	
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS ¹	3
ECN 143	PRINC OF MICROECONOMICS ¹	3
ACC 210	ACCOUNTING FOR BUSINESS	4
SOC 303 & SOC 304	STATISTICS/SOCIAL SCIENCES and STATISTICS LAB	3-4
or MSC 287	BUSINESS STATISTICS I	
FIN 301	PRINCIPLES OF FINANCE	3
FIN 454	INTERNATIONAL FINANCE	3
MGT 301	MANAGING ORGANIZATIONS	3
MKT 301	PRINCIPLES OF MARKETING	3
MGT 450	INTERNATIONAL BUSINESS	3

Elective Courses

Elective hours vary by program, see advisor.

Total Semester Hours **120**¹ PSC 260 and ECN 143 may be shared between the WLC major and the social and behavioral sciences area in the general education.² If a student takes a 6 Hour internship abroad (410), then the student only needs WLC 305 OR 404.**Year 1****Fall**

WLC 101F	INTRO FOREIGN LANG I:FRENCH	3
or WLC 101G	or INTRO FOREIGN LANG I:GERMAN	
or WLC 101R	or INTRO FOREIGN LANG I:RUSSIAN	

Semester Hours

or WLC 101S	or INTRO FOREIGN LANG I: SPANISH	
or WLC 101MS	or INTRO TO MEDICAL SPANISH	
EH 101	COLLEGE WRITING I	3
Fine Arts		3
Math		3
FYE 101	CHARGER SUCCESS	1
Term Semester Hours:		13
Spring		
WLC 102F	INTRO FOREIGN LANG II:FRENCH	3
or WLC 102G	or INTRO FOREIGN LANG II:GERMAN	
or WLC 102R	or INTRO FOREIGN LANG II:RUSSIAN	
or WLC 102S	or INTRO FOREIGN LANG II:SPANISH	
or WLC 102MS	or INTRO TO MEDICAL SPANISH II	
EH 102	COLLEGE WRITING II	3
Humanities/ Fine Arts		3
Science w/Lab		4
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS	3
Term Semester Hours:		16
Year 2		
Fall		
WLC 201F	INTERM FOREIGN LANG:FRENCH	3
or WLC 201G	or INTERM FOREIGN LANG:GERMAN	
or WLC 201R	or INTERM FOREIGN LANG:RUSSIAN	
or WLC 201S	or INTERM FOREIGN LANG:SPANISH	
Science w/Lab		4
ECN 142	PRINC OF MACROECONOMICS	3
ACC 211	PRINC OF FINANCIAL ACCOUNTING	3
EH 207	READINGS LITERATURE/ CULTURE I	3
or EH 208	or READINGS LITERATURE/ CULTURE 2	
Term Semester Hours:		16
Spring		
WLC 202F	INTERM FOREIGN LANG II:FRENCH	3
or WLC 202G	or INTERM FOREIGN LANG II:GERMAN	
or WLC 202R	or INTERM FOREIGN LANG II:RUSSIAN	
or WLC 202S	or INTERM FOREIGN LANG II:SPANISH	
WLC 204	INTERNATIONAL CINEMA	3
HY 104	WORLD HISTORY SINCE 1500	3
or HY 103	or WORLD HISTORY TO 1500	

Literature or Humanities		3
ACC 212	MANAGEMENT ACCOUNTING	3
Term Semester Hours:		15
Year 3		
Fall		
WLC 301F	CONVERSATION:FRENCH	3
or WLC 301G	or CONVERSATION:GERMAN	
or WLC 301R	or CONVERSATION:RUSSIAN	
or WLC 301S	or CONVERSATION:SPANISH	
WLC 303F	FOREIGN LANG LIFE	3
	PROF:FRENC	
or WLC 303G	or FOREIGN LANG LIFE &	
	PROF:GERMA	
or WLC 303R	or FOREIGN LANG LIFE &	
	PROF:RUSSI	
or WLC 303S	or FOREIGN LANG LIFE &	
	PROF:SPANI	
Area V Course ³		
MSC 287	BUSINESS STATISTICS I	3
or SOC 303	or STATISTICS/SOCIAL	
	SCIENCES	
MGT 301	MANAGING ORGANIZATIONS	3
Term Semester Hours:		12
Spring		
WLC 302F	COMPOSITION:FRENCH	3
or WLC 302G	or COMPOSITION:GERMAN	
or WLC 302R	or COMPOSITION:RUSSIAN	
or WLC 302S	or COMPOSITION:SPANISH	
WLC 304F	CULTURE:FRENCH	3
or WLC 304G	or CULTURE:GERMAN	
or WLC 304R	or CULTURE:RUSSIAN	
or WLC 304S	or CULTURE:SPANISH	
FIN 301	PRINCIPLES OF FINANCE	3
HY 103	WORLD HISTORY TO 1500	3
or HY 104	or WORLD HISTORY SINCE 1500	
MKT 301	PRINCIPLES OF MARKETING	3
Term Semester Hours:		15
Year 4		
Fall		
WLC 305F	INTRO TO LITERATURE:FRENCH	3
or WLC 305G	or INTRO TO	
	LITERATURE:GERMAN	
or WLC 305R	or INTRO TO	
	LITERATURE:RUSSIAN	
or WLC 305S	or INTRO TO	
	LITERATURE:SPANISH	
FIN 454	INTERNATIONAL FINANCE	3
MKT 415	INTERNATIONAL MARKETING	3
or MGT 450	or INTERNATIONAL BUSINESS	
Area V Course		3
Elective		3
Term Semester Hours:		15
Spring		

WLC 409	SR SEM: COMPARATIVE LANG CUL	3-6
or WLC 410	or INT'L INTERN:COMP LANG/ CULT	
Area V Course		3
Electives		9
Term Semester Hours:		15-18
Total Semester Hours:		117-120

Foreign Language Minor

Foreign language minors are offered in French, German, Russian, and Spanish. Foreign language majors are permitted to minor in a second foreign language. The Foreign Language Minor Program is comprised of eight courses.

Requirements

Code	Title	Semester Hours
WLC 101F	INTRO FOREIGN LANG I:FRENCH	3
or WLC 101G	INTRO FOREIGN LANG I:GERMAN	
or WLC 101R	INTRO FOREIGN LANG I:RUSSIAN	
or WLC 101S	INTRO FOREIGN LANG I: SPANISH	
or WLC 101MS	INTRO TO MEDICAL SPANISH	
WLC 102F	INTRO FOREIGN LANG II:FRENCH	3
or WLC 102G	INTRO FOREIGN LANG II:GERMAN	
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN	
or WLC 102S	INTRO FOREIGN LANG II:SPANISH	
or WLC 102MS	INTRO TO MEDICAL SPANISH II	
WLC 201F	INTERM FOREIGN LANG:FRENCH	3
or WLC 201G	INTERM FOREIGN LANG:GERMAN	
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN	
or WLC 201S	INTERM FOREIGN LANG:SPANISH	
WLC 202F	INTERM FOREIGN LANG II:FRENCH	3
or WLC 202G	INTERM FOREIGN LANG II:GERMAN	
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN	
or WLC 202S	INTERM FOREIGN LANG II:SPANISH	
WLC 301F	CONVERSATION:FRENCH	3
or WLC 301G	CONVERSATION:GERMAN	
or WLC 301R	CONVERSATION:RUSSIAN	
or WLC 301S	CONVERSATION:SPANISH	
WLC 302F	COMPOSITION:FRENCH	3
or WLC 302G	COMPOSITION:GERMAN	
or WLC 302R	COMPOSITION:RUSSIAN	
or WLC 302S	COMPOSITION:SPANISH	
WLC 305F	INTRO TO LITERATURE:FRENCH	3
or WLC 305G	INTRO TO LITERATURE:GERMAN	
or WLC 305R	INTRO TO LITERATURE:RUSSIAN	
or WLC 305S	INTRO TO LITERATURE:SPANISH	
Select one of the following:		3
WLC 303F	FOREIGN LANG LIFE & PROF:FRENC	
or WLC 303G	FOREIGN LANG LIFE & PROF:GERMA	
or WLC 303R	FOREIGN LANG LIFE & PROF:RUSSI	
or WLC 303S	FOREIGN LANG LIFE & PROF:SPANI	
WLC 304F	CULTURE:FRENCH	

or WLC 304G	CULTURE:GERMAN	
or WLC 304R	CULTURE:RUSSIAN	
or WLC 304S	CULTURE:SPANISH	
WLC 404F	TEXTS & CONTEXTS:SEM LIT:FRENC	
or WLC 404G	TEXTS & CONTEXTS:SEM LIT/GERMA	
or WLC 404R	TEXTS & CONTEXTS:SEM LIT:RUSSI	
or WLC 404S	TEXTS & CONTEXTS:SEM LIT:SPANI	
Total Semester Hours		24

Foreign Language and Global Engagement Certificate

(French/German/Russian/Spanish/Arabic/Japanese)

The Department of World Languages and Cultures, in collaboration with the Global Studies Program, offers a Certificate in Foreign Language and Global Engagement in French, German, Russian, and Spanish. The Certificate may also be earned in Arabic or Japanese if all of the required courses are available, which may be contingent on enrollment. If a student would like to pursue the Certificate in Arabic or Japanese, they should talk to World Languages and Cultures department chair about the availability of courses, possibilities for fulfilling requirements via study abroad, or potential course substitutions.

All coursework must be done in a single language. The Certificate is aimed at UAH students and members of the larger community who wish to acquire officially certified world language and culture skills appropriate for global engagement in a breadth of academic contexts (from research collaboration across the disciplines and professions to medical practice, global trade, the arts, and diplomacy). The Certificate also facilitates UAH's evolving study-abroad/research opportunities that require world language skills. Upon successful completion of the Certificate, the students will have acquired intermediate world language proficiency in both oral and written communication appropriate in a variety of everyday situations and professional environments. They will also have gained basic knowledge in the cultural, economic, political, and historical ramifications of globalization.

The requirements for the Certificate are:

Code	Title	Semester Hours
WLC 101F	INTRO FOREIGN LANG I:FRENCH	3
or WLC 101G	INTRO FOREIGN LANG I:GERMAN	
or WLC 101J	INTRO FOREIGN LANG I:JAPANESE	
or WLC 101R	INTRO FOREIGN LANG I:RUSSIAN	
or WLC 101S	INTRO FOREIGN LANG I: SPANISH	
or WLC 101MS	INTRO TO MEDICAL SPANISH	
or WLC 101A	INTRO FOREIGN LANG I: ARABIC	
WLC 102F	INTRO FOREIGN LANG II:FRENCH	3
or WLC 102G	INTRO FOREIGN LANG II:GERMAN	
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE	
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN	
or WLC 102S	INTRO FOREIGN LANG II:SPANISH	
or WLC 102MS	INTRO TO MEDICAL SPANISH II	
or WLC 102A	INTRO FOREIGN LANG II: ARABIC	
WLC 201F	INTERM FOREIGN LANG:FRENCH	3
or WLC 201G	INTERM FOREIGN LANG:GERMAN	
or WLC 201J	INTERM FOREIGN LANG: JAPANESE	
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN	
or WLC 201S	INTERM FOREIGN LANG:SPANISH	
or WLC 201A	INTERM FOREIGN LANG I: ARABIC	
WLC 202F	INTERM FOREIGN LANG II:FRENCH	3
or WLC 202G	INTERM FOREIGN LANG II:GERMAN	
or WLC 202J	INTERM FORGN LANG II:JAPANESE	
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN	
or WLC 202S	INTERM FOREIGN LANG II:SPANISH	
or WLC 202A	INTERM FOREIGN LANG II: ARABIC	

WLC 301F	CONVERSATION:FRENCH	3
or WLC 301G	CONVERSATION:GERMAN	
or WLC 301J	CONVERSATION:JAPANESE	
or WLC 301R	CONVERSATION:RUSSIAN	
or WLC 301S	CONVERSATION:SPANISH	
or WLC 301A	CONVERSATION: ARABIC	
GS 200	GLOBAL SYSTEMS AND CULTURES	3
Total Semester Hours		18

To qualify for the Certificate, a 'B' average or higher is required for the world language courses; a grade of 'B' or higher is required for GS 200. Students majoring or minoring in world languages can also pursue this Certificate. Native speakers of French, German, Russian, Spanish, Japanese, or Arabic cannot pursue the Certificate in their own language but are encouraged to pursue the Certificate in one of the other languages. Since the Certificate is not a Major/Minor, it does not presuppose Charger Foundations courses or any other coursework prior to the Certificate sequence. It can also be earned as a post-Baccalaureate certificate. Standard UAH admission procedures for degree-seeking students apply.

To be awarded the Certificate upon graduation, students must officially declare the Certificate with a college advisor to have it added to their program of study. Then, they must request for it to be audited when they apply for graduation and go through the degree audit process. Certificate programs are not audited automatically.

Students with some prior knowledge of the language can test out of lower level courses and be placed into higher courses. For the courses they test out of, students will receive up to (6) credit hours, but no grades or quality points, towards completion of the Certificate. Post-Baccalaureate students are not eligible for departmental credit.

If the student tests out of more than six (6) hours of courses, they should choose a language Minor or Major rather than or in conjunction with the Certificate. In the event that pursuing a Minor or Major is not an option, they should take additional courses in their language or a relevant Global Studies-approved course to fulfill any remaining hours required for the Certificate. Unlike major and minor programs, no coursework/hours may be waived from the 18 hours required for the Certificate. Any course substitutions must be approved by the World Languages and Cultures Chair or the Global Studies Director.

Writing, BA

The Writing Major is an interdisciplinary program designed for students who want to make writing central to their career. The major prepares students for careers in writing-related fields—such as technical writing, publishing, social media consulting, and public relations—or graduate studies in rhetoric and composition, communication, creative writing, education, or law. By combining courses from the English and Communication Arts departments, the major gives students a comprehensive education in writing and rhetorical theory along with the techniques necessary to craft effective documents in multiple genres. All students take six core courses that instill a firm foundation in writing fundamentals and two electives that allow students to customize their education. Every student also chooses one of six concentrations: technical and professional writing, creative writing, media writing, rhetoric and composition, public relations, or a customized concentration created by the student in consultation with their advisor. The major also includes a capstone portfolio that allows students to revise documents that they can show to potential employers or graduate programs.

- Writing, BA requires 120 credit hours.
- 36 of 120 credit hours must be taken at 300 level or higher.
- Must have a 2.0 GPA in major, minor, and overall.
- No more than 6 credit hours of HPE may count in degree requirements.
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- No more than 60 credit hours from a two-year school can be applied toward a UAH degree.
- Any double counting of classes must be approved through the CAHS advising office.
- For graduation application instructions, see here (p. 812).

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101	COLLEGE WRITING I	
or EH 101S	COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3

ARH 100	ARH SURV:ANCIENT-MEDIEVAL
ARH 101	ARH SURV:RENAISSANCE-MODERN
ARH 103	ARH SUR:NON-WESTERN TRADITIONS
ARS 160	DRAWING: FOUNDATIONS
TH 122	THEATRE APPRECIATION
TH 123	INTRO TO FILM STUDIES
MU 100	INTRO TO MUSIC LITERATURE
Literature	
EH 207	READINGS LITERATURE/CULTURE I
EH 208	READINGS LITERATURE/CULTURE 2
EH 209	HONORS SEM READINGS LIT/CUL I
EH 210	HONORS SEM READINGS LIT/CUL 2
EH 242	MYTHOLOGY
Humanities and Fine Arts	
CM 113	Intro to Rhetorical Communication
WLC 101S	INTRO FOREIGN LANG I: SPANISH
or WLC 101A	INTRO FOREIGN LANG I: ARABIC
or WLC 101F	INTRO FOREIGN LANG I:FRENCH
or WLC 101G	INTRO FOREIGN LANG I:GERMAN
or WLC 101J	INTRO FOREIGN LANG I:JAPANESE
or WLC 101R	INTRO FOREIGN LANG I:RUSSIAN
WLC 102S	INTRO FOREIGN LANG II:SPANISH
or WLC 102A	INTRO FOREIGN LANG II: ARABIC
or WLC 102F	INTRO FOREIGN LANG II:FRENCH
or WLC 102G	INTRO FOREIGN LANG II:GERMAN
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN
WLC 201S	INTERM FOREIGN LANG:SPANISH
or WLC 201A	INTERM FOREIGN LANG I: ARABIC
or WLC 201F	INTERM FOREIGN LANG:FRENCH
or WLC 201G	INTERM FOREIGN LANG:GERMAN
or WLC 201J	INTERM FOREIGN LANG: JAPANESE
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN
WLC 202S	INTERM FOREIGN LANG II:SPANISH
or WLC 202A	INTERM FOREIGN LANG II: ARABIC
or WLC 202F	INTERM FOREIGN LANG II:FRENCH
or WLC 202G	INTERM FOREIGN LANG II:GERMAN
or WLC 202J	INTERM FORGN LANG II:JAPANESE
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN
WLC 204	INTERNATIONAL CINEMA
PHL 101	INTRODUCTION TO PHILOSOPHY
PHL 102	INTRO TO ETHICS
PHL 103	INTRODUCTION TO LOGIC
PHL 150	TECH, SCIENCE & HUMAN VALUES
WGS 200	INTRO WOMEN'S & GENDER STUDIES
AMS 229	ANCIENT & MEDIEVAL WORLDS
ARH 100	ARH SURV:ANCIENT-MEDIEVAL
ARH 101	ARH SURV:RENAISSANCE-MODERN
ARH 103	ARH SUR:NON-WESTERN TRADITIONS
ARS 160	DRAWING: FOUNDATIONS
TH 122	THEATRE APPRECIATION
TH 123	INTRO TO FILM STUDIES

MU 100	INTRO TO MUSIC LITERATURE	
Area III: Mathematics and Sciences		11-12
Mathematics		3-4
MA 105	NATURE OF MATHEMATICS	
MA 107	ALGEBRA WITH APPLICATIONS	
MA 110	FINITE MATHEMATICS	
MA 112	PRECALCULUS ALGEBRA	
MA 113	PRECALCULUS TRIGONOMETRY	
MA 115	PRECALCULUS ALGEBRA & TRIG	
MA 120	MATH PROFESSIONAL APPLICATIONS	
MA 171	CALCULUS A	
Natural Sciences (Lab)		8
AST 100	SURVEY OF ASTRONOMY	
AST 106	EXPLORING THE COSMOS I	
AST 107	EXPLORING THE COSMOS II	
BYS 109	FUNDAMENTALS OF BIOLOGY	
BYS 119	PRINCIPLES OF BIOLOGY	
BYS 120	ORGANISMAL BIOLOGY	
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I	
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB	
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB	
ESS 103	ENVIRONMENTAL EARTH SCIENCE	
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG	
PH 100	CONCEPTUAL PHYSICS	
PH 101	GENERAL PHYSICS I	
PH 102	GENERAL PHYSICS II	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	
Area IV: History and Social and Behavioral Sciences*		12
History		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Sciences		6-9
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
ESS 105	WORLD REGIONAL GEOGRAPHY	
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS	

PY 101	GENERAL PSYCHOLOGY I
PY 201	LIFE-SPAN DEVELOPMENT
SOC 100	INTRO TO SOCIOLOGY
SOC 102	ANALYSIS OF SOCIAL PROBLEMS
SOC 103	INTRO TO CRIMINOLOGY
SOC 105	INTRO CULTURAL ANTHROPOLOGY

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Area V allows no more than six hours in a single discipline from Area II or Area IV. Area V should cover a breadth of disciplinary study.

Code	Title	Semester Hours
Pre-Professional		19
Choose 3 Hours WLC 101, 102, 201, or 202		3
Pre-Professional Electives		16
Core Courses		15
CM 113	Intro to Rhetorical Communication	
EH 260	INTRO TO WRITING MAJOR	
CM 375	RHETORICAL CRITICISM	
or EH 403	LITERARY CRITICISM & THEORY	
CM 408	CLASSICAL RHET THEORY	
or CM 409	CONTEMPORARY RHETORICAL THEORY	
EH 340	ACADEMIC WRITING	
EH 463	CAPSTONE IN WRITING (Capstone)	
Concentration Courses: Choose one concentration below.		18-19
Technical and Professional Writing		
EH 301	TECHNICAL WRITING	
EH 302	TECHNICAL EDITING	
EH 320	PRACTICUM IN WRITING	
EH 401	THEORY & PRACTICE IN TECH COMM	
Technical Electives: Choose six hours.		
Creative Writing		
EH 211	INTRO CREATIVE WRITING	
EH 410	FICTION WRITING	
EH 411	POETRY WRITING	
EH 414	CREATIVE NONFICTION WRITING	
Literature Electives 300+: Choose six hours.		
Media Writing		
CM 205	INTRO TO JOURNALISM	
CM 405	ADVANCED MEDIA WRITING	
EH 454	NEW MEDIA WRITING & RHETORIC	
or CM 454	NEW MEDIA WRITING & RHETORIC	
CM 444	ADVERTISING	
or CM 435	SOCIAL MEDIA	
EH 414	CREATIVE NONFICTION WRITING	
EH/CM 320	PRACTICUM IN WRITING	
Rhetoric and Composition		
CM 408	CLASSICAL RHET THEORY	
or CM 409	CONTEMPORARY RHETORICAL THEORY	
CM 375	RHETORICAL CRITICISM (Take course not taken in core.)	
or EH 403	LITERARY CRITICISM & THEORY	
EH 400	COMPOSITION STUDIES FOR TCHERS	
EH 475	RHETORIC AND WRITING	

EH 454	NEW MEDIA WRITING & RHETORIC
or CM 454	NEW MEDIA WRITING & RHETORIC
CM 426	BURKEIAN THEORY & CRITICISM
or CM 416	WOMEN ORATORS
or CM 418	LEGAL ARGUMENT
Public Relations	
CM 205	INTRO TO JOURNALISM
CM 220	INTRO PUBLIC RELATIONS
CM 405	ADVANCED MEDIA WRITING
CM 420	PUBLIC RELATIONS WRITING
CM 400	INTERNSHIP
CM 440	PUBLIC RELATIONS CAMPAIGN
Student/Advisor Designed	
18 hours of approved writing electives.	
Electives: Choose two not taken above.	
CM 205	INTRO TO JOURNALISM
CM 220	INTRO PUBLIC RELATIONS
CM 231	FOUNDATIONS OF HUMAN COMMUNICA
CM 310	PERSUASION
CM 375	RHETORICAL CRITICISM
CM 400	INTERNSHIP
CM 405	ADVANCED MEDIA WRITING
CM 408	CLASSICAL RHET THEORY
CM 409	CONTEMPORARY RHETORICAL THEORY
CM 418	LEGAL ARGUMENT
CM 420	PUBLIC RELATIONS WRITING
CM 430	MASS MEDIA IN AMERICA
CM 435	SOCIAL MEDIA
CM 440	PUBLIC RELATIONS CAMPAIGN
CM 444	ADVERTISING
EH 211	INTRO CREATIVE WRITING
EH 300	STRATEGIES FOR BUSINESS WRIT'G
EH 301	TECHNICAL WRITING
EH 302	TECHNICAL EDITING
EH 400	COMPOSITION STUDIES FOR TCHERS
EH 401	THEORY & PRACTICE IN TECH COMM
EH 403	LITERARY CRITICISM & THEORY
EH 410	FICTION WRITING
EH 411	POETRY WRITING
EH 412	SPEC STUDIES CREATIVE WRITING
EH 414	CREATIVE NONFICTION WRITING
EHL 405	SUR GEN LINGUISTICS:APP ENG I
EHL 407	ADV EH GRAM:APP LINGUISTICS II
EH 475	RHETORIC AND WRITING
EH 454	NEW MEDIA WRITING & RHETORIC
or CM 454	NEW MEDIA WRITING & RHETORIC
TH 260	VIDEO PRODUCTION
Minor	
Elective courses	
Elective hours vary by program, please see advisor.	
Total Semester Hours	

6

18+

120

- Writing (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/english/writing-minor/>)

College of Business

Dean's Office

Jason.Greene@uah.edu (jason.greene@uah.edu)
256.824.4424
BAB 202

Undergraduate Advising

u (<http://catalog.uah.edu/undergrad/colleges-departments/business/undergradbusiness@uah.edu>) undergradbusiness@uah.edu
(UnderGradBiz@uah.edu) (<http://catalog.uah.edu/undergrad/colleges-departments/business/undergradbusiness@uah.edu>)
256.824.6787
BAB 102

Graduate Advising

g (<http://catalog.uah.edu/undergrad/colleges-departments/business/gradbusiness@uah.edu>) radbusiness@uah.edu (GradBiz@uah.edu) (<http://catalog.uah.edu/undergrad/colleges-departments/business/gradbusiness@uah.edu>)
256.824.6787
BAB 102

Mission

Our mission is to fuel innovation in business, spark new ideas through research, and launch the careers of our students.

- We tap the creativity, expertise, and energy of our students, faculty, and community to fuel innovation in business practices and business education.
- Our faculty and students spark ideas, foster discovery, create and communicate knowledge, and develop frameworks for solutions to challenges facing business and society today and in the future.
- Our academic programs, emphasize leadership, innovation, analytical reasoning, ethical decision-making, and critical thinking to launch the careers of our diverse population of students.

Degrees Offered

Bachelor of Science in Business Administration (BSBA)

The Bachelor of Science in Business Administration (BSBA) degree is a comprehensive four-year program that prepares graduates to be managers, leaders, and technical specialists in business, not-for-profit, and government organizations. The degree program includes a liberal arts and science foundation (called Charger Foundations), a business core curriculum, a business major, a concentration within the major, and a choice of elective courses. During the first two years, students focus on Charger Foundations with coursework in composition, the humanities and fine arts, history, social and behavioral sciences, natural and physical sciences, and mathematics. Charger Foundation courses are designed to broaden intellectual awareness and enhance the development of cultural literacy and analytical thinking. During the remaining two years, students first study the core foundations of business, then they focus on a specific major in either accounting, finance, information systems, management, or marketing. Within each major, students have an opportunity to further concentrate their program in an area of particular interest such as cybersecurity, federal contracting, human resource management, supply chain management, and other areas. Students electing to double major in accounting, finance, information systems, management, or marketing may use the courses completed in one major to count towards applicable requirements in the second major. BSBA students cannot double major in General Business.

The College of Business offers majors in the following disciplines:

- Accounting (<http://catalog.uah.edu/undergrad/colleges-departments/business/accounting/#majorstext>)
- Finance (<http://catalog.uah.edu/undergrad/colleges-departments/business/finance/#majorstext>)
- Information Systems (<http://catalog.uah.edu/undergrad/colleges-departments/business/information-systems/#minorstext>)
- Management (<http://catalog.uah.edu/undergrad/colleges-departments/business/management/#majorstext>)
- Marketing (<http://catalog.uah.edu/undergrad/colleges-departments/business/marketing/#majorstext>)
- General Business (<http://catalog.uah.edu/undergrad/colleges-departments/business/management/general-business/>)

Bachelor of Science in Economics and Computational Analysis (BSECA)

The Economics and Computational Analysis (BSECA) degree (<http://catalog.uah.edu/undergrad/colleges-departments/business/economics/economics-computational-analysis-bachelor-of-science/>) is a comprehensive four-year program that teaches students how to combine economic models, computational tools, and econometric methods to improve business and social decision-making. Students evaluate economic development strategies,

identify entrepreneurial opportunities, and analyze public policy in a world that continues to change the way people communicate, perceive their world, make decisions, and conduct business. During the first two years, students focus on Charger Foundations with coursework in composition, the humanities and fine arts, history, social and behavioral sciences, natural and physical sciences, and mathematics. Charger Foundation courses are designed to broaden intellectual awareness and enhance the development of cultural literacy and analytical thinking. In the junior and senior years, students move into higher level coursework in economics and complete the requirements for either a major or a minor in an area of interest. The BSECA program is designed to be coupled with a minor or double major to enrich the student's perspective about defining and modeling complex problems. Some students select a double major in a business discipline such as finance or accounting whereas others choose a different context by selecting a double major or minor in sociology, philosophy, or political science.

Minors

Students from any major may want to augment the coursework from their degree program with a minor (<https://www.uah.edu/business/undergraduate/minors/>) in a business-related area. The minor consists of at least 18 semester hours, but not more than 30 semester hours, in subjects available in the College of Business. Students electing a minor may use the courses completed in their general education requirements as part of the required hours in a minor. Students may also use relevant courses to meet the requirements in their major.

The College of Business offers minors in the following disciplines:

- Accounting (<https://catalog.uah.edu/undergrad/colleges-departments/business/accounting/accounting-minor/>)
- Business (<https://catalog.uah.edu/undergrad/colleges-departments/business/management/business-minor/>)
- Economics (<https://catalog.uah.edu/undergrad/colleges-departments/business/economics/economics-minor/>)
- Entrepreneurship (<https://catalog.uah.edu/undergrad/colleges-departments/business/management/entrepreneurship-minor/>)
- Finance (<https://catalog.uah.edu/undergrad/colleges-departments/business/finance/finance-minor/>)
- Human Resource Management (<https://catalog.uah.edu/undergrad/colleges-departments/business/management/human-resource-management-minor/>)
- Information Systems (<http://catalog.uah.edu/undergrad/colleges-departments/business/information-systems/#minorstext>)
- Management & Leadership (<https://catalog.uah.edu/undergrad/colleges-departments/business/management/management-leadership-minor/>)
- Marketing (<https://catalog.uah.edu/undergrad/colleges-departments/business/marketing/marketing-minor/>)

JUMP Program

UAH's Joint Undergraduate Master's Program (JUMP) allows undergraduate students to study at the graduate level. Students from any UAH college and major can apply for JUMP! in the College of Business. Applicants are required to have a UAH GPA of 3.2 or higher and a cumulative GPA, including all undergraduate transfer coursework, of 3.2 or higher. Please visit the JUMP (p. 18) page for additional information.

Accreditation

The College of Business is accredited by AACSB International (<https://www.aacsb.edu/>). AACSB provides the highest standard of accreditation offered to business schools worldwide, with fewer than 25% of U.S. business schools and fewer than 5% of worldwide business schools achieving the distinction. To maintain AACSB accreditation, we must have a specific plan and sufficient resources to support high quality undergraduate and graduate programs, a highly qualified faculty who maintain credentials through continuous research or engagement with practice, and a process for assessing that our students are learning what we teach. We report to AACSB annually and undergo a comprehensive review every five years.

College of Education

323 Roberts Hall
 Telephone: 256.824.6180
 Email: education@uah.edu
Dean: Beth N. Quick, Ed.D.

Mission

The mission of the College of Education is to prepare knowledgeable, caring, and reflective educators and professionals who are committed as leaders to serving the needs of all learners and clients. As a faculty we accomplish our mission through outstanding teaching, cutting-edge research, and meaningful service.

The mission of the College of Education is communicated through our shared vision and articulated in our theme, *Through Teaching, We Lead*. The establishment of this theme codifies the major purpose of our department: to graduate professionals who are exceptionally well-prepared in disciplinary, pedagogical, and professional knowledge, who understand and are prepared to address the needs of all learners and clients, and who are committed to serving as leaders in their professional community to ensure a high-quality public or private education or delivery of services.

Accreditation

Teacher education programs at UAH are accredited by the National Council for Accreditation of Teacher Education (NCATE) and approved by the Alabama State Board of Education, according to standards of the National Association of the State Directors of Teacher Education and Certification (NASDTEC) for the issuance of appropriate professional certificates for service in public schools.

Degrees and Programs Offered

Under the State of Alabama plan, there are five levels of teacher certification programs, namely, P-3, K-6, 4-8, 6-12, and P-12. The College of Education offers all options. In conjunction with the College of Arts, Humanities, and Social Sciences and the College of Science, both undergraduate and graduate certification programs are offered. Candidates who complete the following undergraduate certification programs meet the requirements for the Highly Qualified Teacher in Alabama.

The College of Education offers degree programs in the following departments:

Curriculum and Instruction:

- Early Childhood Education/Early Childhood Special Education (PreK-3/birth to age 8)
- Elementary Education (K-6)
- Secondary/High School Education (6-12) with majors in biology, chemistry, English language arts, foreign language (German, French, Spanish), general science, history, mathematics, physics, and social science
- Collaborative Teacher – Special Education K-6 or 6-12
- Middle School Endorsement (4-8) with teaching fields in biology, chemistry, English language arts, foreign language (German, French, Spanish), general science, history, mathematics, physics, and social science
- Music Education (P-12)
- A minor is not available in education.

Kinesiology:

- Kinesiology - Exercise Science
- Kinesiology - Physical Education Teacher Education (P-12)

Curriculum and Instruction

323 Roberts Hall

Telephone: 256.824.6180

Email: education@uah.edu

Department Chair: Dr. Wolfram Verlaan

Degrees and Programs Offered

The State of Alabama offers five levels of teacher certification programs, namely, P-3, K-6, 6-12, and P-12. The College of Education offers options in four of the five levels of teacher certification.

- Early Childhood Education/Early Childhood Special Education (PreK-3/birth to age 8)
- Elementary Education (K-6)
- Secondary/High School Education (6-12) with majors in Biology, Chemistry, English Language Arts, Foreign Language (German, French, Spanish), General Science, History, Mathematics, Physics, and General Social Science
- Collaborative Teacher – Special Education K-6 or 6-12
- Music Education: Instrumental or Choral (P-12) (through the Department of Music)
- Art Education (P-12) (through the Department of Art, Art History, and Design)
- Physical Education (P-12) (through the Department of Kinesiology)
- A minor is not available in education.

Accreditation

Teacher education programs at UAH are accredited by the Council for the Accreditation of Educator Preparation (CAEP) and approved by the Alabama State Board of Education, according to standards of the National Association of the State Directors of Teacher Education and Certification (NASDTEC) for the issuance of appropriate professional certificates for service in public schools.

Preadmission Requirements

File an *Intent to Apply to the Teacher Education Program (TEP)* with the Teacher Certification Officer as soon as a decision is made to seek teacher certification, but no later than the end of the sophomore year. In addition, students must meet the following requirements:

1. No more than 2 courses of the General Education Requirements remain to be taken without Departmental approval.
2. Minimum GPA of 2.75 and grades of C or higher in EH 101 & EH 102 (or EH 105), CM 113, MA 230, MA 231 and PY 201.
3. Elementary education candidates must earn a 2.75 GPA in each of the following areas: English, Mathematics, Science, and Social Sciences.
4. Secondary education candidates must earn a 2.75 GPA in their major.
5. Submit a finger print card to the Alabama State Department of Education with the appropriate fee in the form of a money order or cashier's check made payable to the Alabama Department of Education and successfully pass a background review conducted by the Alabama Bureau of Investigation and the Federal Bureau of Investigation. Anyone convicted of a felony and/or misdemeanor other than a minor traffic violation may be denied certification or have certification revoked by the State Superintendent of Education.

Admission to the Teacher Education Program

Admission to the university does not qualify a student for admission to the Teacher Education Program. Students must submit an Application for Admission to the Teacher Education Program during the Block I semester of the education courses. They must also meet the following requirements:

1. Minimum 2.75 GPA in Block I ED courses with no grade lower than C.
2. Minimum 2.75 GPA in teaching field or second area of study courses, with no grade lower than C.
3. For Elementary and Early Childhood/Early Childhood Special Education students, a 2.75 GPA for 12 hours in each of the four areas of English, Social Sciences, Mathematics, and Science.
4. Satisfactory completion of specified assignments in Block I, including writing and field experiences.
5. Satisfactory ratings on Admission Interview, Dispositions Ratings, and Application Essay.
6. Passing score on all required subtests of the *Praxis Core Academic Skills for Educators test (CORE)*.

Admission by Reciprocity

Students who have been admitted to a teacher education program at an accredited university or college in Alabama may apply for reciprocal admission to the *Teacher Education Program (TEP)* with the Certification Officer or the Department Chair. Field experience hours from the previous university may be applied to UAH field experience requirements with documentation.

Continuation in the Teacher Education Program

Requirements include:

1. Minimum 2.75 GPA in Education courses, with no grade lower than C.
2. Minimum 2.75 GPA in teaching field or second area of study, with no grade lower than C.
3. Satisfactory completion of Blocks 2 and 3 Field Experience hours and grade of C or higher on required field experience papers. Before the internship, students must complete 200 field experience hours.
4. Satisfactory completion of two Professional Development Activities per semester (unless amended with Department Chair approval).
5. Satisfactory Dispositions Ratings by Education faculty and field experience mentor teachers.
6. Registration for *Praxis II* Test in Block 2-3; must pass *Praxis II* before admission for Internship.

If any of the above requirements are not met, a Professional Development Plan (PDP) will be initiated. Candidates who do not meet the conditions of the PDP may be dismissed from the Teacher Education Program.

Field Experiences

The Alabama State Department of Education requires that all teacher candidates complete robust clinical field experiences in diverse settings prior to the internship. To meet this requirement, candidates will systematically be placed in area schools for a minimum of 70 hours of experience each semester to complete 200 hours total.

Internship Placement Requirements

In addition to satisfactory completion of required coursework and satisfactory completion of 200 hours of field experiences, candidates must meet the following requirements:

1. Minimum 2.75 GPA in Education courses, with no grade lower than C.
2. Minimum 2.75 GPA in second area of study or teaching field, with no grade lower than C. (Elementary Education and Early Childhood/Early Childhood Special Education candidates must earn a 2.75 GPA in each of the following areas: English, Mathematics, Science, and Social Sciences).
3. Satisfactory Dispositions Ratings and field experience evaluations.

4. Satisfactory completing of six (6) Professional Development Activities.
5. Applications for Internship and graduation on file.
6. Passing Score on all required Praxis II exams.
7. (Foreign Language Students): Score of 'Advanced Low' on the ACTFL Oral Proficiency Interview.

Application Dates

Internships must be completed in the final semester before graduation. All internship placements are coordinated by the Coordinator of Field and Clinical Experiences. At UAH, the internship is a full-time, full semester assignment of 15 weeks. Candidates should not expect to enroll in other courses during the internship semester. During the internship, students must complete and pass the edTPA assessment for certification as required by the Alabama State Department of Education.

1. Elementary Education students must complete a primary and intermediate assignment.
2. Secondary Education students will complete a middle and high school assignment.
3. P-12 music education students must complete an early childhood/elementary and a middle/high school assignment.
4. Candidates adding the Collaborative Teacher certification will complete part of the internship in a special education setting.

Certification Requirements

Alabama teaching certificates are the legal responsibility of the Alabama State Department of Education. Colleges and universities cannot issue professional certificates. In order to be recommended for a professional teacher's certificate, candidates must complete a state approved program. Approved undergraduate programs offered by the UAH College of Education are designed to prepare candidates for professional Class B certification with a bachelor's degree.

Initial Certification

It is the candidate's responsibility to initiate the application for the initial certificate. To be recommended for an initial certificate, candidates must:

1. Meet all UAH Education program requirements including satisfactory completion of the internship with evaluations by university supervisors and cooperating teachers of 2.0 or higher.
2. Passing edTPA.
3. Candidates who expect to teach in states other than Alabama are responsible for knowledge of licensure requirements of those states. Such candidates should inform the certification officer of their intentions.

Ensuring the Competence of Graduates

For a period of two years of the valid date of the Professional Educator certificate, The University of Alabama in Huntsville, through the College of Education, shall warranty and provide remediation at no cost to students who are evaluated to be unsatisfactory or deficient in any area of preparation. Remediation in professional education and/or teaching field departments will be based upon recommendations from the performance evaluations conducted by public school administrators who use Educate Alabama which is recognized and approved by the State Board of Education. This policy is consistent with the Alabama State Code of Education.

Teacher Education Programs at UAH

B.A. and/or B.S. programs are available for the following certifications: art, biology, chemistry, collaborative teacher, early childhood/early childhood special education, elementary education, English-language arts, French, general science, German, history, mathematics, music, physical education, physics, social science, and Spanish. (General Education Requirements for teacher candidates may differ from those required of other students. Individuals interested in pursuing teacher education should consult the Department of Curriculum and Instruction about General Education Requirements for their program of study).

Bachelor of Science in Early Childhood and Early Childhood Special Education (PK-3) (p. 239)

Bachelor of Arts in Elementary Education (K-6) (p. 244)

Bachelor of Arts in Elementary Education (K-6) with Collaborative Education (K-6) (p. 247)

Bachelor of Arts in Elementary Education (K-6) with Language and Culture option (p. 250)

Bachelor of Science in Secondary Education (6-12) in the following fields of study:

- Biology (p. 253)
- General Sciences (p. 256)
- Chemistry (p. 258)
- English Language Arts (p. 261)

- Foreign Language (Spanish, French, or German) (p. 264)
- History (p. 268)
- History and General Social Sciences (p. 271)
- Mathematics (p. 274)
- Physics (p. 277)
- Additional Collaborative Certification (6-12) (p. 239)

UAH also offers teacher certification in Music Education (Choral or Instrumental) (p. 143) and Art Education (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/art-art-history/art-education/>).

ED 060 - ENGLISH FOR ACADMC PURP PRGM

Semester Hours: 3

This course aims to help students achieve a greater level of success academically and professionally. Three types of evaluative and consultation tracks are offered: accent modification, oral communication and literacy. A speech pathology model is used toward the accent modification and oral communication tracks, and a consultation approach utilizing a modified multi-sensory method focusing on comprehensive literacy is used toward the literacy track. By the end of the course, students typically exhibit a strong improvement in self-confidence and ability to proceed with their studies and professional dealings.

ED 115 - EFFECTIVE RDG & STUDY SKILLS

Semester Hours: 3

Developmental course focusing on acquisition of strategies to expand an individual's ability to read and study materials encountered in higher education. Effective reading and study strategies which incorporate reading, writing, and listening skills are taught and applied, using college texts and related readings.

ED 301 - INTRO TO EDUCATION PRACTICUM

Semester Hour: 1

Initial practicum experience designed to provide the opportunity to explore the role of the classroom teacher in today's diverse school settings. This experience is a prerequisite for admission to the Teacher Education Program.

ED 305 - FOUNDATIONS OF EDUCATION

Semester Hours: 3

Survey of social, cultural, historical, and philosophical foundations of education; interrelationships of society and education, effects of social change and influences of social-cultural values upon education; educational ideas and processes as they attempt to shape curricula. The perennial search for the meaning of education, perceived not merely as schooling, but as a process of enculturation and socialization. Prerequisites with concurrency: ED 301 and ED 308.

ED 307 - MULTICULTURAL FND EDUCATION

Semester Hours: 3

This course will provide students with an understanding of selected philosophical, historical, social, cultural, political, and economic questions and influences on the development of educational policies and practices. Through an examination of constructs such as race, ethnicity social class, gender, sexual orientation, and religious affiliation, students will develop an understanding of the connections between identity, difference, power and privilege and the role(s) schools play in perpetuating or ending discriminatory practices.

ED 308 - EDUCATIONAL PSYCHOLOGY

Semester Hours: 3

Psychological principles basic to an understanding of the learner, the learning process, and the learning situation. Intensive field experience required. Prerequisites with concurrency: ED 301 and 305.

ED 309 - CLASSROOM & BEHAVIOR MGMT

Semester Hours: 3

This course focuses on instructional options that learners need in order to be successful. It takes a broad approach to classroom and behavior management that is grounded in both theory and reflective practice. Content will emphasize the study and implementation of a variety of classroom and behavior management strategies that are necessary for working with diverse populations. Intensive field experience in an assigned public school required. Prerequisites: Admission to the Teacher Education Program.

ED 310 - TCHNG THE ARTS IN ELEM SCHOOLS

Semester Hours: 2-3

This course covers multiple aspects of fine arts education in elementary education including the use of content, functions, and achievements of the performing arts (dance, music, theatre) and visual arts as primary media for communication, inquiry, and engagement among elementary students.

ED 315 - EDUC EVALUATION & MEASUREMENT

Semester Hours: 3

This course is designed to help prospective teachers use and construct a range of assessments that will help them plan and teach more effectively, improve learning and meet state and national standards. The class will focus on more traditional assessment issues such as validity and reliability, as well as the alternative assessments that are likely used in today's classrooms. Furthermore contextual issues such as educational accountability testing, the No Child Left Behind Act, and teacher testing and evaluation (PEPE) will be explored. Intensive field experience required. Taken concurrently with ED 373, 374, 405. Admission to the Teacher Education Program or permission of the chair.

ED 350 - TECHNOLOGY IN CLASSROOM

Semester Hours: 3

Introduces prospective teachers to current state of the art in educational technology. Designed as a laboratory course providing extensive hands-on experiences with microcomputers and other emerging technology. Emphasis is on enabling the student to effectively integrate technology into instructional settings. May be taken prior to entering Education Program.

ED 360 - EARLY CHILDHOOD EDUC PRACTICUM

Semester Hours: 3

A three-hour credit course in a state-approved or NAEYC-accredited pre-kindergarten or kindergarten placement. It includes a weekly one-hour seminar with a faculty member. Admission to Teacher Education required.

ED 371 - TCHG ELEM LANGUAGE ARTS

Semester Hours: 3

Introduction to current practices in language arts instruction with emphasis on the development of an integrated curriculum using children's literature as a foundation. Includes appropriate techniques for the teaching of grammar, spelling, and handwriting. Intensive field experience required. Prerequisites: Admission to the Teacher Education Program.

ED 372 - TCHG ELEM SOCIAL STUDIES

Semester Hours: 3

Teaching social studies in grades k-6. Helping beginning teachers acquire background skills in organizing and teaching units of work. Intensive field experience required. Prerequisites: Admission to the Teacher Education Program.

ED 373 - TCHG NATURL/HLTH SCIENCE

Semester Hours: 3

Integrates concepts from reflective practice with elementary science teaching. Opportunity to refine teaching skills in the planning, implementation, and evaluation of science lessons and units of instruction. Intensive field experience required. Prerequisites: Admission to the Teacher Education Program.

ED 374 - TCHG ELEM MATHEMATICS

Semester Hours: 3

Overview of the mathematics concepts and skills taught in grades K-6 with an emphasis on the principles, methods, and materials used in the teaching and evaluation of elementary school mathematics. Focuses on the attitudes and behaviors of students and teachers in the actual planning and implementation of mathematics instruction for an elementary school classroom. Intensive field experience required. Prerequisites: Admission to the Teacher Education Program.

ED 375 - TCHG READING IN PRIMARY GRADES

Semester Hours: 3

An introduction to the basic principles of literacy instruction in culturally and linguistically diverse primary grade classrooms, including theoretical bases for instruction, methods of instruction and organization, developmentally appropriate strategies and materials, and assessment of children's literacy needs. Class activities will include mini-lessons, discussions, group activities, and presentations. An intensive school-based practicum in grades pre K -2 is required.

ED 400 - SPECIAL TOPICS-INTERNSHIP

Semester Hours: 3

Innovative internship focused on working with students with disabilities. Observations, participation, and direct instruction and teaching in a middle or high school setting for a prescribed time.

ED 401 - FNDS OF REFLECTIVE TEACHING

Semester Hours: 3

This diversity elective is designed to develop reflective practitioners, who study teaching and student learning in an effort to improve teaching practices and also meet certification requirements. The course will use various lenses of professional teacher noticing to select and discuss evidence of effective teaching. Course topics include edTPA rubrics, lesson planning, video teaching episode analysis, student assessments and feedback, academic language for describing teaching, and professional writing about teaching.

ED 402 - SPECIAL TOPICS IN EDUCATION

Semester Hours: 3

Introduces students to current issues and trends within educational practice, policy and theory through a specific lens. Provides opportunities for students to investigate issues of teaching and learning within the broader social/cultural vantage basic exploration of current research and debate within education. Topic may vary with each offering.

ED 405 - RDG STRATEGIES INTERMED GRADES

Semester Hours: 3

This course provides an in-depth study in and application of the process of reading and reading instruction, theoretical approaches, instructional strategies, classroom organization, and the formal/informal assessment of reading in intermediate grades. This course is required of all elementary education majors and secondary education candidates who are pursuing a middle school endorsement. Intensive field experience required.

Prerequisites: Admission to the Teacher Education Program.

ED 408 - TCHG READING/CONTENT AREA

Semester Hours: 3

Provides knowledge of certain basic developmental and remedial reading skills, practices, and concepts. Extends those learned in previous, more fundamental, reading courses and shows how to apply fundamental skill and knowledge to the classroom. This will include adapting fundamentals of reading instruction to the various subject matter areas (i.e., the sciences, social studies, English, etc.). Survey of special reading programs such as remedial reading and reading instruction as practiced in special education. Intensive field experience required. Prerequisites: Admission to the Teacher Education Program.

ED 410 - FOUNDATIONS EDUC EVALUAT

Semester Hours: 3

Measurement process with emphasis on its relationship to problems of educational evaluation. Evaluation as an integral part of overall educational planning in addition to its use in measurement and evaluation of academic achievement. Prerequisites: Admission to the Teacher Education Program.

ED 413 - CHILDREN'S & ADOLESCENT LIT

Semester Hours: 3

Course content includes the study of various genres of children's and adolescent literature and their relationship to beginning reading, enhancement of reading comprehension, and intervention instruction in the various content areas. Intensive field experience required. Same as EH 413. Prerequisites: Admission to the Teacher Education Program.

ED 421 - SECNDRY ELA INSTR WRIT TO READ

Semester Hours: 2-3

Candidates explore the ways they can use specific writing-to-learn activities to enhance their students' capacity to understand a variety of complex texts. Candidates will learn techniques for engaging students in the questioning, inference-making, syntactical pattern recognition, and meaning-making of both fiction and non-fiction works.

ED 422 - MIDDLE & SECD SCH MATH METHODS

Semester Hours: 2-3

This course is part one in a series of two courses that are designed for teacher candidates who are pursuing teaching certification in middle and/or secondary mathematics. This methods course provides background for middle school and secondary teaching from the perspective of theory, research, and practice.

ED 423 - TCHNG SCIENCE MID & SEC SCH I

Semester Hours: 2-3

This course will focus on how secondary students learn science. Candidates will learn how to develop and design developmentally appropriate lessons in which their students are able to make observations, examine relationships, notice patterns, and make inferences, while confronting naive misconceptions. Candidates will discuss the nature of science (NOS).

ED 424 - TCHNG SOC STUD MID & SEC SCH I

Semester Hours: 2-3

This course teaches research-based techniques and strategies employed by social science teachers at the secondary levels. As well as learning theoretical foundations and the goal of social science instruction (citizenship skills), students will learn pedagogic skills, instructional strategies, and modes of reasoning unique to the social studies classroom.

ED 425 - METHODS OF TEACHG FOREIGN LANG**Semester Hours: 2-3**

This course is designed to provide undergraduate level Foreign Language majors with the theory, tools (i.e. authentic media and technology), and techniques for teaching middle and secondary students. The focus of the course is primarily, though not exclusively, on designing lessons that allow for maximum student participation and control.

ED 431 - SEC ELA METHD: READING TO WRIT**Semester Hours: 2-3**

In this course, candidates will explore the ways they can use specific reading activities to enhance their students' ability to express themselves in multiple registers and forms of discourse. Candidates will learn techniques for engaging students in the process of developing and expressing their ideas while demonstrating an improved command of the grammatical, syntactical, and discursive elements of language.

ED 432 - TCH REASON/PROOF SEC MATH**Semester Hours: 2-3**

This methods course provides background for middle school and secondary teaching from the perspective of theory, research, and practice. It is designed to provide an introduction to and practice in ways in which to engage students in mathematical reasoning and proof.

ED 433 - TEACH SC MID & SEC SCHOOL II**Semester Hours: 2-3**

Students will discuss the status of science education in our nation's schools, and the need for implementing research-based strategies in the classroom using the 5E learning cycle as framework.

ED 434 - TCHG SOC ST MID & SEC SCHLS II**Semester Hours: 2-3**

This methods course is designed to study effective techniques and strategies employed by social science teachers at the middle and secondary levels. As well as learning theoretical foundations in social studies education, students will learn pedagogic skills, instructional strategies, and modes of reasoning unique to the social studies classroom.

ED 435 - DIFF INSTR IN FOREIGN LANGUAGE**Semester Hours: 2-3**

This course is designed to provide undergraduate level Foreign Language majors with the theory, tools (i.e. authentic media and technology), and techniques for teaching middle and secondary students. The focus of the course is primarily, though not exclusively, on designing lessons that allow for maximum student participation through and understanding of student development.

ED 490 - EARLY CHILDHOOD INTERNSHIP**Semester Hours: 12****ED 493 - ELEMENTARY SCHOOL INTERNSHIP****Semester Hours: 12**

Observation, participation and teaching in elementary school (full time, 15 week semesters). Students will also attend campus-based seminars designed to meet specific needs of the interns.

ED 497 - HIGH SCHOOL INTERNSHIP**Semester Hours: 12**

Observation, participation and teaching in middle/high school (full time, 15 week semester). Students will also attend campus-based seminars designed to meet specific needs of the interns.

ED 499 - P-12 INTERNSHIP**Semester Hours: 12**

Observation, participation and teaching in elementary and middle/high school (full time, 15 week semester). Students will also attend campus-based seminars designed to meet specific needs of the interns.

EDC 301 - TCHG THE EXCEPTIONAL CHILD**Semester Hours: 3**

Examines special education laws and methodology used in teaching special education students. Focus is primarily on those students with mild learning disabilities. Also examines requirements needed in the regular classroom for special teachers. Intensive field experience required. To be taken concurrently with ED 301, ED 307, ED 308 and EDC 311. Prerequisites: Completion of all general education classes.

EDC 302 - INTRO LOW INCIDENCE POPULATION

Semester Hours: 3

Students will learn about low incidence disabilities through reading, research, discussion, and the integration of specific learning strategies during class activities. Students are expected to complete a case study/practicum with a disabled student in addition to 15 hours of observation in classrooms for low incidence exceptional students. Intensive field experience required.

EDC 311 - INSTR STRATEGIES INCLUSIVE CLR

Semester Hours: 3

Students learn about low incidence disabilities through reading, research, discussion, and the integration of specific learning strategies during class activities. Students are expected to complete a case study/practicum with a disabled student in addition to 15 hours of observation in classrooms for low incidence exceptional students. Intensive field experience required.

EDC 316 - DIFFER INSTR FOR ECSE

Semester Hours: 3

This course provides practical strategies to maximize learning for all young learners (birth to 8 years old) with a variety of disabilities. Students will learn to utilize the principles of universal design for learning and differentiated instruction to create structured classrooms and lessons that meet the individual needs of young learners with special needs. This will include learning to select, implement, and evaluate lesson accommodations and modifications for students with exceptional needs.

EDC 321 - COLLAB CONSU(PARENT-TCHR-TEAM)

Semester Hours: 3

This class focuses on the description and rationale for collaboration, including communication skills, group work, problem solving, and co-teaching. Each student will participate as a member of a collaborative team during the practicum. This course will also provide an examination of selected school district issues involving collaboration within traditional K-12 educational settings. Intensive field experience required. Prerequisites: Admission to the Teacher Education Program.

EDC 331 - CRITICAL ISSUES IN SPEC EDUC

Semester Hours: 3

Provides an in-depth discussion and evaluation of current issues in special education such as litigation, legislation, personnel preparation, and research. School-based practicum required. Intensive field experience required. Prerequisites: Admission to The Teacher Education Program.

EDC 341 - ASSESS/PLN TRANSITION K-12 STU

Semester Hours: 3

Teacher candidates will develop the skills necessary for transitional planning, including administering cognitive, social, and functional assessments. Results of assessments will be interpreted and utilized to plan transitions from one placement to another, to inform instruction in regular, inclusive and self-contained classrooms, and to develop Individualized Education Plans (IEPs) for eligible students. Field work is required. Prerequisites: Admission to the Teacher Education Program.

EDC 351 - BEHAVIOR ANAL & INTERVENTION

Semester Hours: 3

This course focuses on the concepts of applied behavior analysis and how to implement those concepts in classrooms and other settings. Students learn how to conduct a functional behavior assessment and design, implement, and evaluate a behavioral-change project with an appropriate subject in a public school setting. Intensive field work required. Prerequisites: Admission to the Teacher Education Program.

EDC 361 - ECSE PRACTICUM

Semester Hours: 3

A three-hour credit course in a state-approved or NAEYC-accredited early childhood education setting that includes children with developmental delays or diagnosed disabilities. It includes a weekly one hour seminar with a faculty member. Admission to teacher education program required.

ECH 306 - PRINCPLS OF EARLY CHILDHOOD ED

Semester Hours: 3

This introductory course will provide preservice early childhood educators with basic knowledge of the core principles and foundations of early childhood education. The course introduces students to the historical and sociocultural forces that have impacted the field along with contemporary early childhood programs and models, recent trends and issues, and theories of play. Admission to teacher education program required.

ECH 320 - DIFF INSTR FOR EARLY LEARNERS

Semester Hours: 3

An early childhood education curriculum course designed to provide practical knowledge for blending content areas to maximize children's learning and prepare teacher candidates to meet the needs of children across the curriculum. Focus is on the implementation of a curriculum designed to promote learning and development in the social, emotional, physical, language and cognitive domains. Additionally, the course will emphasize developmentally, culturally, and linguistically appropriate and effective teaching approaches to enhance each child's learning and development. Admission to teacher education program required.

ECH 330 - ASSESSMENT OF YOUNG LEARNERS

Semester Hours: 3

This course provides candidates with an understanding of the forms, functions, methods, and roles of assessment for planning and implementing effective early childhood programs for young children, ages birth to five, from diverse cultures and with varied learning needs. Candidates will explore both quantitative and qualitative approaches to evaluation and assessment. They will learn about technological adaptations to enhance the assessment process. Students will gain an understanding of appropriate strategies for conducting, reporting, and decision making related to specific functions of assessment. They will learn about assessment strategies necessary for second language learners and about adaptations for children with disabilities. They will use selected assessment strategies with young children in their field placements and are expected to become competent in the use of authentic assessment strategies to describe a child's learning strengths and instructional needs. Admission to teacher education program required.

ECH 340 - LANGUAGE, SPEECH & LITERACY DEV

Semester Hours: 3

This course provides an introductory examination of the development of language, speech, and literacy in young learners. Pragmatic syntactic, and phonological analyses of children's language and speech development are required. The connections of oral communication and written communication (literacy) are explored.

ECH 490 - EARLY CHILDHOOD INTERNSHIP

Semester Hours: 12

Observation, participation and teaching in at least two early childhood settings with children ranging from infancy to grade 3 (full time, 15 week semesters). Students will also attend campus-based seminars designed to meet specific needs of the interns. Admission to the teacher education program required.

Additional Collaborative Certification (6-12)

Code	Title	Semester Hours
EDC 301	TCHG THE EXCEPTIONAL CHILD	3
EDC 311	INSTR STRATEGIES INCLUSIVE CLR	3
EDC 302	INTRO LOW INCIDENCE POPULATION	3
EDC 331	CRITICAL ISSUES IN SPEC EDUC	3
EDC 341	ASSESS/PLN TRANSITION K-12 STU	3
EDC 351	BEHAVIOR ANAL & INTERVENTION	3
ED 400	SPECIAL TOPICS-INTERNSHIP	3
Total Semester Hours		21

This program is completed along with a Secondary Education program in English, History, General Social Sciences, Biology, Chemistry, Physics, General Science, and Mathematics. Students complete a split internship between General Education (High School) and Collaborative Education (Middle School).

Early Childhood and Early Childhood Special Education (PK-3), BS

Degree Requirements

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	

EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts		
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
AMS 229	ANCIENT & MEDIEVAL WORLDS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3
CM 113	Intro to Rhetorical Communication ¹	
WLC 101S	INTRO FOREIGN LANG I: SPANISH	
or WLC 101A	INTRO FOREIGN LANG I: ARABIC	
or WLC 101F	INTRO FOREIGN LANG I:FRENCH	
or WLC 101G	INTRO FOREIGN LANG I:GERMAN	
or WLC 101J	INTRO FOREIGN LANG I:JAPANESE	
or WLC 101R	INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S	INTRO FOREIGN LANG II:SPANISH	
or WLC 102A	INTRO FOREIGN LANG II: ARABIC	
or WLC 102F	INTRO FOREIGN LANG II:FRENCH	
or WLC 102G	INTRO FOREIGN LANG II:GERMAN	
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE	
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN	
WLC 201S	INTERM FOREIGN LANG:SPANISH	
or WLC 201A	INTERM FOREIGN LANG I: ARABIC	
or WLC 201F	INTERM FOREIGN LANG:FRENCH	
or WLC 201G	INTERM FOREIGN LANG:GERMAN	
or WLC 201J	INTERM FOREIGN LANG: JAPANESE	
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN	
WLC 202S	INTERM FOREIGN LANG II:SPANISH	
or WLC 202A	INTERM FOREIGN LANG II: ARABIC	
or WLC 202F	INTERM FOREIGN LANG II:FRENCH	
or WLC 202G	INTERM FOREIGN LANG II:GERMAN	
or WLC 202J	INTERM FORGN LANG II:JAPANESE	
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN	
WLC 204	INTERNATIONAL CINEMA	
PHL 101	INTRODUCTION TO PHILOSOPHY	
PHL 102	INTRO TO ETHICS	
PHL 103	INTRODUCTION TO LOGIC	
PHL 150	TECH, SCIENCE & HUMAN VALUES	
WGS 200	INTRO WOMEN'S & GENDER STUDIES	
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	

ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Area III: Mathematics		
Mathematics		3
MA 105	NATURE OF MATHEMATICS	
MA 107	ALGEBRA WITH APPLICATIONS	
MA 110	FINITE MATHEMATICS	
MA 112	PRECALCULUS ALGEBRA	
MA 113	PRECALCULUS TRIGONOMETRY	
MA 115	PRECALCULUS ALGEBRA & TRIG	
MA 120	MATH PROFESSIONAL APPLICATIONS	
MA 230	MATH FOR ELEMENTARY TEACHERS	
MA 231	MATH FOR ELEM SCH TCHERS II	
MA 171	CALCULUS A (or Higher)	
Natural Sciences (Lab)		8
BYS 109	FUNDAMENTALS OF BIOLOGY	
BYS 119	PRINCIPLES OF BIOLOGY ¹	
BYS 120	ORGANISMAL BIOLOGY	
AST 100	SURVEY OF ASTRONOMY	
AST 106	EXPLORING THE COSMOS I	
AST 107	EXPLORING THE COSMOS II	
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB	
CH 121 & CH 105	GENERAL CHEMISTRY I and INTRO CHEMISTRY LAB	
CH 123 & CH 125	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB I	
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB	
ESS 103	ENVIRONMENTAL EARTH SCIENCE	
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG	
PH 100	CONCEPTUAL PHYSICS	
PH 101	GENERAL PHYSICS I	
PH 102	GENERAL PHYSICS II	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	
Area IV: History and Social Behavioral Sciences		
History		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Sciences		6-9
PY 101	GENERAL PSYCHOLOGY I ¹	
PY 201	LIFE-SPAN DEVELOPMENT ¹	
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	

GS 200	GLOBAL SYSTEMS AND CULTURES
ESS 105	WORLD REGIONAL GEOGRAPHY
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY
PSC 101	INTRO TO AMERICAN GOVERNMENT
PSC 102	INTRO TO COMPARATIVE POLITICS
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS
SOC 100	INTRO TO SOCIOLOGY
SOC 102	ANALYSIS OF SOCIAL PROBLEMS
SOC 103	INTRO TO CRIMINOLOGY
SOC 105	INTRO CULTURAL ANTHROPOLOGY

¹ Required course

Code	Title	Semester Hours
Pre-Professional Courses		
Mathematics		9
Science w/Lab		4
Professional Studies		
ED 301	INTRO TO EDUCATION PRACTICUM	0
ED 307	MULTICULTURAL FND EDUCATION	3
ED 308	EDUCATIONAL PSYCHOLOGY	3
ECH 320	DIFF INSTR FOR EARLY LEARNERS	3
ECH 330	ASSESSMENT OF YOUNG LEARNERS	3
ED 350	TECHNOLOGY IN CLASSROOM	3
EDC 301	TCHG THE EXCEPTIONAL CHILD	3
EDC 316	DIFFER INSTR FOR ECSE	3
Internship		
ECH 490	EARLY CHILDHOOD INTERNSHIP	12
Teaching Field		
ECH 306	PRINCPLS OF EARLY CHILDHOOD ED	3
ECH 340	LANGUAGE, SPEECH & LITERCY DEV	3
ED 360	EARLY CHILDHOOD EDUC PRACTICUM	3
ED 371	TCHG ELEM LANGUAGE ARTS	3
ED 374	TCHG ELEM MATHEMATICS	3
ED 375	TCHG READING IN PRIMARY GRADES	3
EDC 302	INTRO LOW INCIDENCE POPULATION	3
EDC 321	COLLAB CONSU(PARENT-TCHR-TEAM)	3
EDC 341	ASSESS/PLN TRANSITION K-12 STU	3
EDC 351	BEHAVIOR ANAL & INTERVENTION	3
EDC 361	ECSE PRACTICUM	3
Total Semester Hours		124

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Take no more than six hours in a single discipline in Area II or Area IV.

Early Childhood Education/Early Childhood Special Education, BS

Year 1

Fall		Semester Hours
EH 101	COLLEGE WRITING I	3
PY 101	GENERAL PSYCHOLOGY I	3
Math		3
Humanities and Fine Arts		3

History		3
	Term Semester Hours:	15
Spring		
EH 102	COLLEGE WRITING II	3
CM 113	Intro to Rhetorical Communication	3
PY 201	LIFE-SPAN DEVELOPMENT	3
Science w/Lab		4
Math		3
	Term Semester Hours:	16
Year 2		
Fall		
History		3
Science w/Lab		4
Math		3
Literature		3
	Term Semester Hours:	13
Spring		
Science w/Lab		4
Math		3
Literature		3
ED 307	MULTICULTURAL FND EDUCATION	3
ED 350	TECHNOLOGY IN CLASSROOM	3
	Term Semester Hours:	16
Year 3		
Fall		
ED 301	INTRO TO EDUCATION PRACTICUM	1
ED 306		3
ED 308	EDUCATIONAL PSYCHOLOGY	3
ED 340		3
EDC 301	TCHG THE EXCEPTIONAL CHILD	3
	Term Semester Hours:	13
Spring		
ED 371	TCHG ELEM LANGUAGE ARTS	3
ED 375	TCHG READING IN PRIMARY GRADES	3
ED 360	EARLY CHILDHOOD EDUC PRACTICUM	3
ED 320		3
EDC 351	BEHAVIOR ANAL INTERVENTION	3
	Term Semester Hours:	15
Summer		
EDC 302	INTRO LOW INCIDENCE POPULATION	3
EDC 341	ASSESS/PLN TRANSITION K-12 STU	3
	Term Semester Hours:	6
Year 4		
Fall		
ED 330		3
ED 374	TCHG ELEM MATHEMATICS	3
EDC 321	COLLAB CONSU(PARENT-TCHR-TEAM)	3
EDC 316		3
EDC 361		3
	Term Semester Hours:	15
Spring		

ED 490 Internship	12
Term Semester Hours:	12
Total Semester Hours:	121

Elementary Education (K-6), BA

Degree Requirements

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 & 101S	COLLEGE WRITING I and COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts		
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
AMS 229	ANCIENT & MEDIEVAL WORLDS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3
CM 113	Intro to Rhetorical Communication ¹	
WLC 101S	INTRO FOREIGN LANG I: SPANISH	
or WLC 101A	INTRO FOREIGN LANG I: ARABIC	
or WLC 101F	INTRO FOREIGN LANG I:FRENCH	
or WLC 101G	INTRO FOREIGN LANG I:GERMAN	
or WLC 101J	INTRO FOREIGN LANG I:JAPANESE	
or WLC 101R	INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S	INTRO FOREIGN LANG II:SPANISH	
or WLC 102A	INTRO FOREIGN LANG II: ARABIC	
or WLC 102F	INTRO FOREIGN LANG II:FRENCH	
or WLC 102G	INTRO FOREIGN LANG II:GERMAN	
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE	
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN	
WLC 201S	INTERM FOREIGN LANG:SPANISH	
or WLC 201A	INTERM FOREIGN LANG I: ARABIC	
or WLC 201F	INTERM FOREIGN LANG:FRENCH	
or WLC 201G	INTERM FOREIGN LANG:GERMAN	
or WLC 201J	INTERM FOREIGN LANG: JAPANESE	
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN	
WLC 202S	INTERM FOREIGN LANG II:SPANISH	

or WLC 202A	INTERM FOREIGN LANG II: ARABIC
or WLC 202F	INTERM FOREIGN LANG II:FRENCH
or WLC 202G	INTERM FOREIGN LANG II:GERMAN
or WLC 202J	INTERM FORGN LANG II:JAPANESE
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN
WLC 204	INTERNATIONAL CINEMA
PHL 101	INTRODUCTION TO PHILOSOPHY
PHL 102	INTRO TO ETHICS
PHL 103	INTRODUCTION TO LOGIC
PHL 150	TECH, SCIENCE & HUMAN VALUES
WGS 200	INTRO WOMEN'S & GENDER STUDIES
ARH 100	ARH SURV:ANCIENT-MEDIEVAL
ARH 101	ARH SURV:RENAISSANCE-MODERN
ARH 103	ARH SUR:NON-WESTERN TRADITIONS
ARS 160	DRAWING: FOUNDATIONS
TH 122	THEATRE APPRECIATION
TH 123	INTRO TO FILM STUDIES
MU 100	INTRO TO MUSIC LITERATURE

Area III: Mathematics and Sciences

Mathematics	3
MA 105	NATURE OF MATHEMATICS
MA 107	ALGEBRA WITH APPLICATIONS
MA 110	FINITE MATHEMATICS
MA 112	PRECALCULUS ALGEBRA
MA 113	PRECALCULUS TRIGONOMETRY
MA 115	PRECALCULUS ALGEBRA & TRIG
MA 120	MATH PROFESSIONAL APPLICATIONS
MA 230	MATH FOR ELEMENTARY TEACHERS
MA 231	MATH FOR ELEM SCH TCHERS II
MA 171	CALCULUS A (or Higher)
Natural Sciences (Lab)	8
BYS 109	FUNDAMENTALS OF BIOLOGY
BYS 119	PRINCIPLES OF BIOLOGY ¹
BYS 120	ORGANISMAL BIOLOGY
AST 100	SURVEY OF ASTRONOMY
AST 106	EXPLORING THE COSMOS I
AST 107	EXPLORING THE COSMOS II
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB
CH 121 & CH 105	GENERAL CHEMISTRY I and INTRO CHEMISTRY LAB
CH 123 & CH 125	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB I
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB
ESS 103	ENVIRONMENTAL EARTH SCIENCE
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG
PH 100	CONCEPTUAL PHYSICS
PH 101	GENERAL PHYSICS I
PH 102	GENERAL PHYSICS II
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I

PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	
Area IV: History and Social Behavioral Sciences		
History		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Sciences		6-9
PY 101	GENERAL PSYCHOLOGY I ¹	
PY 201	LIFE-SPAN DEVELOPMENT ¹	
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
ESS 105	WORLD REGIONAL GEOGRAPHY	
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS	
SOC 100	INTRO TO SOCIOLOGY	
SOC 102	ANALYSIS OF SOCIAL PROBLEMS	
SOC 103	INTRO TO CRIMINOLOGY	
SOC 105	INTRO CULTURAL ANTHROPOLOGY	

¹ Required course

Code	Title	Semester Hours
Pre-Professional Courses		
Mathematics		9
Science w/Lab		4
Elective Credit		1-3
Professional Studies		
ED 301	INTRO TO EDUCATION PRACTICUM	0
ED 307	MULTICULTURAL FND EDUCATION	3
ED 308	EDUCATIONAL PSYCHOLOGY	3
ED 309	CLASSROOM & BEHAVIOR MGMT	3
ED 350	TECHNOLOGY IN CLASSROOM	3
EDC 301	TCHG THE EXCEPTIONAL CHILD	3
EDC 311	INSTR STRATEGIES INCLUSIVE CLR	3
Internship		
ED 493	ELEMENTARY SCHOOL INTERNSHIP	12
Teaching Field		
ED 315	EDUC EVALUATION & MEASUREMENT	3
ED 371	TCHG ELEM LANGUAGE ARTS	3
ED 372	TCHG ELEM SOCIAL STUDIES	3
ED 373	TCHG NATURL/HLTH SCIENCE	3
ED 374	TCHG ELEM MATHEMATICS	3
ED 375	TCHG READING IN PRIMARY GRADES	3
ED 405	RDG STRATEGIES INTERMED GRADES	3
ED 310	TCHNG THE ARTS IN ELEM SCHOOLS	2

KIN 464	HEALTH/PE FOR ELEM TEACHERS	2
ED 360	EARLY CHILDHOOD EDUC PRACTICUM	3
Diversity Electives: Choose 3		
ED 401	FNDS OF REFLECTIVE TEACHING	3
ED 402	SPECIAL TOPICS IN EDUCATION	3
ED 413	CHILDREN'S & ADOLESCENT LIT	3
EDC 302	INTRO LOW INCIDENCE POPULATION	3
EDC 321	COLLAB CONSU(PARENT-TCHR-TEAM)	3
EDC 331	CRITICAL ISSUES IN SPEC EDUC	3
EDC 341	ASSESS/PLN TRANSITION K-12 STU	3
EDC 351	BEHAVIOR ANAL & INTERVENTION	3
EHL 405	SUR GEN LINGUISTICS:APP ENG I	3
EHL 406	CRITICAL ISSUES	3
EHL 407	ADV EH GRAM:APP LINGUISTICS II	3
EHL 409	SPEC STUDIES: APPL LINGUISTICS	3
ECH 306	PRINCPLS OF EARLY CHILDHOOD ED	3
ECH 320	DIFF INSTR FOR EARLY LEARNERS	3
ECH 330	ASSESSMENT OF YOUNG LEARNERS	3
ECH 340	LANGUAGE, SPEECH & LITERCY DEV	3
Other ED Courses approved by the Department		
Total Semester Hours		123-127

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Take no more than six hours in a single discipline in Area II or Area IV.

Elementary Education (K-6), BA - Collaborative Education (K-6)

Degree Requirements

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts		
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
AMS 229	ANCIENT & MEDIEVAL WORLDS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3

CM 113	Intro to Rhetorical Communication ¹
WLC 101S	INTRO FOREIGN LANG I: SPANISH
or WLC 101A	INTRO FOREIGN LANG I: ARABIC
or WLC 101F	INTRO FOREIGN LANG I:FRENCH
or WLC 101G	INTRO FOREIGN LANG I:GERMAN
or WLC 101J	INTRO FOREIGN LANG I:JAPANESE
or WLC 101R	INTRO FOREIGN LANG I:RUSSIAN
WLC 102S	INTRO FOREIGN LANG II:SPANISH
or WLC 102A	INTRO FOREIGN LANG II: ARABIC
or WLC 102F	INTRO FOREIGN LANG II:FRENCH
or WLC 102G	INTRO FOREIGN LANG II:GERMAN
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN
WLC 201S	INTERM FOREIGN LANG:SPANISH
or WLC 201A	INTERM FOREIGN LANG I: ARABIC
or WLC 201F	INTERM FOREIGN LANG:FRENCH
or WLC 201G	INTERM FOREIGN LANG:GERMAN
or WLC 201J	INTERM FOREIGN LANG: JAPANESE
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN
WLC 202S	INTERM FOREIGN LANG II:SPANISH
or WLC 202A	INTERM FOREIGN LANG II: ARABIC
or WLC 202F	INTERM FOREIGN LANG II:FRENCH
or WLC 202G	INTERM FOREIGN LANG II:GERMAN
or WLC 202J	INTERM FORGN LANG II:JAPANESE
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN
WLC 204	INTERNATIONAL CINEMA
PHL 101	INTRODUCTION TO PHILOSOPHY
PHL 102	INTRO TO ETHICS
PHL 103	INTRODUCTION TO LOGIC
PHL 150	TECH, SCIENCE & HUMAN VALUES
WGS 200	INTRO WOMEN'S & GENDER STUDIES
ARH 100	ARH SURV:ANCIENT-MEDIEVAL
ARH 101	ARH SURV:RENAISSANCE-MODERN
ARH 103	ARH SUR:NON-WESTERN TRADITIONS
ARS 160	DRAWING: FOUNDATIONS
TH 122	THEATRE APPRECIATION
TH 123	INTRO TO FILM STUDIES
MU 100	INTRO TO MUSIC LITERATURE

Area III: Mathematics and Sciences

Mathematics	3
MA 105	NATURE OF MATHEMATICS
MA 107	ALGEBRA WITH APPLICATIONS
MA 110	FINITE MATHEMATICS
MA 112	PRECALCULUS ALGEBRA
MA 113	PRECALCULUS TRIGONOMETRY
MA 115	PRECALCULUS ALGEBRA & TRIG
MA 120	MATH PROFESSIONAL APPLICATIONS
MA 230	MATH FOR ELEMENTARY TEACHERS
MA 231	MATH FOR ELEM SCH TCHERS II
MA 171	CALCULUS A (or Higher)
Natural Sciences (Lab)	8
BYS 109	FUNDAMENTALS OF BIOLOGY

BYS 119	PRINCIPLES OF BIOLOGY ¹
BYS 120	ORGANISMAL BIOLOGY
AST 100	SURVEY OF ASTRONOMY
AST 106	EXPLORING THE COSMOS I
AST 107	EXPLORING THE COSMOS II
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB
CH 121 & CH 105	GENERAL CHEMISTRY I and INTRO CHEMISTRY LAB
CH 123 & CH 125	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB I
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB
ESS 103	ENVIRONMENTAL EARTH SCIENCE
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG
PH 100	CONCEPTUAL PHYSICS
PH 101	GENERAL PHYSICS I
PH 102	GENERAL PHYSICS II
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III

Area IV: History and Social Behavioral Sciences

History		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Sciences		6-9
PY 101	GENERAL PSYCHOLOGY I ¹	
PY 201	LIFE-SPAN DEVELOPMENT ¹	
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
ESS 105	WORLD REGIONAL GEOGRAPHY	
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS	
SOC 100	INTRO TO SOCIOLOGY	
SOC 102	ANALYSIS OF SOCIAL PROBLEMS	
SOC 103	INTRO TO CRIMINOLOGY	
SOC 105	INTRO CULTURAL ANTHROPOLOGY	

¹ Required course

Code	Title	Semester Hours
Pre-Professional Courses		
Mathematics		9
Science w/Lab		4
Elective Credit		1-3

Professional Studies

ED 301	INTRO TO EDUCATION PRACTICUM	0
ED 307	MULTICULTURAL FND EDUCATION	3
ED 308	EDUCATIONAL PSYCHOLOGY	3
ED 309	CLASSROOM & BEHAVIOR MGMT	3
ED 350	TECHNOLOGY IN CLASSROOM	3
EDC 301	TCHG THE EXCEPTIONAL CHILD	3
EDC 311	INSTR STRATEGIES INCLUSIVE CLR	3

Internship

ED 493	ELEMENTARY SCHOOL INTERNSHIP	12
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Teaching Field

ED 315	EDUC EVALUATION & MEASUREMENT	3
ED 371	TCHG ELEM LANGUAGE ARTS	3
ED 372	TCHG ELEM SOCIAL STUDIES	3
ED 373	TCHG NATURL/HLTH SCIENCE	3
ED 374	TCHG ELEM MATHEMATICS	3
ED 375	TCHG READING IN PRIMARY GRADES	3
ED 405	RDG STRATEGIES INTERMED GRADES	3
ED 310	TCHNG THE ARTS IN ELEM SCHOOLS	2
KIN 464	HEALTH/PE FOR ELEM TEACHERS	2
ED 360	EARLY CHILDHOOD EDUC PRACTICUM	3
EDC 302	INTRO LOW INCIDENCE POPULATION	3
EDC 321	COLLAB CONSU(PARENT-TCHR-TEAM)	3
EDC 331	CRITICAL ISSUES IN SPEC EDUC	3
EDC 341	ASSESS/PLN TRANSITION K-12 STU	3
EDC 351	BEHAVIOR ANAL & INTERVENTION	3

Total Semester Hours **123-127**

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Take no more than six hours in a single discipline in Area II or Area IV.

Elementary Education (K-6), BA - Language and Culture Option

Degree Requirements

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts		
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
AMS 229	ANCIENT & MEDIEVAL WORLDS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6

EH 207	READINGS LITERATURE/CULTURE I
EH 208	READINGS LITERATURE/CULTURE 2
EH 209	HONORS SEM READINGS LIT/CUL I
EH 210	HONORS SEM READINGS LIT/CUL 2
EH 242	MYTHOLOGY
Humanities and Fine Arts	
3	
CM 113	Intro to Rhetorical Communication ¹
WLC 101S	INTRO FOREIGN LANG I: SPANISH
or WLC 101A	INTRO FOREIGN LANG I: ARABIC
or WLC 101F	INTRO FOREIGN LANG I:FRENCH
or WLC 101G	INTRO FOREIGN LANG I:GERMAN
or WLC 101J	INTRO FOREIGN LANG I:JAPANESE
or WLC 101R	INTRO FOREIGN LANG I:RUSSIAN
WLC 102S	INTRO FOREIGN LANG II:SPANISH
or WLC 102A	INTRO FOREIGN LANG II: ARABIC
or WLC 102F	INTRO FOREIGN LANG II:FRENCH
or WLC 102G	INTRO FOREIGN LANG II:GERMAN
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN
WLC 201S	INTERM FOREIGN LANG:SPANISH
or WLC 201A	INTERM FOREIGN LANG I: ARABIC
or WLC 201F	INTERM FOREIGN LANG:FRENCH
or WLC 201G	INTERM FOREIGN LANG:GERMAN
or WLC 201J	INTERM FOREIGN LANG: JAPANESE
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN
WLC 202S	INTERM FOREIGN LANG II:SPANISH
or WLC 202A	INTERM FOREIGN LANG II: ARABIC
or WLC 202F	INTERM FOREIGN LANG II:FRENCH
or WLC 202G	INTERM FOREIGN LANG II:GERMAN
or WLC 202J	INTERM FORGN LANG II:JAPANESE
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN
WLC 204	INTERNATIONAL CINEMA
PHL 101	INTRODUCTION TO PHILOSOPHY
PHL 102	INTRO TO ETHICS
PHL 103	INTRODUCTION TO LOGIC
PHL 150	TECH, SCIENCE & HUMAN VALUES
WGS 200	INTRO WOMEN'S & GENDER STUDIES
ARH 100	ARH SURV:ANCIENT-MEDIEVAL
ARH 101	ARH SURV:RENAISSANCE-MODERN
ARH 103	ARH SUR:NON-WESTERN TRADITIONS
ARS 160	DRAWING: FOUNDATIONS
TH 122	THEATRE APPRECIATION
TH 123	INTRO TO FILM STUDIES
MU 100	INTRO TO MUSIC LITERATURE
Area III: Mathematics and Sciences	
Mathematics	
3	
MA 105	NATURE OF MATHEMATICS
MA 107	ALGEBRA WITH APPLICATIONS
MA 110	FINITE MATHEMATICS
MA 112	PRECALCULUS ALGEBRA
MA 113	PRECALCULUS TRIGONOMETRY
MA 115	PRECALCULUS ALGEBRA & TRIG

MA 120	MATH PROFESSIONAL APPLICATIONS	
MA 230	MATH FOR ELEMENTARY TEACHERS	
MA 231	MATH FOR ELEM SCH TCHERS II	
MA 171	CALCULUS A (or Higher)	
Natural Sciences (Lab)		8
BYS 109	FUNDAMENTALS OF BIOLOGY	
BYS 119	PRINCIPLES OF BIOLOGY ¹	
BYS 120	ORGANISMAL BIOLOGY	
AST 100	SURVEY OF ASTRONOMY	
AST 106	EXPLORING THE COSMOS I	
AST 107	EXPLORING THE COSMOS II	
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB	
CH 121 & CH 105	GENERAL CHEMISTRY I and INTRO CHEMISTRY LAB	
CH 123 & CH 125	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB I	
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB	
ESS 103	ENVIRONMENTAL EARTH SCIENCE	
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG	
PH 100	CONCEPTUAL PHYSICS	
PH 101	GENERAL PHYSICS I	
PH 102	GENERAL PHYSICS II	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	
Area IV: History and Social Behavioral Sciences		
History		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Sciences		6-9
PY 101	GENERAL PSYCHOLOGY I ¹	
PY 201	LIFE-SPAN DEVELOPMENT ¹	
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
ESS 105	WORLD REGIONAL GEOGRAPHY	
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS	
SOC 100	INTRO TO SOCIOLOGY	
SOC 102	ANALYSIS OF SOCIAL PROBLEMS	
SOC 103	INTRO TO CRIMINOLOGY	
SOC 105	INTRO CULTURAL ANTHROPOLOGY	

¹ Required course

Code	Title	Semester Hours
Pre-Professional Courses		
Mathematics		9
Science w/Lab		4
Elective Credit		1-3
Professional Studies		
ED 301	INTRO TO EDUCATION PRACTICUM	0
ED 307	MULTICULTURAL FND EDUCATION	3
ED 308	EDUCATIONAL PSYCHOLOGY	3
ED 309	CLASSROOM & BEHAVIOR MGMT	3
ED 350	TECHNOLOGY IN CLASSROOM	3
EDC 301	TCHG THE EXCEPTIONAL CHILD	3
EDC 311	INSTR STRATEGIES INCLUSIVE CLR	3
Internship		
ED 493	ELEMENTARY SCHOOL INTERNSHIP	12
Teaching Field		
ED 315	EDUC EVALUATION & MEASUREMENT	3
ED 371	TCHG ELEM LANGUAGE ARTS	3
ED 372	TCHG ELEM SOCIAL STUDIES	3
ED 373	TCHG NATURL/HLTH SCIENCE	3
ED 374	TCHG ELEM MATHEMATICS	3
ED 375	TCHG READING IN PRIMARY GRADES	3
ED 405	RDG STRATEGIES INTERMED GRADES	3
ED 413	CHILDREN'S & ADOLESCENT LIT	3
ED 310	TCHNG THE ARTS IN ELEM SCHOOLS	2
KIN 464	HEALTH/PE FOR ELEM TEACHERS	2
ED 360	EARLY CHILDHOOD EDUC PRACTICUM	3
EHL 405	SUR GEN LINGUISTICS:APP ENG I	3
EHL 406	CRITICAL ISSUES	3
EHL 407	ADV EH GRAM:APP LINGUISTICS II	3
EHL 409	SPEC STUDIES: APPL LINGUISTICS	3
Total Semester Hours		123-127

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Take no more than six hours in a single discipline in Area II or Area IV.

Secondary Education, BS - Biology

Degree Requirements

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts		
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	

AMS 229	ANCIENT & MEDIEVAL WORLDS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		6
CM 113	Intro to Rhetorical Communication ¹	
WLC 101S	INTRO FOREIGN LANG I: SPANISH	
or WLC 101A	INTRO FOREIGN LANG I: ARABIC	
or WLC 101F	INTRO FOREIGN LANG I:FRENCH	
or WLC 101G	INTRO FOREIGN LANG I:GERMAN	
or WLC 101J	INTRO FOREIGN LANG I:JAPANESE	
or WLC 101R	INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S	INTRO FOREIGN LANG II:SPANISH	
or WLC 102A	INTRO FOREIGN LANG II: ARABIC	
or WLC 102F	INTRO FOREIGN LANG II:FRENCH	
or WLC 102G	INTRO FOREIGN LANG II:GERMAN	
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE	
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN	
WLC 201S	INTERM FOREIGN LANG:SPANISH	
or WLC 201A	INTERM FOREIGN LANG I: ARABIC	
or WLC 201F	INTERM FOREIGN LANG:FRENCH	
or WLC 201G	INTERM FOREIGN LANG:GERMAN	
or WLC 201J	INTERM FOREIGN LANG: JAPANESE	
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN	
WLC 202S	INTERM FOREIGN LANG II:SPANISH	
or WLC 202A	INTERM FOREIGN LANG II: ARABIC	
or WLC 202F	INTERM FOREIGN LANG II:FRENCH	
or WLC 202G	INTERM FOREIGN LANG II:GERMAN	
or WLC 202J	INTERM FORGN LANG II:JAPANESE	
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN	
WLC 204	INTERNATIONAL CINEMA	
PHL 101	INTRODUCTION TO PHILOSOPHY	
PHL 102	INTRO TO ETHICS	
PHL 103	INTRODUCTION TO LOGIC	
PHL 150	TECH, SCIENCE & HUMAN VALUES	
WGS 200	INTRO WOMEN'S & GENDER STUDIES	
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	

Area III: Mathematics and Sciences

Mathematics

3-4

MA 171	CALCULUS A (or Higher)	
Natural Sciences (Lab)		16
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
CH 201 & CH 205	ELEM ORGANIC CHEMISTRY and ELEM ORGANIC CHEMISTRY LAB	
PH 101	GENERAL PHYSICS I	
PH 102	GENERAL PHYSICS II	

Area IV: History and Social Behavioral Sciences

History		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	

Social and Behavioral Sciences		6
PY 101	GENERAL PSYCHOLOGY I ¹	
PY 201	LIFE-SPAN DEVELOPMENT ¹	
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
ESS 105	WORLD REGIONAL GEOGRAPHY	
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS	
SOC 100	INTRO TO SOCIOLOGY	
SOC 102	ANALYSIS OF SOCIAL PROBLEMS	
SOC 103	INTRO TO CRIMINOLOGY	
SOC 105	INTRO CULTURAL ANTHROPOLOGY	

¹ Required course

Code	Title	Semester Hours
Professional Studies		
CH 301	ELEMENTARY BIOCHEMISTRY	3
ESS 103	ENVIRONMENTAL EARTH SCIENCE	4
ESS 103L	LABORATORY	0
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG	4
Professional Studies		
ED 301	INTRO TO EDUCATION PRACTICUM	1
ED 307	MULTICULTURAL FND EDUCATION	3
ED 308	EDUCATIONAL PSYCHOLOGY	3
ED 309	CLASSROOM & BEHAVIOR MGMT	3
ED 350	TECHNOLOGY IN CLASSROOM	3
EDC 301	TCHG THE EXCEPTIONAL CHILD	3
EDC 311	INSTR STRATEGIES INCLUSIVE CLR	3
ED 408	TCHG READING/CONTENT AREA	3
ED 410	FOUNDATIONS EDUC EVALUAT	3
ED 423	TCHNG SCIENCE MID & SEC SCH I	2
ED 433	TEACH SC MID & SEC SCHOOL II	2
Internship		
ED 497	HIGH SCHOOL INTERNSHIP	12

Teaching Field		
BYS 119	PRINCIPLES OF BIOLOGY	4
BYS 120	ORGANISMAL BIOLOGY	4
BYS 219	GENETICS AND EVOLUTION	4
BYS 300	CELL & DEVELOPMENTAL BIOLOGY	4
BYS 312	PRINCIPLES OF ECOLOGY	4
BYS 321	GENERAL MICROBIOLOGY I	4
BYS 490	SENIOR CAPSTONE	2
BYS 300+ Electives		6
Total Semester Hours		132-136

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Take no more than six hours in a single discipline in Area II or Area IV.

Secondary Education, BS - Biology and General Sciences

Degree Requirements

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts		
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
AMS 229	ANCIENT & MEDIEVAL WORLDS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		6
CM 113	Intro to Rhetorical Communication ¹	
WLC 101S or WLC 101A or WLC 101F or WLC 101G or WLC 101J or WLC 101R	INTRO FOREIGN LANG I: SPANISH INTRO FOREIGN LANG I: ARABIC INTRO FOREIGN LANG I:FRENCH INTRO FOREIGN LANG I:GERMAN INTRO FOREIGN LANG I:JAPANESE INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S or WLC 102A or WLC 102F or WLC 102G	INTRO FOREIGN LANG II:SPANISH INTRO FOREIGN LANG II: ARABIC INTRO FOREIGN LANG II:FRENCH INTRO FOREIGN LANG II:GERMAN	

or WLC 102J	INTRO FOREIGN LANG II:JAPANESE
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN
WLC 201S	INTERM FOREIGN LANG:SPANISH
or WLC 201A	INTERM FOREIGN LANG I: ARABIC
or WLC 201F	INTERM FOREIGN LANG:FRENCH
or WLC 201G	INTERM FOREIGN LANG:GERMAN
or WLC 201J	INTERM FOREIGN LANG: JAPANESE
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN
WLC 202S	INTERM FOREIGN LANG II:SPANISH
or WLC 202A	INTERM FOREIGN LANG II: ARABIC
or WLC 202F	INTERM FOREIGN LANG II:FRENCH
or WLC 202G	INTERM FOREIGN LANG II:GERMAN
or WLC 202J	INTERM FORGN LANG II:JAPANESE
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN
WLC 204	INTERNATIONAL CINEMA
PHL 101	INTRODUCTION TO PHILOSOPHY
PHL 102	INTRO TO ETHICS
PHL 103	INTRODUCTION TO LOGIC
PHL 150	TECH, SCIENCE & HUMAN VALUES
WGS 200	INTRO WOMEN'S & GENDER STUDIES
ARH 100	ARH SURV:ANCIENT-MEDIEVAL
ARH 101	ARH SURV:RENAISSANCE-MODERN
ARH 103	ARH SUR:NON-WESTERN TRADITIONS
ARS 160	DRAWING: FOUNDATIONS
TH 122	THEATRE APPRECIATION
TH 123	INTRO TO FILM STUDIES
MU 100	INTRO TO MUSIC LITERATURE

Area III: Mathematics and Science

Mathematics		3-4
MA 171	CALCULUS A (or Higher)	
Natural Sciences (Lab)		16
BYS 119	PRINCIPLES OF BIOLOGY	
BYS 120	ORGANISMAL BIOLOGY	
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	

Area IV: History and Social Behavioral Sciences

History		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Sciences		6-9
PY 101	GENERAL PSYCHOLOGY I ¹	
PY 201	LIFE-SPAN DEVELOPMENT ¹	
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
ESS 105	WORLD REGIONAL GEOGRAPHY	
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	
PSC 101	INTRO TO AMERICAN GOVERNMENT	

PSC 102	INTRO TO COMPARATIVE POLITICS
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS
SOC 100	INTRO TO SOCIOLOGY
SOC 102	ANALYSIS OF SOCIAL PROBLEMS
SOC 103	INTRO TO CRIMINOLOGY
SOC 105	INTRO CULTURAL ANTHROPOLOGY

¹ Required course

Code	Title	Semester Hours
Professional Studies		
PH 102	GENERAL PHYSICS II	4
PH 102L	GENERAL PHYSICS LAB II	0
ESS 103	ENVIRONMENTAL EARTH SCIENCE	4
ESS 103L	LABORATORY	0
Professional Studies		
ED 301	INTRO TO EDUCATION PRACTICUM	1
ED 307	MULTICULTURAL FND EDUCATION	3
ED 308	EDUCATIONAL PSYCHOLOGY	3
ED 309	CLASSROOM & BEHAVIOR MGMT	3
ED 350	TECHNOLOGY IN CLASSROOM	3
EDC 301	TCHG THE EXCEPTIONAL CHILD	3
EDC 311	INSTR STRATEGIES INCLUSIVE CLR	3
ED 408	TCHG READING/CONTENT AREA	3
ED 410	FOUNDATIONS EDUC EVALUAT	3
ED 423	TCHNG SCIENCE MID & SEC SCH I	2
ED 433	TEACH SC MID & SEC SCHOOL II	2
Internship		
ED 497	HIGH SCHOOL INTERNSHIP	12
Teaching Field		
BYS 219	GENETICS AND EVOLUTION	4
BYS 300	CELL & DEVELOPMENTAL BIOLOGY	4
BYS 312	PRINCIPLES OF ECOLOGY	4
BYS 321	GENERAL MICROBIOLOGY I	4
CH 223	QUANTITATIVE ANALYSIS	3
CH 224	QUANTITATIVE ANALYSIS LAB	1
CH 301	ELEMENTARY BIOCHEMISTRY	3
CH 331	ORGANIC CHEMISTRY I	3
CH 331R	ORGANIC CHEM I RECITATION	0
CH 332R	ORGANIC CHEM II RECITATION	0
CH 401	INORGANIC CHEMISTRY	3
Total Semester Hours		134-140

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Take no more than six hours in a single discipline in Area II or Area IV.

Secondary Education, BS - Chemistry

Degree Requirements

Code	Title	Semester Hours
Area I: Freshman Composition		
EH 101	COLLEGE WRITING I	3-6

or EH 101S	COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts		
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
AMS 229	ANCIENT & MEDIEVAL WORLDS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		6
CM 113	Intro to Rhetorical Communication ¹	
WLC 101S	INTRO FOREIGN LANG I: SPANISH	
or WLC 101A	INTRO FOREIGN LANG I: ARABIC	
or WLC 101F	INTRO FOREIGN LANG I:FRENCH	
or WLC 101G	INTRO FOREIGN LANG I:GERMAN	
or WLC 101J	INTRO FOREIGN LANG I:JAPANESE	
or WLC 101R	INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S	INTRO FOREIGN LANG II:SPANISH	
or WLC 102A	INTRO FOREIGN LANG II: ARABIC	
or WLC 102F	INTRO FOREIGN LANG II:FRENCH	
or WLC 102G	INTRO FOREIGN LANG II:GERMAN	
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE	
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN	
WLC 201S	INTERM FOREIGN LANG:SPANISH	
or WLC 201A	INTERM FOREIGN LANG I: ARABIC	
or WLC 201F	INTERM FOREIGN LANG:FRENCH	
or WLC 201G	INTERM FOREIGN LANG:GERMAN	
or WLC 201J	INTERM FOREIGN LANG: JAPANESE	
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN	
WLC 202S	INTERM FOREIGN LANG II:SPANISH	
or WLC 202A	INTERM FOREIGN LANG II: ARABIC	
or WLC 202F	INTERM FOREIGN LANG II:FRENCH	
or WLC 202G	INTERM FOREIGN LANG II:GERMAN	
or WLC 202J	INTERM FORGN LANG II:JAPANESE	
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN	
WLC 204	INTERNATIONAL CINEMA	
PHL 101	INTRODUCTION TO PHILOSOPHY	
PHL 102	INTRO TO ETHICS	
PHL 103	INTRODUCTION TO LOGIC	
PHL 150	TECH, SCIENCE & HUMAN VALUES	
WGS 200	INTRO WOMEN'S & GENDER STUDIES	

ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	

Area III: Mathematics

Mathematics		3=4
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MA 171	CALCULUS A (or Higher)
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Natural Sciences (Lab)		8
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PH 101	GENERAL PHYSICS I
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PH 102	GENERAL PHYSICS II
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Area IV: History and Social Behavioral Sciences

History		3-6
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HY 103	WORLD HISTORY TO 1500
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HY 104	WORLD HISTORY SINCE 1500
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HY 221	UNITED STATES TO 1877
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HY 222	UNITED STATES SINCE 1877
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Social and Behavioral Sciences		6-9
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PY 101	GENERAL PSYCHOLOGY I ¹
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PY 201	LIFE-SPAN DEVELOPMENT ¹
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ECN 142	PRINC OF MACROECONOMICS
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ECN 143	PRINC OF MICROECONOMICS
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GS 200	GLOBAL SYSTEMS AND CULTURES
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ESS 105	WORLD REGIONAL GEOGRAPHY
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ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY
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PSC 101	INTRO TO AMERICAN GOVERNMENT
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PSC 102	INTRO TO COMPARATIVE POLITICS
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PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS
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SOC 100	INTRO TO SOCIOLOGY
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SOC 102	ANALYSIS OF SOCIAL PROBLEMS
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SOC 103	INTRO TO CRIMINOLOGY
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SOC 105	INTRO CULTURAL ANTHROPOLOGY
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¹ Required course

Code	Title	Semester Hours
Professional Studies		
BYS 119	PRINCIPLES OF BIOLOGY	4
BYS 120	ORGANISMAL BIOLOGY	4
ESS 103	ENVIRONMENTAL EARTH SCIENCE	4
ESS 103L	LABORATORY	0
Professional Studies		
ED 301	INTRO TO EDUCATION PRACTICUM	1
ED 307	MULTICULTURAL FND EDUCATION	3
ED 308	EDUCATIONAL PSYCHOLOGY	3
ED 309	CLASSROOM & BEHAVIOR MGMT	3
ED 350	TECHNOLOGY IN CLASSROOM	3
EDC 301	TCHG THE EXCEPTIONAL CHILD	3
EDC 311	INSTR STRATEGIES INCLUSIVE CLR	3

ED 408	TCHG READING/CONTENT AREA	3
ED 410	FOUNDATIONS EDUC EVALUAT	3
ED 423	TCHNG SCIENCE MID & SEC SCH I	2
ED 433	TEACH SC MID & SEC SCHOOL II	2
Internship		
ED 497	HIGH SCHOOL INTERNSHIP	12
Teaching Field		
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	4
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	4
CH 223 & CH 224	QUANTITATIVE ANALYSIS and QUANTITATIVE ANALYSIS LAB	4
CH 331 & CH 335	ORGANIC CHEMISTRY I and ORGANIC CHEMISTRY LAB I	4
CH 331R	ORGANIC CHEM I RECITATION	0
CH 332 & CH 336	ORGANIC CHEMISTRY II and ORGANIC CHEMISTRY LAB II	4
CH 332R	ORGANIC CHEM II RECITATION	0
CH 347	BIOPHYSICAL CHEMISTRY I	3
CH 348	BIOPHYSICAL CHEMISTRY II	3
CH 361 & CH 362	GENERAL BIOCHEMISTRY and GENERAL BIOCHEMISTRY LAB	4
CH 401	INORGANIC CHEMISTRY	3
Total Semester Hours		123-132

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Take no more than six hours in a single discipline in Area II or Area IV.

Secondary Education, BS - English Language Arts

Degree Requirements

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
AMS 229	ANCIENT & MEDIEVAL WORLDS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	

EH 242	MYTHOLOGY	
Humanities and Fine Arts		6
CM 113	Intro to Rhetorical Communication ¹	
WLC 101S	INTRO FOREIGN LANG I: SPANISH	
or WLC 101A	INTRO FOREIGN LANG I: ARABIC	
or WLC 101F	INTRO FOREIGN LANG I:FRENCH	
or WLC 101G	INTRO FOREIGN LANG I:GERMAN	
or WLC 101J	INTRO FOREIGN LANG I:JAPANESE	
or WLC 101R	INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S	INTRO FOREIGN LANG II:SPANISH	
or WLC 102A	INTRO FOREIGN LANG II: ARABIC	
or WLC 102F	INTRO FOREIGN LANG II:FRENCH	
or WLC 102G	INTRO FOREIGN LANG II:GERMAN	
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE	
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN	
WLC 201S	INTERM FOREIGN LANG:SPANISH	
or WLC 201A	INTERM FOREIGN LANG I: ARABIC	
or WLC 201F	INTERM FOREIGN LANG:FRENCH	
or WLC 201G	INTERM FOREIGN LANG:GERMAN	
or WLC 201J	INTERM FOREIGN LANG: JAPANESE	
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN	
WLC 202S	INTERM FOREIGN LANG II:SPANISH	
or WLC 202A	INTERM FOREIGN LANG II: ARABIC	
or WLC 202F	INTERM FOREIGN LANG II:FRENCH	
or WLC 202G	INTERM FOREIGN LANG II:GERMAN	
or WLC 202J	INTERM FORGN LANG II:JAPANESE	
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN	
WLC 204	INTERNATIONAL CINEMA	
PHL 101	INTRODUCTION TO PHILOSOPHY	
PHL 102	INTRO TO ETHICS	
PHL 103	INTRODUCTION TO LOGIC	
PHL 150	TECH, SCIENCE & HUMAN VALUES	
WGS 200	INTRO WOMEN'S & GENDER STUDIES	
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Area III: Mathematics and Sciences		
Mathematics		4
MA 105	NATURE OF MATHEMATICS	
MA 107	ALGEBRA WITH APPLICATIONS	
MA 110	FINITE MATHEMATICS	
MA 112	PRECALCULUS ALGEBRA	
MA 113	PRECALCULUS TRIGONOMETRY	
MA 115	PRECALCULUS ALGEBRA & TRIG	
MA 120	MATH PROFESSIONAL APPLICATIONS	
MA 230	MATH FOR ELEMENTARY TEACHERS	
MA 231	MATH FOR ELEM SCH TCHERS II	
MA 171	CALCULUS A (or Higher)	

Natural Sciences (Lab)		8
BYS 109	FUNDAMENTALS OF BIOLOGY	
BYS 119	PRINCIPLES OF BIOLOGY ¹	
BYS 120	ORGANISMAL BIOLOGY	
AST 100	SURVEY OF ASTRONOMY	
AST 106	EXPLORING THE COSMOS I	
AST 107	EXPLORING THE COSMOS II	
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB	
CH 121 & CH 105	GENERAL CHEMISTRY I and INTRO CHEMISTRY LAB	
CH 123 & CH 125	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB I	
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB	
ESS 103	ENVIRONMENTAL EARTH SCIENCE	
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG	
PH 100	CONCEPTUAL PHYSICS	
PH 101	GENERAL PHYSICS I	
PH 102	GENERAL PHYSICS II	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	
Area IV: History and Social Behavioral Sciences		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Sciences		6-9
PY 101	GENERAL PSYCHOLOGY I ¹	
PY 201	LIFE-SPAN DEVELOPMENT ¹	
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
ESS 105	WORLD REGIONAL GEOGRAPHY	
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS	
SOC 100	INTRO TO SOCIOLOGY	
SOC 102	ANALYSIS OF SOCIAL PROBLEMS	
SOC 103	INTRO TO CRIMINOLOGY	
SOC 105	INTRO CULTURAL ANTHROPOLOGY	

¹ Required course

Code	Title	Semester Hours
Pre Professional Studies		
Choose two courses from Arts, Humanities, and Social Sciences (EH, CM, MU, ARH, WLC, HY, PHL, SOC, ECN, GS, GSS, or GY)		6
Professional Studies		

ED 301	INTRO TO EDUCATION PRACTICUM	0
ED 307	MULTICULTURAL FND EDUCATION	3
ED 308	EDUCATIONAL PSYCHOLOGY	3
ED 309	CLASSROOM & BEHAVIOR MGMT	3
ED 350	TECHNOLOGY IN CLASSROOM	3
EDC 301	TCHG THE EXCEPTIONAL CHILD	3
EDC 311	INSTR STRATEGIES INCLUSIVE CLR	3
ED 408	TCHG READING/CONTENT AREA	3
ED 410	FOUNDATIONS EDUC EVALUAT	3
ED 421	SECNDRY ELA INSTR WRIT TO READ	2
ED 431	SEC ELA METHD: READING TO WRIT	2
Internship		
ED 497	HIGH SCHOOL INTERNSHIP	12
Teaching Field		
EH 305	INTRO TO LITERARY STUDIES	3
EH 400	COMPOSITION STUDIES FOR TCHERS	3
EHL 405	SUR GEN LINGUISTICS:APP ENG I	3
EH 300-400: American Literature		3
EH 300-400: British Literature		3
Literature Elective (May include ED 413)		3
CM 231	FOUNDATIONS OF HUMAN COMMUNICA	3
Theatre/Drama (select 2):		
TH 221	ACTING	3
CM 205	INTRO TO JOURNALISM (300+ Theater (TH) or CM course with approval)	3
CM 430	MASS MEDIA IN AMERICA	3
300+ Theater (TH) or Communication (CM) course with Departmental Approval		3
Total Semester Hours		120-126

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Take no more than six hours in a single discipline in Area II or Area IV.

Secondary Education, BS - Foreign Language

Degree Requirements

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
AMS 229	ANCIENT & MEDIEVAL WORLDS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	

EH 208	READINGS LITERATURE/CULTURE 2
EH 209	HONORS SEM READINGS LIT/CUL I
EH 210	HONORS SEM READINGS LIT/CUL 2
EH 242	MYTHOLOGY
Humanities and Fine Arts	
6	
CM 113	Intro to Rhetorical Communication ¹
WLC 101S	INTRO FOREIGN LANG I: SPANISH
or WLC 101A	INTRO FOREIGN LANG I: ARABIC
or WLC 101F	INTRO FOREIGN LANG I:FRENCH
or WLC 101G	INTRO FOREIGN LANG I:GERMAN
or WLC 101J	INTRO FOREIGN LANG I:JAPANESE
or WLC 101R	INTRO FOREIGN LANG I:RUSSIAN
WLC 102S	INTRO FOREIGN LANG II:SPANISH
or WLC 102A	INTRO FOREIGN LANG II: ARABIC
or WLC 102F	INTRO FOREIGN LANG II:FRENCH
or WLC 102G	INTRO FOREIGN LANG II:GERMAN
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN
WLC 201S	INTERM FOREIGN LANG:SPANISH
or WLC 201A	INTERM FOREIGN LANG I: ARABIC
or WLC 201F	INTERM FOREIGN LANG:FRENCH
or WLC 201G	INTERM FOREIGN LANG:GERMAN
or WLC 201J	INTERM FOREIGN LANG: JAPANESE
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN
WLC 202S	INTERM FOREIGN LANG II:SPANISH
or WLC 202A	INTERM FOREIGN LANG II: ARABIC
or WLC 202F	INTERM FOREIGN LANG II:FRENCH
or WLC 202G	INTERM FOREIGN LANG II:GERMAN
or WLC 202J	INTERM FORGN LANG II:JAPANESE
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN
WLC 204	INTERNATIONAL CINEMA
PHL 101	INTRODUCTION TO PHILOSOPHY
PHL 102	INTRO TO ETHICS
PHL 103	INTRODUCTION TO LOGIC
PHL 150	TECH, SCIENCE & HUMAN VALUES
WGS 200	INTRO WOMEN'S & GENDER STUDIES
ARH 100	ARH SURV:ANCIENT-MEDIEVAL
ARH 101	ARH SURV:RENAISSANCE-MODERN
ARH 103	ARH SUR:NON-WESTERN TRADITIONS
ARS 160	DRAWING: FOUNDATIONS
TH 122	THEATRE APPRECIATION
TH 123	INTRO TO FILM STUDIES
MU 100	INTRO TO MUSIC LITERATURE
Area III: Mathematics and Sciences	
Mathematics	
3-4	
MA 105	NATURE OF MATHEMATICS
MA 107	ALGEBRA WITH APPLICATIONS
MA 110	FINITE MATHEMATICS
MA 112	PRECALCULUS ALGEBRA
MA 113	PRECALCULUS TRIGONOMETRY
MA 115	PRECALCULUS ALGEBRA & TRIG
MA 120	MATH PROFESSIONAL APPLICATIONS

MA 230	MATH FOR ELEMENTARY TEACHERS	
MA 231	MATH FOR ELEM SCH TCHERS II	
MA 171	CALCULUS A (or Higher)	
Natural Sciences (Lab)		8
BYS 109	FUNDAMENTALS OF BIOLOGY	
BYS 119	PRINCIPLES OF BIOLOGY ¹	
BYS 120	ORGANISMAL BIOLOGY	
AST 100	SURVEY OF ASTRONOMY	
AST 106	EXPLORING THE COSMOS I	
AST 107	EXPLORING THE COSMOS II	
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB	
CH 121 & CH 105	GENERAL CHEMISTRY I and INTRO CHEMISTRY LAB	
CH 123 & CH 125	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB I	
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB	
ESS 103	ENVIRONMENTAL EARTH SCIENCE	
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG	
PH 100	CONCEPTUAL PHYSICS	
PH 101	GENERAL PHYSICS I	
PH 102	GENERAL PHYSICS II	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	
Area IV: History and Social Behavioral Sciences		
History		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Sciences		6-9
PY 101	GENERAL PSYCHOLOGY I ¹	
PY 201	LIFE-SPAN DEVELOPMENT ¹	
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
ESS 105	WORLD REGIONAL GEOGRAPHY	
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS	
SOC 100	INTRO TO SOCIOLOGY	
SOC 102	ANALYSIS OF SOCIAL PROBLEMS	
SOC 103	INTRO TO CRIMINOLOGY	
SOC 105	INTRO CULTURAL ANTHROPOLOGY	

¹ Required course

Code	Title	Semester Hours
Pre Professional Studies		
Choose two courses from Arts, Humanities, and Social Sciences (EH, CM, MU, ARH, HY, PHL, SOC, ECN, GY, ESS, or GS).		6
Professional Studies		
ED 301	INTRO TO EDUCATION PRACTICUM	0
ED 307	MULTICULTURAL FND EDUCATION	3
ED 308	EDUCATIONAL PSYCHOLOGY	3
ED 309	CLASSROOM & BEHAVIOR MGMT	3
ED 350	TECHNOLOGY IN CLASSROOM	3
EDC 301	TCHG THE EXCEPTIONAL CHILD	3
EDC 311	INSTR STRATEGIES INCLUSIVE CLR	3
ED 408	TCHG READING/CONTENT AREA	3
ED 410	FOUNDATIONS EDUC EVALUAT	3
ED 425	METHODS OF TEACHG FOREIGN LANG	2
ED 435	DIFF INSTR IN FOREIGN LANGUAGE	2
Internship		
ED 497	HIGH SCHOOL INTERNSHIP	12
Teaching Field		
Certification Available in Spanish, French, and German		
WLC 101F or WLC 101G or WLC 101S	INTRO FOREIGN LANG I:FRENCH INTRO FOREIGN LANG I:GERMAN INTRO FOREIGN LANG I: SPANISH	3
WLC 102F or WLC 102G or WLC 102S	INTRO FOREIGN LANG II:FRENCH INTRO FOREIGN LANG II:GERMAN INTRO FOREIGN LANG II:SPANISH	3
WLC 201F or WLC 201G or WLC 201S	INTERM FOREIGN LANG:FRENCH INTERM FOREIGN LANG:GERMAN INTERM FOREIGN LANG:SPANISH	3
WLC 202F or WLC 202G or WLC 202S	INTERM FOREIGN LANG II:FRENCH INTERM FOREIGN LANG II:GERMAN INTERM FOREIGN LANG II:SPANISH	3
WLC 204	INTERNATIONAL CINEMA	3
WLC 301F or WLC 301G or WLC 301S	CONVERSATION:FRENCH CONVERSATION:GERMAN CONVERSATION:SPANISH	3
WLC 302F or WLC 302G or WLC 302S	COMPOSITION:FRENCH COMPOSITION:GERMAN COMPOSITION:SPANISH	3
WLC 303F or WLC 303G or WLC 303S	FOREIGN LANG LIFE & PROF:FRENC FOREIGN LANG LIFE & PROF:GERMA FOREIGN LANG LIFE & PROF:SPANI	3
WLC 304F or WLC 304G or WLC 304S	CULTURE:FRENCH CULTURE:GERMAN CULTURE:SPANISH	3
WLC 305F or WLC 305G or WLC 305S	INTRO TO LITERATURE:FRENCH INTRO TO LITERATURE:GERMAN INTRO TO LITERATURE:SPANISH	3
WLC 404F or WLC 404G or WLC 404S	TEXTS & CONTEXTS:SEM LIT:FRENC TEXTS & CONTEXTS:SEM LIT/GERMA TEXTS & CONTEXTS:SEM LIT:SPANI	3

WLC 410	INT'L INTERN:COMP LANG/CULT	3-6
Total Semester Hours		123-129

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Take no more than six hours in a single discipline in Area II or Area IV.

Secondary Education, BS - History

Degree Requirements

Code	Title	Semester Hours
Area I: Freshman Composition		
EH 101	COLLEGE WRITING I	
or EH 101S	COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts		
Fine Arts		
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
AMS 229	ANCIENT & MEDIEVAL WORLDS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		
CM 113	Intro to Rhetorical Communication ¹	
WLC 101S	INTRO FOREIGN LANG I: SPANISH	
or WLC 101A	INTRO FOREIGN LANG I: ARABIC	
or WLC 101F	INTRO FOREIGN LANG I:FRENCH	
or WLC 101G	INTRO FOREIGN LANG I:GERMAN	
or WLC 101J	INTRO FOREIGN LANG I:JAPANESE	
or WLC 101R	INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S	INTRO FOREIGN LANG II:SPANISH	
or WLC 102A	INTRO FOREIGN LANG II: ARABIC	
or WLC 102F	INTRO FOREIGN LANG II:FRENCH	
or WLC 102G	INTRO FOREIGN LANG II:GERMAN	
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE	
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN	
WLC 201S	INTERM FOREIGN LANG:SPANISH	
or WLC 201A	INTERM FOREIGN LANG I: ARABIC	
or WLC 201F	INTERM FOREIGN LANG:FRENCH	
or WLC 201G	INTERM FOREIGN LANG:GERMAN	
or WLC 201J	INTERM FOREIGN LANG: JAPANESE	
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN	

WLC 202S	INTERM FOREIGN LANG II:SPANISH
or WLC 202A	INTERM FOREIGN LANG II: ARABIC
or WLC 202F	INTERM FOREIGN LANG II:FRENCH
or WLC 202G	INTERM FOREIGN LANG II:GERMAN
or WLC 202J	INTERM FORGN LANG II:JAPANESE
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN
WLC 204	INTERNATIONAL CINEMA
PHL 101	INTRODUCTION TO PHILOSOPHY
PHL 102	INTRO TO ETHICS
PHL 103	INTRODUCTION TO LOGIC
PHL 150	TECH, SCIENCE & HUMAN VALUES
WGS 200	INTRO WOMEN'S & GENDER STUDIES
ARH 100	ARH SURV:ANCIENT-MEDIEVAL
ARH 101	ARH SURV:RENAISSANCE-MODERN
ARH 103	ARH SUR:NON-WESTERN TRADITIONS
ARS 160	DRAWING: FOUNDATIONS
TH 122	THEATRE APPRECIATION
TH 123	INTRO TO FILM STUDIES
MU 100	INTRO TO MUSIC LITERATURE

Area III: Mathematics and Sciences

Mathematics

MA 105	NATURE OF MATHEMATICS
MA 107	ALGEBRA WITH APPLICATIONS
MA 110	FINITE MATHEMATICS
MA 112	PRECALCULUS ALGEBRA
MA 113	PRECALCULUS TRIGONOMETRY
MA 115	PRECALCULUS ALGEBRA & TRIG
MA 120	MATH PROFESSIONAL APPLICATIONS
MA 230	MATH FOR ELEMENTARY TEACHERS
MA 231	MATH FOR ELEM SCH TCHERS II
MA 171	CALCULUS A (or Higher)

Natural Sciences (Lab)

BYS 109	FUNDAMENTALS OF BIOLOGY
BYS 119	PRINCIPLES OF BIOLOGY ¹
BYS 120	ORGANISMAL BIOLOGY
AST 100	SURVEY OF ASTRONOMY
AST 106	EXPLORING THE COSMOS I
AST 107	EXPLORING THE COSMOS II
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB
CH 121 & CH 105	GENERAL CHEMISTRY I and INTRO CHEMISTRY LAB
CH 123 & CH 125	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB I
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB
ESS 103	ENVIRONMENTAL EARTH SCIENCE
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG
PH 100	CONCEPTUAL PHYSICS
PH 101	GENERAL PHYSICS I
PH 102	GENERAL PHYSICS II
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I

PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III

Area IV: History and Social Behavioral Sciences

History

HY 103	WORLD HISTORY TO 1500
HY 104	WORLD HISTORY SINCE 1500
HY 221	UNITED STATES TO 1877
HY 222	UNITED STATES SINCE 1877

Social and Behavioral Sciences

PY 101	GENERAL PSYCHOLOGY I ¹
PY 201	LIFE-SPAN DEVELOPMENT ¹
ECN 142	PRINC OF MACROECONOMICS
ECN 143	PRINC OF MICROECONOMICS
GS 200	GLOBAL SYSTEMS AND CULTURES
ESS 105	WORLD REGIONAL GEOGRAPHY
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY
PSC 101	INTRO TO AMERICAN GOVERNMENT
PSC 102	INTRO TO COMPARATIVE POLITICS
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS
SOC 100	INTRO TO SOCIOLOGY
SOC 102	ANALYSIS OF SOCIAL PROBLEMS
SOC 103	INTRO TO CRIMINOLOGY
SOC 105	INTRO CULTURAL ANTHROPOLOGY

¹ Required course

Code	Title	Semester Hours
Pre Professional Studies		
Choose two course from Arts, Humanities, and Social Sciences (EH, CM, ARH, HY, WLC, PHL, PSC, SOC, ECN, GS, or GY).		
Professional Studies		
ED 301	INTRO TO EDUCATION PRACTICUM	0
ED 307	MULTICULTURAL FND EDUCATION	3
ED 308	EDUCATIONAL PSYCHOLOGY	3
ED 309	CLASSROOM & BEHAVIOR MGMT	3
ED 350	TECHNOLOGY IN CLASSROOM	3
EDC 301	TCHG THE EXCEPTIONAL CHILD	3
EDC 311	INSTR STRATEGIES INCLUSIVE CLR	3
ED 408	TCHG READING/CONTENT AREA	3
ED 410	FOUNDATIONS EDUC EVALUAT	3
ED 424	TCHNG SOC STUD MID & SEC SCH I	2-3
ED 434	TCHG SOC ST MID & SEC SCHLS II	2-3
Internship		
ED 497	HIGH SCHOOL INTERNSHIP	12
Teaching Field		
HY 104	WORLD HISTORY SINCE 1500	3
HY 221	UNITED STATES TO 1877	3
HY 222	UNITED STATES SINCE 1877	3
HY 300	CRAFT OF HISTORY	3
HY 325	HISTORY OF ALABAMA	3
HY 490	RESEARCH SEMINAR IN HY	3

American History 300+	6
Non-American History 300+	6
History Electives 300+	6
Total Semester Hours	120-124

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Take no more than six hours in a single discipline in Area II or Area IV.

Secondary Education, BS - History and Social Sciences

Degree Requirements

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts		
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
AMS 229	ANCIENT & MEDIEVAL WORLDS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		6
CM 113	Intro to Rhetorical Communication ¹	
WLC 101S or WLC 101A or WLC 101F or WLC 101G or WLC 101J or WLC 101R	INTRO FOREIGN LANG I: SPANISH INTRO FOREIGN LANG I: ARABIC INTRO FOREIGN LANG I:FRENCH INTRO FOREIGN LANG I:GERMAN INTRO FOREIGN LANG I:JAPANESE INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S or WLC 102A or WLC 102F or WLC 102G or WLC 102J or WLC 102R	INTRO FOREIGN LANG II:SPANISH INTRO FOREIGN LANG II: ARABIC INTRO FOREIGN LANG II:FRENCH INTRO FOREIGN LANG II:GERMAN INTRO FOREIGN LANG II:JAPANESE INTRO FOREIGN LANG II:RUSSIAN	
WLC 201S or WLC 201A or WLC 201F or WLC 201G	INTERM FOREIGN LANG:SPANISH INTERM FOREIGN LANG I: ARABIC INTERM FOREIGN LANG:FRENCH INTERM FOREIGN LANG:GERMAN	

or WLC 201J	INTERM FOREIGN LANG: JAPANESE
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN
WLC 202S	INTERM FOREIGN LANG II:SPANISH
or WLC 202A	INTERM FOREIGN LANG II: ARABIC
or WLC 202F	INTERM FOREIGN LANG II:FRENCH
or WLC 202G	INTERM FOREIGN LANG II:GERMAN
or WLC 202J	INTERM FORGN LANG II:JAPANESE
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN
WLC 204	INTERNATIONAL CINEMA
PHL 101	INTRODUCTION TO PHILOSOPHY
PHL 102	INTRO TO ETHICS
PHL 103	INTRODUCTION TO LOGIC
PHL 150	TECH, SCIENCE & HUMAN VALUES
WGS 200	INTRO WOMEN'S & GENDER STUDIES
ARH 100	ARH SURV:ANCIENT-MEDIEVAL
ARH 101	ARH SURV:RENAISSANCE-MODERN
ARH 103	ARH SUR:NON-WESTERN TRADITIONS
ARS 160	DRAWING: FOUNDATIONS
TH 122	THEATRE APPRECIATION
TH 123	INTRO TO FILM STUDIES
MU 100	INTRO TO MUSIC LITERATURE

Area III: Mathematics and Sciences

Mathematics	3-4
MA 105	NATURE OF MATHEMATICS
MA 107	ALGEBRA WITH APPLICATIONS
MA 110	FINITE MATHEMATICS
MA 112	PRECALCULUS ALGEBRA
MA 113	PRECALCULUS TRIGONOMETRY
MA 115	PRECALCULUS ALGEBRA & TRIG
MA 120	MATH PROFESSIONAL APPLICATIONS
MA 230	MATH FOR ELEMENTARY TEACHERS
MA 231	MATH FOR ELEM SCH TCHERS II
MA 171	CALCULUS A (or Higher)
Natural Sciences (Lab)	8
BYS 109	FUNDAMENTALS OF BIOLOGY
BYS 119	PRINCIPLES OF BIOLOGY ¹
BYS 120	ORGANISMAL BIOLOGY
AST 100	SURVEY OF ASTRONOMY
AST 106	EXPLORING THE COSMOS I
AST 107	EXPLORING THE COSMOS II
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB
CH 121 & CH 105	GENERAL CHEMISTRY I and INTRO CHEMISTRY LAB
CH 123 & CH 125	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB I
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB
ESS 103	ENVIRONMENTAL EARTH SCIENCE
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG
PH 100	CONCEPTUAL PHYSICS
PH 101	GENERAL PHYSICS I
PH 102	GENERAL PHYSICS II

PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III

Area IV: History and Social Behavioral Sciences

History	3
HY 103	WORLD HISTORY TO 1500
HY 104	WORLD HISTORY SINCE 1500
HY 221	UNITED STATES TO 1877
HY 222	UNITED STATES SINCE 1877
Social and Behavioral Sciences	6-9
PY 101	GENERAL PSYCHOLOGY I ¹
PY 201	LIFE-SPAN DEVELOPMENT ¹
ECN 142	PRINC OF MACROECONOMICS
ECN 143	PRINC OF MICROECONOMICS
GS 200	GLOBAL SYSTEMS AND CULTURES
ESS 105	WORLD REGIONAL GEOGRAPHY
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY
PSC 101	INTRO TO AMERICAN GOVERNMENT
PSC 102	INTRO TO COMPARATIVE POLITICS
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS
SOC 100	INTRO TO SOCIOLOGY
SOC 102	ANALYSIS OF SOCIAL PROBLEMS
SOC 103	INTRO TO CRIMINOLOGY
SOC 105	INTRO CULTURAL ANTHROPOLOGY

¹ Required course

Code	Title	Semester Hours
Pre Professional Studies		
SOC 100	INTRO TO SOCIOLOGY	3
Professional Studies		
ED 301	INTRO TO EDUCATION PRACTICUM	0
ED 307	MULTICULTURAL FND EDUCATION	3
ED 308	EDUCATIONAL PSYCHOLOGY	3
ED 309	CLASSROOM & BEHAVIOR MGMT	3
ED 350	TECHNOLOGY IN CLASSROOM	3
EDC 301	TCHG THE EXCEPTIONAL CHILD	3
EDC 311	INSTR STRATEGIES INCLUSIVE CLR	3
ED 408	TCHG READING/CONTENT AREA	3
ED 410	FOUNDATIONS EDUC EVALUAT	3
ED 424	TCHNG SOC STUD MID & SEC SCH I	2-3
ED 434	TCHG SOC ST MID & SEC SCHLS II	2-3
Internship		
ED 497	HIGH SCHOOL INTERNSHIP	12
Teaching Field		
History:		
HY 104	WORLD HISTORY SINCE 1500	3
HY 221	UNITED STATES TO 1877	3
HY 222	UNITED STATES SINCE 1877	3

HY 300	CRAFT OF HISTORY	3
HY 325	HISTORY OF ALABAMA	3
HY 490	RESEARCH SEMINAR IN HY	3
American History 300+		6
Non-American History 300+		6
History Elective 300+		3
Social Science Courses:		
PSC 101	INTRO TO AMERICAN GOVERNMENT	3
PSC 102	INTRO TO COMPARATIVE POLITICS	3
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS	3
ECN 142	PRINC OF MACROECONOMICS	3
ECN 143	PRINC OF MICROECONOMICS	3
ESS 105	WORLD REGIONAL GEOGRAPHY	3
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	3
Total Semester Hours		134-138

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Take no more than six hours in a single discipline in Area II or Area IV.

Secondary Education, BS - Mathematics

Degree Requirements

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts		
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
AMS 229	ANCIENT & MEDIEVAL WORLDS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		6
CM 113	Intro to Rhetorical Communication ¹	
WLC 101S or WLC 101A or WLC 101F or WLC 101G or WLC 101J	INTRO FOREIGN LANG I: SPANISH INTRO FOREIGN LANG I: ARABIC INTRO FOREIGN LANG I:FRENCH INTRO FOREIGN LANG I:GERMAN INTRO FOREIGN LANG I:JAPANESE	

or WLC 101R	INTRO FOREIGN LANG I:RUSSIAN
WLC 102S	INTRO FOREIGN LANG II:SPANISH
or WLC 102A	INTRO FOREIGN LANG II: ARABIC
or WLC 102F	INTRO FOREIGN LANG II:FRENCH
or WLC 102G	INTRO FOREIGN LANG II:GERMAN
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN
WLC 201S	INTERM FOREIGN LANG:SPANISH
or WLC 201A	INTERM FOREIGN LANG I: ARABIC
or WLC 201F	INTERM FOREIGN LANG:FRENCH
or WLC 201G	INTERM FOREIGN LANG:GERMAN
or WLC 201J	INTERM FOREIGN LANG: JAPANESE
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN
WLC 202S	INTERM FOREIGN LANG II:SPANISH
or WLC 202A	INTERM FOREIGN LANG II: ARABIC
or WLC 202F	INTERM FOREIGN LANG II:FRENCH
or WLC 202G	INTERM FOREIGN LANG II:GERMAN
or WLC 202J	INTERM FORGN LANG II:JAPANESE
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN
WLC 204	INTERNATIONAL CINEMA
PHL 101	INTRODUCTION TO PHILOSOPHY
PHL 102	INTRO TO ETHICS
PHL 103	INTRODUCTION TO LOGIC
PHL 150	TECH, SCIENCE & HUMAN VALUES
WGS 200	INTRO WOMEN'S & GENDER STUDIES
ARH 100	ARH SURV:ANCIENT-MEDIEVAL
ARH 101	ARH SURV:RENAISSANCE-MODERN
ARH 103	ARH SUR:NON-WESTERN TRADITIONS
ARS 160	DRAWING: FOUNDATIONS
TH 122	THEATRE APPRECIATION
TH 123	INTRO TO FILM STUDIES
MU 100	INTRO TO MUSIC LITERATURE

Area III: Mathematics and Sciences

Mathematics	4
MA 171	CALCULUS A (or Higher)
Natural Sciences (Lab)	8
BYS 109	FUNDAMENTALS OF BIOLOGY
BYS 119	PRINCIPLES OF BIOLOGY ¹
BYS 120	ORGANISMAL BIOLOGY
AST 100	SURVEY OF ASTRONOMY
AST 106	EXPLORING THE COSMOS I
AST 107	EXPLORING THE COSMOS II
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB
CH 121 & CH 105	GENERAL CHEMISTRY I and INTRO CHEMISTRY LAB
CH 123 & CH 125	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB I
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB
ESS 103	ENVIRONMENTAL EARTH SCIENCE
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG
PH 100	CONCEPTUAL PHYSICS

PH 101	GENERAL PHYSICS I
PH 102	GENERAL PHYSICS II
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III

Area IV: History and Social Behavioral Sciences

History		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Sciences		6-9
PY 101	GENERAL PSYCHOLOGY I ¹	
PY 201	LIFE-SPAN DEVELOPMENT ¹	
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
ESS 105	WORLD REGIONAL GEOGRAPHY	
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS	
SOC 100	INTRO TO SOCIOLOGY	
SOC 102	ANALYSIS OF SOCIAL PROBLEMS	
SOC 103	INTRO TO CRIMINOLOGY	
SOC 105	INTRO CULTURAL ANTHROPOLOGY	

¹ Required course

Code	Title	Semester Hours
Pre Professional Studies		
CS 102	INTRO TO C PROGRAMMING	3
Professional Studies		
ED 301	INTRO TO EDUCATION PRACTICUM	0
ED 307	MULTICULTURAL FND EDUCATION	3
ED 308	EDUCATIONAL PSYCHOLOGY	3
ED 309	CLASSROOM & BEHAVIOR MGMT	3
ED 350	TECHNOLOGY IN CLASSROOM	3
EDC 301	TCHG THE EXCEPTIONAL CHILD	3
EDC 311	INSTR STRATEGIES INCLUSIVE CLR	3
ED 408	TCHG READING/CONTENT AREA	3
ED 410	FOUNDATIONS EDUC EVALUAT	3
ED 422	MIDDLE & SECD SCH MATH METHODS	2
ED 432	TCH REASON/PROOF SEC MATH	2
Internship		
ED 497	HIGH SCHOOL INTERNSHIP	12
Teaching Field		
MA 172	CALCULUS B	4
MA 201	CALCULUS C	4

MA 238	APPL DIFFERENTIAL EQUATIONS	3
MA 244	INTRO TO LINEAR ALGEBRA	3
MA 330	FOUNDATIONS OF MATH	3
MA 385	INTRO TO PROBABILITY & STATIST	3
MA 433	INTRODUCTION TO GEOMETRY	3
MA 442	ALGEBRAIC STRUCTURES W/APPLIC	3
MA 452	INTRO TO REAL ANALYSIS	3
MA/ST 487	INTRO TO MATH STATISTICS	3
Math Electives 300+		6
Total Semester Hours		123-126

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Take no more than six hours in a single discipline in Area II or Area IV.

Secondary Education, BS - Physics

Degree Requirements

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts		
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
AMS 229	ANCIENT & MEDIEVAL WORLDS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		6
CM 113	Intro to Rhetorical Communication ¹	
WLC 101S or WLC 101A or WLC 101F or WLC 101G or WLC 101J or WLC 101R	INTRO FOREIGN LANG I: SPANISH INTRO FOREIGN LANG I: ARABIC INTRO FOREIGN LANG I:FRENCH INTRO FOREIGN LANG I:GERMAN INTRO FOREIGN LANG I:JAPANESE INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S or WLC 102A or WLC 102F or WLC 102G	INTRO FOREIGN LANG II:SPANISH INTRO FOREIGN LANG II: ARABIC INTRO FOREIGN LANG II:FRENCH INTRO FOREIGN LANG II:GERMAN	

or WLC 102J	INTRO FOREIGN LANG II:JAPANESE
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN
WLC 201S	INTERM FOREIGN LANG:SPANISH
or WLC 201A	INTERM FOREIGN LANG I: ARABIC
or WLC 201F	INTERM FOREIGN LANG:FRENCH
or WLC 201G	INTERM FOREIGN LANG:GERMAN
or WLC 201J	INTERM FOREIGN LANG: JAPANESE
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN
WLC 202S	INTERM FOREIGN LANG II:SPANISH
or WLC 202A	INTERM FOREIGN LANG II: ARABIC
or WLC 202F	INTERM FOREIGN LANG II:FRENCH
or WLC 202G	INTERM FOREIGN LANG II:GERMAN
or WLC 202J	INTERM FORGN LANG II:JAPANESE
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN
WLC 204	INTERNATIONAL CINEMA
PHL 101	INTRODUCTION TO PHILOSOPHY
PHL 102	INTRO TO ETHICS
PHL 103	INTRODUCTION TO LOGIC
PHL 150	TECH, SCIENCE & HUMAN VALUES
WGS 200	INTRO WOMEN'S & GENDER STUDIES
ARH 100	ARH SURV:ANCIENT-MEDIEVAL
ARH 101	ARH SURV:RENAISSANCE-MODERN
ARH 103	ARH SUR:NON-WESTERN TRADITIONS
ARS 160	DRAWING: FOUNDATIONS
TH 122	THEATRE APPRECIATION
TH 123	INTRO TO FILM STUDIES
MU 100	INTRO TO MUSIC LITERATURE

Area III: Mathematics and Sciences

Mathematics		12
MA 171	CALCULUS A	
MA 172	CALCULUS B	
MA 201	CALCULUS C	
Natural Sciences (Lab)		8
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	

Area IV: History and Social Behavioral Sciences

History		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Sciences		6-9
PY 101	GENERAL PSYCHOLOGY I ¹	
PY 201	LIFE-SPAN DEVELOPMENT ¹	
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
ESS 105	WORLD REGIONAL GEOGRAPHY	
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	
PSC 101	INTRO TO AMERICAN GOVERNMENT	

PSC 102	INTRO TO COMPARATIVE POLITICS
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS
SOC 100	INTRO TO SOCIOLOGY
SOC 102	ANALYSIS OF SOCIAL PROBLEMS
SOC 103	INTRO TO CRIMINOLOGY
SOC 105	INTRO CULTURAL ANTHROPOLOGY

¹ Required course

Code	Title	Semester Hours
Professional Studies		
BYS 119	PRINCIPLES OF BIOLOGY	4
BYS 119L	LABORATORY	0
ESS 103	ENVIRONMENTAL EARTH SCIENCE	4
ESS 103L	LABORATORY	0
MA 238	APPL DIFFERENTIAL EQUATIONS	3
or MA 244	INTRO TO LINEAR ALGEBRA	
Professional Studies		
ED 301	INTRO TO EDUCATION PRACTICUM	0
ED 307	MULTICULTURAL FND EDUCATION	3
ED 308	EDUCATIONAL PSYCHOLOGY	3
ED 309	CLASSROOM & BEHAVIOR MGMT	3
ED 350	TECHNOLOGY IN CLASSROOM	3
EDC 301	TCHG THE EXCEPTIONAL CHILD	3
EDC 311	INSTR STRATEGIES INCLUSIVE CLR	3
ED 408	TCHG READING/CONTENT AREA	3
ED 410	FOUNDATIONS EDUC EVALUAT	3
ED 423	TCHNG SCIENCE MID & SEC SCH I	2
ED 433	TEACH SC MID & SEC SCHOOL II	2
Internship		
ED 497	HIGH SCHOOL INTERNSHIP	12
Teaching Field		
PH 110	FRONTIERS IN SCIENCE	3
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	4
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	4
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	4
PH 251	SPECIAL RELATIVITY	1
PH 301	INTERMEDIATE MECHANICS	3
PH 305	MATH METHODS IN PHYSICS	3
PH 351	INTRODUCTION TO MODERN PHYSICS	3
PH 499	PHYSICS PRACTICUM	3
Electives: Choose two		7
AST 300+		
PH 300+		
OPT 300+		
Total Semester Hours		133-136

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Take no more than six hours in a single discipline in Area II or Area IV.

Health and Physical Education

Activity Courses

Our activity courses provide fun ways for students to improve overall health. Check out the variety of courses available!

Group Fitness

Aerobics
Butts and Guts Workout
Weight Training
Yoga

Sports and Recreation

Racquetball
Rock Climbing
Speed and Plyometrics
Swimming
Tai Chi
Tennis
Volleyball
Basketball
Ballroom Dance
Walk/Jog/Run
Judo/Jujitsu
Karate
Kung Fu
Ladies' Self-Defense

HPE 100 - AEROBICS
Semester Hours: 2

Improve cardiovascular fitness, flexibility, muscular strength and endurance, balance, and postural alignment. This class will focus on aerobic activity, specifically in the form of low- and high- impact aerobics. A wide variety of exercises will be included to provide a total-body workout.

HPE 105 - CARDIO DANCE
Semester Hours: 1-2

HPE 109 - SPEED & PLYOMETRIC TRAINING
Semester Hours: 2

HPE 110 - WALK/JOG/RUN
Semester Hour: 1

A beginner and intermediate level course with emphasis placed on giving a positive introduction to walking, jogging, and running as a way to enhance fitness and promote weight control, and to provide a viable option for a lifetime fitness activity.

HPE 111 - BUTTS & GUTS WORKOUT
Semester Hours: 2

HPE 117 - WEIGHT TRAINING
Semester Hours: 2

Learn to safely and efficiently use strength training techniques to reach your fitness goals. Develop the skills needed to create a personalized weight training program.

HPE 120 - SWIMMING
Semester Hour: 1

Learn the basic or progress in your swimming by learning the common swim strokes and techniques. Introduction to conditioning and training and work toward improving skills and endurance bringing higher efficiency in the water.

HPE 127 - LADIES SELF-DEFENSE

Semester Hour: 1

Explore the concepts, strategies, and methods of self defense. Topics and skills include wrist escapes, falling skills, various strikes and kicks, groundwork, weaponry, and escape tactics. Further, an emphasis will be placed on developing and improving situational awareness.

HPE 129 - KUNG FU

Semester Hours: 2

Kung Fu has become one of the most popular forms of martial arts. Students will be introduced to Sil Lum Tao, the first in the three forms of Wing Chun Kung Fu. The name means 'little imagination' and refers to the need of the student to use their imagination in the practice and application of techniques.

HPE 130 - KARATE

Semester Hours: 2

Learn karate techniques and acquire skills required to perform these techniques. The objective of Karate is to teach the student defensive skills through various stances and self-defense techniques.

HPE 133 - AIKIDO

Semester Hour: 1

HPE 134 - T'AI CHI

Semester Hours: 2

Learn an ancient Chinese exercise and martial art which is used to develop one's internal energy, health and well-being. The 37 postures of the short form in the Yang style will be executed.

HPE 135 - INTERMEDIATE T'AI CHI

Semester Hours: 2

HPE 136 - YOGA

Semester Hour: 1

HPE 137 - JUDO/JUJITSU

Semester Hours: 2

Judo/Jujitsu provides students with an introduction to the Japanese martial arts of Judo and Jujitsu. Focus will be on both the competition aspect of Judo and the self-defense aspects of each art including throws, take-downs, joint manipulation and chokes.

HPE 140 - BALLROOM DANCE

Semester Hours: 2

An introduction to the most popular smooth and rhythm ballroom patterns danced in America including the Waltz, Fox Trot, Tango, Cha-Cha, Rumba, Samba, Merengue, Bolero, Polka, Swing, and Mambo. Learn the appropriate skills necessary to become a social dancer, including leading, following etiquette and partner dancing.

HPE 142 - SWING DANCE

Semester Hours: 2

HPE 144 - COUNTRY WESTERN DANCE

Semester Hour: 1

HPE 150 - RACQUETBALL

Semester Hours: 2

Learn the basic of racquetball, including rules, equipment and skills. Singles (2 players), Cut throat (3 players) and Doubles (4 players) versions of racquetball will be taught. Double games during class times will be played when both safety and skill level of the players are acceptable to the instructor.

HPE 153 - TENNIS

Semester Hour: 1

Students will learn the fundamentals of tennis including forehand, backhand, serve, volley, footwork, and ground strokes. There will be both singles and doubles play and a class tournament. Highlights include understanding the rules, regulations and strategies of the game.

HPE 156 - GOLF

Semester Hour: 1

Students will understand and learn the basic skills of golf, including rules, proper stance, grip and swing for all clubs. Clubs are available if needed.

HPE 167 - ROCK CLIMBING

Semester Hours: 2

\$100 fee to be paid directly to Rock Climbing facility.

HPE 169 - BASKETBALL

Semester Hour: 1

HPE 170 - VOLLEYBALL

Semester Hour: 1

Learn the fundamentals skills of volleyball including passing, setting, hitting, blocking, and serving with advanced skills in spikes and positioning also being covered. Scrimmage games will be played to practice learned skills. This course will cover the rules of volleyball and its advantage as a lifetime sport, with a focus on skill development.

HPE 174 - BILLIARDS

Semester Hour: 1

HPE 199 - SP TOP:HLTH & PHYS ED

Semester Hours: 1-3

HPE 221 - ADVANCED SCUBA

Semester Hour: 1

Presents skills and knowledge for deep diving (80 + feet). Limited visibility diving, and advanced navigation techniques. Earn YMCA advanced open water certification. Students must provide mask, fins, and snorkel. Cost of open water dives not included in lab fee.

HPE 223 - LIFEGUARD TRAINING

Semester Hours: 2

Certification as a Red Cross approved lifeguard upon successful completion of classroom and in-water instruction and testing.

HPE 224 - WATER SAFETY INSTRUCTOR

Semester Hours: 3

Techniques for teaching infant and pre-school aquatics. The American Red Cross Learn to Swim Program, and Basic Water and Emergency Water Safety courses. Includes pre-test and instructor candidate training course.

HPE 231 - INSTR AIRPLANE(IFR)RATING GR S

Semester Hours: 3

Provides student with knowledge needed for instrument flight instruction air training. Prepares student for FAA Instrument Flying Examination.

HPE 400 - SPECIAL TOPICS - INTERNSHIP

Semester Hours: 3

Innovative internship focused on working with students with disabilities. Observations, participation, and direct instruction and teaching in a middle or high school setting for a prescribed time.

Kinesiology

329 Wilson Hall

Telephone: 256.824.6007

Email: kin@uah.edu

Programs Offered

The **Bachelor of Science in Kinesiology** offers the following two concentration areas:

The **Exercise Science** concentration prepares students for fields of study in the health sciences, such as physical therapy, occupational therapy, and cardiovascular rehabilitation. Students will also be prepared for graduate studies in exercise physiology, biomechanics, and exercise science. With an Exercise Science concentration, students are prepared for fitness and wellness professions, such as fitness training and instruction, corporate wellness, sports and strength coaching, and fitness and wellness center management. Program outcomes align with the standards of key professional associations such as the the American College of Sports Medicine (ACSM) and the National Strength and Conditioning Association (NSCA).

The **Physical Education Teacher Education (P-12)** concentration prepares students to obtain the license required to teach physical education in Alabama. Students meet all Alabama Quality Teaching Standards and specific physical education standards established by the Alabama State Department of Education (ALSDE). These standards are aligned with the Society of Health and Physical Educators (SHAPE) teacher education standards and the Alabama Course of Study for Physical Education. Students who choose the Physical Education concentration must satisfy the

requirements for admission to the UAH Teacher Education Program as outlined in the Unit Assessment System of the Institutional Report submitted by the Department of Education to CAEP.

The **Bachelor of Science in Sport and Fitness Management**

The **Sport and Fitness Management** degree program is designed for those students interested in the administrative aspect of sports and fitness. The purpose of the Sport and Fitness Management degree is to prepare students for both graduate studies and entry into management, marketing, and administrative positions in educational and sport business settings. Sport and Fitness Management graduates will also earn a minor in Business Administration.

Academic Advising

Students who are interested in the kinesiology degree program should contact the Department of Kinesiology at (256) 824-6007 to consult our advisor about program admission, curricular, and degree requirements.

Please contact Liz Redding at liz.redding@uah.edu.

- Kinesiology, Bachelor of Science - Exercise Science Concentration (p. 289)
- Kinesiology, Bachelor of Science - Physical Education Teacher Education Concentration (p. 294)
- Sport and Fitness Management, Bachelor of Science (p. 299)

Coaching (p. 288)

Health and Nutrition (p. 289)

KIN 200 - CONTEMPORARY NUTRITION

Semester Hours: 3

Introduction to the principles of nutrition as they relate to the growth, development, and maintenance of the human body throughout the lifespan. Emphasis is placed on the classes of nutrients, weight management, and nutritional planning.

KIN 205 - FIRST AID & CPR

Semester Hour: 1

Students will focus on recognizing emergency situations. First Aid and CPR also provides skills and knowledge necessary in caring for injuries or sudden illness.

KIN 210 - ATHLC INJURY PREVENTION & CARE

Semester Hours: 3

Presents the knowledge and techniques necessary to prevent and/or care for common athletic injuries. For coaches, athletes, and those working in recreation, physical education, or athletics.

KIN 215 - FIRST RESPONDER/PROFESSN'L CPR

Semester Hours: 2

Learn the concepts and skills needed to function as a First Responder and Professional Rescuer. Emphasis is placed on preparing for, recognizing, and providing emergency care in various situations where needed. Additionally, this course fully addresses the objectives in the U.S. Department of Transportation's National Standards Curriculum.

KIN 240 - HEALTH & WELLNESS CONCEPTS

Semester Hours: 3

This course provides students with an overview of individual and societal health and wellness and the impact of lifestyle choices. Laboratory experiences provide opportunity for assessment of individual health and fitness behaviors. Topics covered include: wellness, physical fitness, behavior modification, weight management, stress management, disease prevention, addictive behavior and sexual health.

KIN 250 - ESSENTIALS OF PERSONAL TRAIN'G

Semester Hours: 2

This course is designed to provide theoretical knowledge and practical skills in preparation for a national certification exam in personal training. Topics include guidelines for instructing safe, effective, and purposeful exercise, essentials of the client-trainer relationship, conducting health and fitness assessments, and designing and implementing appropriate exercise programming.

KIN 260 - FOUNDATIONS OF KINESIOLOGY

Semester Hours: 3

An introductory course for students in the Kinesiology major. The course will provide an overview of the Kinesiology field, including all subdisciplines and an in-depth discussion of teacher v non-teacher career choices. The history and development of physical education, exercise science, and sport studies will be covered, as well as issues and trends in physical education, exercise science, and sport studies.

KIN 265 - INTRO TO SPORT MGMT

Semester Hours: 3

This 3 hour course provides the student with the knowledge of sport management and administration in both athletics and leisure-based sports. Topics include management concepts, roles and responsibilities, fiscal management, fundraising, legal issues, event scheduling, and decision making.

KIN 290 - EX TECHNIQUES & LEADERSHIP

Semester Hours: 3

This course provides a practical guide in leadership for group and individual exercise settings. Critical evaluation of a safe fitness environment, adult physical activity programs to promote health, and exercise techniques according to the American College of Sports Medicine and National Strength and Conditioning Association are included.

KIN 300 - NUTRITION FOR FITNESS & SPORT

Semester Hours: 3

Explores the theoretical and applied nutritional sciences as they relate to fitness and sport. Students will develop practical skills applicable to solving nutritional problems in exercising populations. Nutritional requirements and practices related to general fitness, athletic performance, and special needs individuals will also be covered.

KIN 315 - STRENGTH TRNG & CONDITION

Semester Hours: 3

This course provides a comprehensive overview of strength and athletic conditioning. Emphasis is placed on the exercise sciences (including anatomy, exercise physiology, and biomechanics) and exercise technique, program design, organization and administration, and testing and evaluation. Additionally, this course is designed to prepare students for the nationally accredited Certified Strength and Conditioning Specialist (CSCS) certification exam. Prerequisites: KIN 210, KIN 290, KIN 327 (C or better).

KIN 327 - EXERCISE PHYSIOLOGY

Semester Hours: 3

An introduction to the response and adaptations of the body systems to exercise and physical activity. Prerequisites: KIN 260, BYS 215 and BYS 216 with a grade of C- or better Co-requisite: KIN 328.

KIN 328 - EXERCISE PHYSIOLOGY

Semester Hour: 1

Exercise physiology lab experience to accompany the introduction to exercise physiology course lectures. The course meets two hours weekly for one credit hour. Co-requisite: KIN 327.

KIN 340 - SCHOOL AND COMMUNITY HEALTH

Semester Hours: 3

Obtain information and skills related to school and community health programs with an emphasis on health instruction, strategies, and resources. Survey the components of a school health program: school health services, healthful school environment, principles of physical and movement education, nutrition services, counseling and social services, parent/community involvement, health promotion for staff. Examine the core functions of public health, prevention of diseases and injuries, health needs of special populations, and functions of various organizations.

KIN 351 - EXER TEST & PRECR HEALTHY POP

Semester Hours: 3

Provides students with techniques that evaluate aerobic capacity, muscular strength and endurance, flexibility, and body composition. The development of exercise prescriptions based on evaluation results will be emphasized. Prerequisites: KIN 327 (C- or better grade) and KIN 328.

KIN 352 - EXER TEST & PRECR SPECIAL POP

Semester Hours: 3

This advanced-level course integrates both lecture and laboratory to prepare students with the knowledge and skills necessary to conduct fitness evaluations, exercise prescriptions, and risk stratification of at-risk individuals. Specific emphasis will be placed on the administration of safe fitness testing using protocols published by ACSM for the health related components of physical fitness. Prerequisites: KIN 351.

KIN 361 - TEACHING TEAM SPORTS

Semester Hours: 3

Teaching methods and strategies of sports that require more than one participant. While knowledge of how to play the sport will be taught, emphasis will be placed on the organization, management, and assessment of skills in activities such as, but not limited to soccer, handball, and basketball.

KIN 362 - TEACHING INDIVIDUAL ACTIVITIES

Semester Hours: 3

Teaching methods and strategies for games involving individuals rather than a team. Emphasis will be placed on the organization, management, and assessment of skills in activities including, but not limited to, aerobic dance, cross country/trail running, and tumbling/gymnastics.

KIN 363 - TEACHING FITNESS & WELLNESS

Semester Hours: 3

Learn to perform and instruct a variety of fitness activities. Emphasis will be placed on performing fitness skills and on the methods and techniques for instructing and teaching specific fitness activities. Techniques for evaluating the knowledge and skills of the activities will also be stressed.

KIN 370 - ADAPTED PHYSICAL EDUCATION

Semester Hours: 3

Develop knowledge of current concepts and trends in adapted physical education as well as the ability to plan and implement a physical education program designed to meet the unique needs of individuals.

KIN 371 - ADAPTED FITNESS

Semester Hours: 3

Develop knowledge of current concepts and trends in adapted physical fitness as well as the ability to plan and implement fitness and wellness programs designed to meet the unique needs of individuals, particularly those with disabilities and special needs. Prerequisite: KIN 260.

KIN 381 - FACILITIES AND EQUIPMENT MGT

Semester Hours: 3

This course will provide theories for the design, development, operation, maintenance, and management of sport and fitness facilities. Prerequisite: KIN 260.

KIN 382 - SPORT LEADERSHIP

Semester Hours: 3

This course focuses on the role of leadership in general, with a specific application to a sport setting. We will focus on the numerous approaches to leadership that have been used, and emphasize illustrating and applying them to different aspects of sports. Prerequisites: KIN 260.

KIN 383 - SOCIOLOGY IN SPORT

Semester Hours: 3

This course is designed to study the role sport plays as a social institution. Additionally, we will identify what social institutions are most affected by sport and how these institutions are created. Topics will include the definition of sport as well as why and how it is studied, the effect of sport on society, sport as an institution, and sport and culture. Prerequisite: SOC 100.

KIN 384 - EVENT MANAGEMENT

Semester Hours: 3

This course investigates event management (in a planning and administration of sports events context) using a secondary objective model for planning, implementation management of events. This 'management' of an event will include aspects such as event planning, event promotion, event sponsorship, recruiting & managing volunteers, event risk management, and event facilitation. The financial elements of sports event management will be investigated such as: the ability to plan, develop and implement budgets, and to produce a profit/loss statement. The ability to effectively integrate and satisfy the needs of external stakeholders, such as sponsors, media and community will be investigated. This course uses an integrated mix of lecture/seminar and workshop formats for learning. Your learning is complemented with experiential learning opportunities that are supported with accepted theory and practice in planning and administering sports events. Learning outcomes are met with time spent in preparing for, and completing, assessment tasks, time spent in general study/event management delivery, evaluation and reflection. Students will consider how and why events building community (i.e., investigating how the event promotes health and well-being, and how risks can be managed, identifying why sports and recreation events are an important element for building prosperous progressive communities). Students are expected to work inclusively in all learning activities. Classroom as Organisation learning approach will be used to develop competency. Prerequisite: KIN 265.

KIN 400 - NUTRITION IN HEALTH & DISEASE

Semester Hours: 3

This course will provide students an opportunity to examine the role of epigenetics in disease development, the impact of weight stigma on health and the makeup of a healthy relationship with food and exercise. Having knowledge on the complex components that make up a person's body shape and size will allow students to more accurately assess health status. Prerequisite: KIN 200 (C- or better).

KIN 418 - STRUCTURE/FUNCTIONAL KIN

Semester Hours: 3

This course will provide development of knowledge of anatomic systems related to purposeful movement of the human body. Thorough instruction of the structure and function of musculoskeletal system will be provided. Prerequisites: BYS 215 and BYS 216.

KIN 419 - EXERCISE & SPORT BIOMECHANICS

Semester Hours: 3

This course will provide an advanced understanding of biomechanical conditions of human movement as well as knowledge and skills needed to analyze and evaluate human motor performance in order to prescribe appropriate interventions for optimized application to rehabilitation and sports performance. Students will learn to appropriately represent kinematic and kinetic quantities as vectors and use vectors, vector addition, and vector resolution to enhance the understanding of basic mechanical concepts. Prerequisites: BYS 215, BYS 216, and PH 101; and either KIN 418 or BYS 402.

KIN 421 - INST APP TO SPORT PEDAGOGY

Semester Hours: 3

This class is designed to expand and enrich the teaching repertoire. Special emphasis will be given to how selected models of teaching can be used to achieve multiple outcomes of teaching in physical education and other contexts (e.g., physical activity programs & youth sport). Additionally, the course will increase awareness in other instructional areas related to the profession (teaching underserved youth, youth sports programs, etc.). Prerequisites: KIN 361 or KIN 362 or KIN 363.

KIN 427 - ENVIRONMENTAL EXERCISE PHYSIOL

Semester Hours: 3

KIN 427 will examine how the human body responds and adapts to diverse forms of environmental stress during exercise. The course will focus on the responses and adaptations that occur from performing exercise under various environmental conditions. Prerequisite: KIN 327.

KIN 440 - MGT SPORT & PHYSICAL EDUCATION

Semester Hours: 3

This course provides the student with the knowledge of sport management and administration in both athletic and leisure-based sports. Topics include management concepts, roles and responsibilities, fiscal management, fund-raising, legal issues, event scheduling, and decision making.

KIN 442 - INTRO TO SPORT LAW

Semester Hours: 3

This course is designed to introduce students to the legal doctrines, major statutes, standards, and case law that establish legal responsibilities, rights, privileges and controls related to the field of exercise and sport sciences. Prerequisite: KIN 260.

KIN 443 - SP TOPICS IN SPORT ADMIN

Semester Hours: 3

This course will address a variety of topics based on emerging trends in Sport Administration. Potential course offerings will include coach education, advanced legal issues, sport sociology, sport finance and accounting and globalization of sport. Course content will be offered in rotation as needed. Prerequisite: KIN 260.

KIN 445 - PRINCIPLES OF COACHING

Semester Hours: 3

Gain knowledge and skills specific to coaching: developing a coaching philosophy and objectives, motivating athletes, managing a team. Emphasis is placed on sport at the high school and club level with consideration given to coaching youth, recreational, and intercollegiate. Coursework provides preparation for the American Sport Education Program (ASEP) Coaching Principles exam which is required by the Alabama High School Athletic Association (AHSAA).

KIN 450 - EXERCISE PHYSIOLOGY INTERNSHIP

Semester Hour: 1

Designed to provide on-site practical experience in a wellness/fitness program, physical therapy clinic, and/or a cardiac rehabilitation facility for Kinesiology-Exercise Science majors. Prerequisites: KIN 351.

KIN 451 - RESEARCH EXERCISE SCIENCE I

Semester Hours: 3

Initial capstone course (part of a two-course sequence) providing a broad and balanced background in various types of research methods and the development of a research proposal. Development of a research question, hypothesis, and research methodology. Application of computers will be used to search databases for relevant literature. Completion of an Institutional Review Board application is required. Prerequisites: KIN 351.

KIN 452 - RESEARCH EXERCISE SCIENCE II

Semester Hours: 3

Final capstone course (part of a two-course sequence) in which students must integrate and apply skills acquired throughout the program to complete a comprehensive research project. The student will complete the research project proposed in KIN 451 by recruiting research participants to collect data, writing the results and conclusions for a manuscript. Results will be prepared for publication and presented in a professional setting. Prerequisites: KIN 451 and PY 300 (with concurrency).

KIN 455 - MOTOR LEARNING

Semester Hours: 3

Study the principles and practices that affect the learning and development of motor skills; theories of motor learning, motor control, and development; lifespan motor development perspective related to performing motor and sport skills; and professional applications of motor learning and development in exercise science, athletic training, and physical education.

KIN 457 - MEASUREMENT & EVAL IN PHYS ACTV

Semester Hours: 3

Measure and evaluate learning or skill improvement based on accepted standards. Gain an understanding of the logic behind measurement instruments in order to better interpret and implement results and to achieve improved learning or physical fitness improvement. These methods of measurement and evaluation are important skills in health, physical education, and exercise science fields. Prerequisite: KIN 351 or permission of instructor.

KIN 460 - SPECIAL TOPICS KINESIOLOGY I

Semester Hours: 3

This course is intended to cover a variety of topics based on emerging topics in Kinesiology. Potential course offerings will include environmental exercise physiology, cardiovascular exercise physiology, childhood and adolescent exercise physiology, emerging topics in sport & fitness management, and expanded nutrition content. Prerequisites: KIN 327 or instructor permission.

KIN 461 - SPECIAL TOPICS KINESIOLOGY II

Semester Hours: 3

This course is developed to cover a variety of topics based on emerging topics in Kinesiology. Potential course offerings will include environmental exercise physiology, cardiovascular exercise physiology, childhood and adolescent exercise physiology, emerging topics in sport & fitness management, and expanded nutrition content. Course content will be offered in rotation. Prerequisites: KIN 327 or instructor permission.

KIN 462 - TEACHING PHYS ED IN ELEM SCH

Semester Hours: 3

Physical education teacher candidates will acquire the ability to understand, recognize, analyze, and demonstrate the range of teaching skills employed by successful physical educators in the preschool and elementary setting. Emphasis is placed on understanding the theoretical implications of different teaching skills and the contexts in which they are effective. Teacher candidates will design lessons that allow for maximum student participation while remaining aligned with Alabama Consent Standards. Field experience is required. Candidates will observe, participate in, and teach lessons in physical education classrooms. Prerequisite: Admission to the Teacher Education Program. Prerequisite: KIN 370.

KIN 463 - PSYCHOLOGICAL ASPECTS SPORT

Semester Hours: 3

Provides students with an introductory experience in sport, exercise, and fitness psychology based on the latest research and practice. Practical examples and case studies for individual and group sports are provided. The aim is to bridge science and practice to teach students the role of a sport and fitness psychologist. Prerequisites: KIN 327.

KIN 464 - HEALTH/PE FOR ELEM TEACHERS

Semester Hours: 2

The purpose of this course is to help the future elementary classroom teacher learn to appreciate, plan, organize, and conduct (if called upon to do so) a quality physical education program for children in grades pre-K-5. The pre-service teacher (PT) will be provided background knowledge about physical education content, skill themes and movement concepts, how to teach skill themes and movement concepts, and fitness concepts.

KIN 465 - TEACHING SECONDARY PE

Semester Hours: 3

Physical education teacher candidates will acquire the ability to understand, recognize, analyze, and demonstrate the range of teaching skills employed by successful educators in the secondary setting.

KIN 470 - SPORT MARKETING

Semester Hours: 3

Sport Marketing presents an overview of the various techniques and strategies used in meeting the wants and needs of consumers in the sport industry as well as the understanding how sport can be used to assist in the marketing of other companies and products. Areas to be addressed are the uniqueness of sport marketing in comparison with traditional marketing, an overview of the segments of the sport industry, the importance of market research and segmentation in identifying the right sport consumer, the issue of data-based marketing in researching the sport consumer, an overview of the marketing mix as individual units and the relationship between those units, and the development of sponsorship and endorsement packages. Prerequisite: MKT 301.

KIN 471 - SPORT FINANCE

Semester Hours: 3

This course examines the financial tools that sports managers use to run their sport businesses. As such, it explores traditional and innovative methods of revenue acquisition and financial management in sports organizations, the financial business structure of sports organizations, and the financial planning and forecasting processes that make organizations effective. Various other aspects of finance are discussed as they relate to sports organizations, including the time value of money, capital structuring, stocks and bonds, inventory management, and taxation. Prerequisite: FIN 301.

KIN 472 - ETHICS IN SPORT

Semester Hours: 3

This course prepares students to take a more critical view of sport, as well as reflect on their own personal ethical and competitive orientations. A central focus of the course is to view sport and competition from social justice and diversity perspectives. More specifically, sport is discussed from a socio-cultural context regarding how dominant and non-dominant groups (racial, ethnic, or socio-economic) have used sport to preserve or change their societal status. This includes such areas as racial identity and equity, gender identity and equity, cultural and ethnic stereotyping, sexual orientation, hazing and bullying, religion and sport, and individuals with disabilities. This course will also look at how to become an agent for change by using social capital to promote ethical equity and diversity. Prerequisite: KIN 265.

KIN 473 - SPORT & FITNESS MANAGEMENT

Semester Hours: 3

The course is an in-depth analysis of the relationship of sport and management. The study of sport includes sporting goods manufacturers; fitness centers; recreation departments; broadcasting; Little League teams; and high school, NCAA, and professional leagues. The study of management follows the four functions of management: planning, organizing, leading, and controlling. Prerequisite: KIN 265.

KIN 490 - EXERCISE SCIENCE INTERNSHIP

Semester Hours: 6

Designed to provide on-site practical experience in a wellness/fitness program, physical therapy clinic, and/or a cardiac rehabilitation facility for Kinesiology-Exercise Science majors. Prerequisites: KIN 351, senior standing.

KIN 491 - SPORT & FITNESS MGT INTERNSHIP

Semester Hours: 6

Sport Administration Internship will introduce and promote professionalism through a hands-on experience with a local company. The student will be guided by a faculty member and company representative to achieve a strong overall work experience pertaining to the student's interests. Prerequisites: KIN 265.

Coaching, Minor

Open to individuals from any department on campus, this program is designed for those interested in sport coaching. The purpose of the program is to provide students with a general framework of knowledge and the skills to be effective coaches in school, recreational, and adult league settings. The program blends coursework in the fields of Sport Pedagogy, Exercise Science, and Sport Management to give students a well-rounded, cross-disciplined approach to athletic coaching. It consists of 6 classes for 18 hours of course work:

Code	Title	Semester Hours
KIN 361	TEACHING TEAM SPORTS	3
or KIN 362	TEACHING INDIVIDUAL ACTIVITIES	
KIN 381	FACILITIES AND EQUIPMENT MGT	3
KIN 382	SPORT LEADERSHIP	3
KIN 445	PRINCIPLES OF COACHING	3
KIN 463	PSYCHOLOGICAL ASPECTS SPORT	3

KIN 472	ETHICS IN SPORT	3
Total Semester Hours		18

Health and Nutrition, Minor

The Health and Nutrition minor is open to all students looking to expand their knowledge of health and wellness. The goals of the program are to increase nutritional knowledge, expose individuals to the benefits of exercise, and help destigmatize mental health. Increased knowledge in all areas is beneficial to all students regardless of their major. The program consists of 7 courses for 21 hrs of course work.

Code	Title	Semester Hours
KIN 200	CONTEMPORARY NUTRITION	3
KIN 240	HEALTH & WELLNESS CONCEPTS	3
KIN 290	EX TECHNIQUES & LEADERSHIP	3
KIN 300	NUTRITION FOR FITNESS & SPORT	3
KIN 400	NUTRITION IN HEALTH & DISEASE	3
PY 333	PY OF ADJUSTMENT & ADAPTATION	3
PY 437	PSYCHOBIOLOGY STRESS & ILLNESS	3
Total Hours ¹		18-21

¹ PY 437 is only offered once, every other year. If the course is not offered when the student needs it, they may earn the minor without that course, for a total of 18 hours; however, if the course is offered during the time frame that the student needs it, they will be required to take it, thus completing a full 21 hours.

Kinesiology with Exercise Science Option, BS

- A Bachelor of Science in Kinesiology with a concentration in Exercise Science requires 120 credit hours.
- For transfer students, no more than 60 credit hours from a two-year school can be applied toward a UAH degree.
- In order to graduate, 12 of the last 18 credit hours must be taken at UAH, and 25% of all coursework must be taken at UAH.
- For graduation application instructions, see here (p. 812).

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6

CM 113	Intro to Rhetorical Communication
WLC 101S	INTRO FOREIGN LANG I: SPANISH
or WLC 101A	INTRO FOREIGN LANG I: ARABIC
or WLC 101F	INTRO FOREIGN LANG I:FRENCH
or WLC 101G	INTRO FOREIGN LANG I:GERMAN
or WLC 101J	INTRO FOREIGN LANG I:JAPANESE
or WLC 101R	INTRO FOREIGN LANG I:RUSSIAN
WLC 102S	INTRO FOREIGN LANG II:SPANISH
or WLC 102A	INTRO FOREIGN LANG II: ARABIC
or WLC 102F	INTRO FOREIGN LANG II:FRENCH
or WLC 102G	INTRO FOREIGN LANG II:GERMAN
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN
WLC 201S	INTERM FOREIGN LANG:SPANISH
or WLC 201A	INTERM FOREIGN LANG I: ARABIC
or WLC 201F	INTERM FOREIGN LANG:FRENCH
or WLC 201G	INTERM FOREIGN LANG:GERMAN
or WLC 201J	INTERM FOREIGN LANG: JAPANESE
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN
WLC 202S	INTERM FOREIGN LANG II:SPANISH
or WLC 202A	INTERM FOREIGN LANG II: ARABIC
or WLC 202F	INTERM FOREIGN LANG II:FRENCH
or WLC 202G	INTERM FOREIGN LANG II:GERMAN
or WLC 202J	INTERM FORGN LANG II:JAPANESE
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN
WLC 204	INTERNATIONAL CINEMA
PHL 101	INTRODUCTION TO PHILOSOPHY
PHL 102	INTRO TO ETHICS
PHL 103	INTRODUCTION TO LOGIC
PHL 150	TECH, SCIENCE & HUMAN VALUES
WGS 200	INTRO WOMEN'S & GENDER STUDIES
AMS 229	ANCIENT & MEDIEVAL WORLDS
ARH 100	ARH SURV:ANCIENT-MEDIEVAL
ARH 101	ARH SURV:RENAISSANCE-MODERN
ARH 103	ARH SUR:NON-WESTERN TRADITIONS
ARS 160	DRAWING: FOUNDATIONS
TH 122	THEATRE APPRECIATION
TH 123	INTRO TO FILM STUDIES
MU 100	INTRO TO MUSIC LITERATURE

Area III: Mathematics and Sciences**11-12**

Mathematics	3-4
MA 105	NATURE OF MATHEMATICS
MA 107	ALGEBRA WITH APPLICATIONS
MA 110	FINITE MATHEMATICS
MA 112	PRECALCULUS ALGEBRA
MA 113	PRECALCULUS TRIGONOMETRY
MA 115	PRECALCULUS ALGEBRA & TRIG
MA 120	MATH PROFESSIONAL APPLICATIONS
MA 171	CALCULUS A
Natural Sciences (Lab)	8
AST 100	SURVEY OF ASTRONOMY
AST 106	EXPLORING THE COSMOS I

AST 107	EXPLORING THE COSMOS II
BYS 109	FUNDAMENTALS OF BIOLOGY
BYS 119	PRINCIPLES OF BIOLOGY
BYS 120	ORGANISMAL BIOLOGY
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB
ESS 103	ENVIRONMENTAL EARTH SCIENCE
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG
PH 100	CONCEPTUAL PHYSICS
PH 101	GENERAL PHYSICS I
PH 102	GENERAL PHYSICS II
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III

Area IV: History and Social and Behavioral Sciences* **12**

History 3-6

HY 103	WORLD HISTORY TO 1500
HY 104	WORLD HISTORY SINCE 1500
HY 221	UNITED STATES TO 1877
HY 222	UNITED STATES SINCE 1877

Social and Behavioral Sciences 6-9

ECN 142	PRINC OF MACROECONOMICS
ECN 143	PRINC OF MICROECONOMICS
GS 200	GLOBAL SYSTEMS AND CULTURES
ESS 105	WORLD REGIONAL GEOGRAPHY
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY
PSC 101	INTRO TO AMERICAN GOVERNMENT
PSC 102	INTRO TO COMPARATIVE POLITICS
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS
PY 101	GENERAL PSYCHOLOGY I
PY 201	LIFE-SPAN DEVELOPMENT
SOC 100	INTRO TO SOCIOLOGY
SOC 102	ANALYSIS OF SOCIAL PROBLEMS
SOC 103	INTRO TO CRIMINOLOGY
SOC 105	INTRO CULTURAL ANTHROPOLOGY

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Take no more than six hours in a single discipline in Area II or Area IV.

Code	Title	Semester Hours
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Area V Pre-Professional Courses

Courses in this area may also fulfill Charger Foundations requirements.

BYS 119	PRINCIPLES OF BIOLOGY	4
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BYS 215 & 215L	HUMAN ANATOMY & PHYSIOLOGY I and HA&P I LABORATORY	4
BYS 216 & 216L	HUMAN ANATOMY & PHYSIOLOGY II and HA&P II LABORATORY	4
BYS 320	MEDICAL TERMINOLOGY	3
CM 113	Intro to Rhetorical Communication	3
CH 101 & CH 105 or CH 121 & CH 125	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	4
MA 110 or higher	FINITE MATHEMATICS	3
PH 101	GENERAL PHYSICS I	4
PY 101	GENERAL PSYCHOLOGY I	3
PY 201	LIFE-SPAN DEVELOPMENT	3
PY 300	PSYCHOLOGICAL STATISTICS	3
Kinesiology Major Core		
KIN 240	HEALTH & WELLNESS CONCEPTS	3
KIN 260	FOUNDATIONS OF KINESIOLOGY	3
KIN 455	MOTOR LEARNING	3
KIN 457	MEASUREMNT & EVAL IN PHYS ACTV	3
Exercise Science Courses		
KIN 210	ATHLC INJURY PREVENTION & CARE	3
KIN 290	EX TECHNIQUES & LEADERSHIP	3
KIN 300	NUTRITION FOR FITNESS & SPORT	3
KIN 315	STRENGTH TRNG & CONDITION	3
KIN 327	EXERCISE PHYSIOLOGY	3
KIN 328	EXERCISE PHYSIOLOGY	1
KIN 351	EXER TEST & PRECR HEALTHY POP	3
KIN 352	EXER TEST & PRECR SPECIAL POP	3
KIN 440	MGT SPORT & PHYSICAL EDUCATION	3
KIN 451	RESEARCH EXERCISE SCIENCE I	3
KIN 452	RESEARCH EXERCISE SCIENCE II	3
KIN 463	PSYCHOLOGICAL ASPECTS SPORT	3
KIN 490	EXERCISE SCIENCE INTERNSHIP	6
Electives: Choose two of the following		
KIN 361	TEACHING TEAM SPORTS	3
KIN 362	TEACHING INDIVIDUAL ACTIVITIES	3
KIN 370	ADAPTED PHYSICAL EDUCATION	3
KIN 400	NUTRITION IN HEALTH & DISEASE	3
KIN 445	PRINCIPLES OF COACHING	3
KIN 460	SPECIAL TOPICS KINESIOLOGY I	3
KIN 461	SPECIAL TOPICS KINESIOLOGY II	3
Total Semester Hours		120

Sample four year plan for BS degree in Kinesiology: Exercise Science

Note: This is only an example and variations are possible.

Year 1

		Semester Hours
Fall		
FYE 101D	CHARGER SUCCESS - EDUCATION	1
BYS 119	PRINCIPLES OF BIOLOGY	4
EH 101	COLLEGE WRITING I	3
MA 110	FINITE MATHEMATICS	3

or MA 112	or PRECALCULUS ALGEBRA	
Fine Arts elective-see Requirements tab for options		3
Term Semester Hours:		14
Spring		
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB	4
CM 113	Intro to Rhetorical Communication	3
EH 102	COLLEGE WRITING II	3
KIN 240	HEALTH WELLNESS CONCEPTS	3
History elective-see Requirements tab for options		3
Term Semester Hours:		16
Year 2		
Fall		
BYS 215 & 215L	HUMAN ANATOMY & PHYSIOLOGY I and HA&P I LABORATORY	4
PY 101	GENERAL PSYCHOLOGY I	3
KIN 210	ATHLC INJURY PREVENTION CARE	3
KIN 260	FOUNDATIONS OF KINESIOLOGY	3
Literature elective-see Requirements tab for options		3
Term Semester Hours:		16
Spring		
BYS 216 & 216L	HUMAN ANATOMY & PHYSIOLOGY II and HA&P II LABORATORY	4
KIN 290	EX TECHNIQUES LEADERSHIP	3
PY 201	LIFE-SPAN DEVELOPMENT	3
KIN elective-see Requirements tab for options		3
2nd Humanities, Fine Art, or Literature-see Requirements tab for options		3
Term Semester Hours:		16
Year 3		
Fall		
PH 101 & 101L	GENERAL PHYSICS I and GENERAL PHYSICS I LAB	4
KIN 327 & KIN 328	EXERCISE PHYSIOLOGY and EXERCISE PHYSIOLOGY	4
KIN 440	MGT SPORT PHYSICAL EDUCATION	3
KIN 455	MOTOR LEARNING	3
2nd History or Social & Behavioral Science-see Requirements tab for options		3
Term Semester Hours:		17
Spring		
BYS 320	MEDICAL TERMINOLOGY	3
KIN 300	NUTRITION FOR FITNESS SPORT	3
KIN 315	STRENGTH TRNG CONDITION	3
KIN 351	EXER TEST PRECR HEALTHY POP	3
PY 300	PSYCHOLOGICAL STATISTICS	3
Term Semester Hours:		15
Year 4		

Fall

KIN 352	EXER TEST PRECR SPECIAL POP	3
KIN 418	STRUCTURE/FUNCTIONAL KIN	3
KIN 451	RESEARCH EXERCISE SCIENCE I	3
KIN 457	MEASUREMNT EVAL IN PHYS ACTV	3
KIN elective-see Requirements tab for options		3

Term Semester Hours:	15
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Spring

KIN 452	RESEARCH EXERCISE SCIENCE II	3
KIN 463	PSYCHOLOGICAL ASPECTS SPORT	3
KIN 490	EXERCISE SCIENCE INTERNSHIP	6

Term Semester Hours:	12
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Total Semester Hours:	121
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Kinesiology with Physical Education (P-12) Licensure, BS

- Bachelor of Science in Kinesiology: Physical Education Teacher Education requires 123 credit hours.
- 12 credit hours of 300 level and above must be taken in the major.
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- No more than 61 credit hours from a two-year school can be applied toward a UAH degree.
- For graduation application instructions, see here (p. 812).

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S or WLC 101A or WLC 101F or WLC 101G or WLC 101J	INTRO FOREIGN LANG I: SPANISH INTRO FOREIGN LANG I: ARABIC INTRO FOREIGN LANG I:FRENCH INTRO FOREIGN LANG I:GERMAN INTRO FOREIGN LANG I:JAPANESE	

or WLC 101R	INTRO FOREIGN LANG I:RUSSIAN
WLC 102S	INTRO FOREIGN LANG II:SPANISH
or WLC 102A	INTRO FOREIGN LANG II: ARABIC
or WLC 102F	INTRO FOREIGN LANG II:FRENCH
or WLC 102G	INTRO FOREIGN LANG II:GERMAN
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN
WLC 201S	INTERM FOREIGN LANG:SPANISH
or WLC 201A	INTERM FOREIGN LANG I: ARABIC
or WLC 201F	INTERM FOREIGN LANG:FRENCH
or WLC 201G	INTERM FOREIGN LANG:GERMAN
or WLC 201J	INTERM FOREIGN LANG: JAPANESE
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN
WLC 202S	INTERM FOREIGN LANG II:SPANISH
or WLC 202A	INTERM FOREIGN LANG II: ARABIC
or WLC 202F	INTERM FOREIGN LANG II:FRENCH
or WLC 202G	INTERM FOREIGN LANG II:GERMAN
or WLC 202J	INTERM FORGN LANG II:JAPANESE
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN
WLC 204	INTERNATIONAL CINEMA
PHL 101	INTRODUCTION TO PHILOSOPHY
PHL 102	INTRO TO ETHICS
PHL 103	INTRODUCTION TO LOGIC
PHL 150	TECH, SCIENCE & HUMAN VALUES
WGS 200	INTRO WOMEN'S & GENDER STUDIES
AMS 229	ANCIENT & MEDIEVAL WORLDS
ARH 100	ARH SURV:ANCIENT-MEDIEVAL
ARH 101	ARH SURV:RENAISSANCE-MODERN
ARH 103	ARH SUR:NON-WESTERN TRADITIONS
ARS 160	DRAWING: FOUNDATIONS
TH 122	THEATRE APPRECIATION
TH 123	INTRO TO FILM STUDIES
MU 100	INTRO TO MUSIC LITERATURE

Area III: Mathematics and Sciences**11-12****Mathematics****3-4**

MA 105	NATURE OF MATHEMATICS
MA 107	ALGEBRA WITH APPLICATIONS
MA 110	FINITE MATHEMATICS
MA 112	PRECALCULUS ALGEBRA
MA 113	PRECALCULUS TRIGONOMETRY
MA 115	PRECALCULUS ALGEBRA & TRIG
MA 120	MATH PROFESSIONAL APPLICATIONS
MA 171	CALCULUS A

Natural Sciences (Lab)**8**

AST 100	SURVEY OF ASTRONOMY
AST 106	EXPLORING THE COSMOS I
AST 107	EXPLORING THE COSMOS II
BYS 109	FUNDAMENTALS OF BIOLOGY
BYS 119	PRINCIPLES OF BIOLOGY
BYS 120	ORGANISMAL BIOLOGY
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I

CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB	
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB	
ESS 103	ENVIRONMENTAL EARTH SCIENCE	
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG	
PH 100	CONCEPTUAL PHYSICS	
PH 101	GENERAL PHYSICS I	
PH 102	GENERAL PHYSICS II	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	
Area IV: History and Social and Behavioral Sciences*		12
History		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Sciences		6-9
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
ESS 105	WORLD REGIONAL GEOGRAPHY	
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS	
PY 101	GENERAL PSYCHOLOGY I	
PY 201	LIFE-SPAN DEVELOPMENT	
SOC 100	INTRO TO SOCIOLOGY	
SOC 102	ANALYSIS OF SOCIAL PROBLEMS	
SOC 103	INTRO TO CRIMINOLOGY	
SOC 105	INTRO CULTURAL ANTHROPOLOGY	

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Take no more than six hours in a single discipline in Area II or Area IV.

Code	Title	Semester Hours
Area V Pre-Professional Courses		
Courses in this area may also fulfill Charger Foundations requirements.		
BYS 119	PRINCIPLES OF BIOLOGY	4
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I	4
BYS 216	HUMAN ANATOMY & PHYSIOLOGY II	4
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB	4
or CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	

CM 113	Intro to Rhetorical Communication	3
KIN 327 & KIN 328	EXERCISE PHYSIOLOGY and EXERCISE PHYSIOLOGY	4
MA 110	FINITE MATHEMATICS	3
or higher		
PY 101	GENERAL PSYCHOLOGY I	3
PY 201	LIFE-SPAN DEVELOPMENT	3
Education Courses		28
ED 301	INTRO TO EDUCATION PRACTICUM	
ED 307	MULTICULTURAL FND EDUCATION	
ED 308	EDUCATIONAL PSYCHOLOGY	
ED 408	TCHG READING/CONTENT AREA	
ED 499	P-12 INTERNSHIP	
EDC 301	TCHG THE EXCEPTIONAL CHILD	
EDC 311	INSTR STRATEGIES INCLUSIVE CLR	
Kinesiology Core Courses		12
KIN 240	HEALTH & WELLNESS CONCEPTS	
KIN 260	FOUNDATIONS OF KINESIOLOGY	
KIN 455	MOTOR LEARNING	
KIN 457	MEASUREMNT & EVAL IN PHYS ACTV	
PETE Specific Courses		24
KIN 340	SCHOOL AND COMMUNITY HEALTH	
KIN 361	TEACHING TEAM SPORTS	
KIN 362	TEACHING INDIVIDUAL ACTIVITIES	
KIN 363	TEACHING FITNESS & WELLNESS	
KIN 370	ADAPTED PHYSICAL EDUCATION	
KIN 421	INST APP TO SPORT PEDAGOGY	
KIN 462	TEACHING PHYS ED IN ELEM SCH	
KIN 465	TEACHING SECONDARY PE	
Choose 6 hours of KIN Electives 300+		6
Total Semester Hours		123

Sample four year plan for BS degree in Kinesiology: Physical Education Teacher Education (P-12)

Note: This is only an example and variations are possible.

Year 1

Fall		Semester Hours
FYE 101D	CHARGER SUCCESS - EDUCATION	1
BYS 119	PRINCIPLES OF BIOLOGY	4
EH 101	COLLEGE WRITING I	3
KIN 240	HEALTH WELLNESS CONCEPTS	3
MA 110	FINITE MATHEMATICS	3
or MA 112	or PRECALCULUS ALGEBRA	
Fine Arts elective-see Requirements tab for options		3
Term Semester Hours:		17

Spring

CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB	4
CM 113	Intro to Rhetorical Communication	3
EH 102	COLLEGE WRITING II	3
KIN 260	FOUNDATIONS OF KINESIOLOGY	3

History elective-see Requirements tab for options		3
Term Semester Hours:		16
Year 2		
Fall		
BYS 215 & 215L	HUMAN ANATOMY & PHYSIOLOGY I and HA&P I LABORATORY	4
KIN 362	TEACHING INDIVIDUAL ACTIVITIES	3
KIN 370	ADAPTED PHYSICAL EDUCATION	3
PY 101	GENERAL PSYCHOLOGY I	3
Literature elective-see Requirements tab for options		3
Term Semester Hours:		16
Spring		
BYS 216 & 216L	HUMAN ANATOMY & PHYSIOLOGY II and HA&P II LABORATORY	4
KIN 363	TEACHING FITNESS WELLNESS	3
PY 201	LIFE-SPAN DEVELOPMENT	3
2nd Humanities, Fine Art, or Literature-see Requirements tab for options		3
2nd History or Social & Behavioral Science-see Requirements tab for options		3
Term Semester Hours:		16
Year 3		
Fall		
ED 301	INTRO TO EDUCATION PRACTICUM	1
ED 307	MULTICULTURAL FND EDUCATION	3
ED 308	EDUCATIONAL PSYCHOLOGY	3
EDC 301	TCHG THE EXCEPTIONAL CHILD	3
EDC 311	INSTR STRATEGIES INCLUSIVE CLR	3
KIN 300+ level elective		3
Term Semester Hours:		16
Spring		
KIN 327 & KIN 328	EXERCISE PHYSIOLOGY and EXERCISE PHYSIOLOGY	4
KIN 340	SCHOOL AND COMMUNITY HEALTH	3
KIN 361	TEACHING TEAM SPORTS	3
KIN 455	MOTOR LEARNING	3
KIN 462	TEACHING PHYS ED IN ELEM SCH	3
Term Semester Hours:		16
Year 4		
Fall		
KIN 421	INST APP TO SPORT PEDAGOGY	3
KIN 465	TEACHING SECONDARY PE	3
KIN 457	MEASUREMNT EVAL IN PHYS ACTV	3
ED 408	TCHG READING/CONTENT AREA	3
KIN 300+ level elective		3
Term Semester Hours:		15
Spring		

ED 499	P-12 INTERNSHIP	12
	Term Semester Hours:	12
	Total Semester Hours:	124

Sport & Fitness Management, BS

- A Bachelor of Science in Sport & Fitness Management requires 120 credit hours.
- For transfer students, no more than 60 credit hours from a two-year school can be applied toward a UAH degree.
- In order to graduate, 12 of the last 18 credit hours must be taken at UAH, and 25% of all coursework must be taken at UAH.
- For graduation application instructions, see here (<https://catalog.uah.edu/undergrad/policies-procedures/application-graduation/>).

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101	COLLEGE WRITING I	
or EH 101S	COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S	INTRO FOREIGN LANG I: SPANISH	
or WLC 101A	INTRO FOREIGN LANG I: ARABIC	
or WLC 101F	INTRO FOREIGN LANG I:FRENCH	
or WLC 101G	INTRO FOREIGN LANG I:GERMAN	
or WLC 101J	INTRO FOREIGN LANG I:JAPANESE	
or WLC 101R	INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S	INTRO FOREIGN LANG II:SPANISH	
or WLC 102A	INTRO FOREIGN LANG II: ARABIC	
or WLC 102F	INTRO FOREIGN LANG II:FRENCH	
or WLC 102G	INTRO FOREIGN LANG II:GERMAN	
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE	
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN	
WLC 201S	INTERM FOREIGN LANG:SPANISH	
or WLC 201A	INTERM FOREIGN LANG I: ARABIC	
or WLC 201F	INTERM FOREIGN LANG:FRENCH	
or WLC 201G	INTERM FOREIGN LANG:GERMAN	
or WLC 201J	INTERM FOREIGN LANG: JAPANESE	

or WLC 201R	INTERM FOREIGN LANG:RUSSIAN	
WLC 202S	INTERM FOREIGN LANG II:SPANISH	
or WLC 202A	INTERM FOREIGN LANG II: ARABIC	
or WLC 202F	INTERM FOREIGN LANG II:FRENCH	
or WLC 202G	INTERM FOREIGN LANG II:GERMAN	
or WLC 202J	INTERM FORGN LANG II:JAPANESE	
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN	
WLC 204	INTERNATIONAL CINEMA	
PHL 101	INTRODUCTION TO PHILOSOPHY	
PHL 102	INTRO TO ETHICS	
PHL 103	INTRODUCTION TO LOGIC	
PHL 150	TECH, SCIENCE & HUMAN VALUES	
WGS 200	INTRO WOMEN'S & GENDER STUDIES	
AMS 229	ANCIENT & MEDIEVAL WORLDS	
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Area III: Mathematics and Sciences		11-12
Mathematics		3-4
MA 105	NATURE OF MATHEMATICS	
MA 107	ALGEBRA WITH APPLICATIONS	
MA 110	FINITE MATHEMATICS	
MA 112	PRECALCULUS ALGEBRA	
MA 113	PRECALCULUS TRIGONOMETRY	
MA 115	PRECALCULUS ALGEBRA & TRIG	
MA 120	MATH PROFESSIONAL APPLICATIONS	
MA 171	CALCULUS A	
Natural Sciences (Lab)		8
AST 100	SURVEY OF ASTRONOMY	
AST 106	EXPLORING THE COSMOS I	
AST 107	EXPLORING THE COSMOS II	
BYS 109	FUNDAMENTALS OF BIOLOGY	
BYS 119	PRINCIPLES OF BIOLOGY	
BYS 120	ORGANISMAL BIOLOGY	
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I	
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB	
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB	
ESS 103	ENVIRONMENTAL EARTH SCIENCE	
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG	
PH 100	CONCEPTUAL PHYSICS	
PH 101	GENERAL PHYSICS I	
PH 102	GENERAL PHYSICS II	

PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	
Area IV: History and Social and Behavioral Sciences*		12
History		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Sciences		6-9
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
ESS 105	WORLD REGIONAL GEOGRAPHY	
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS	
PY 101	GENERAL PSYCHOLOGY I	
PY 201	LIFE-SPAN DEVELOPMENT	
SOC 100	INTRO TO SOCIOLOGY	
SOC 102	ANALYSIS OF SOCIAL PROBLEMS	
SOC 103	INTRO TO CRIMINOLOGY	
SOC 105	INTRO CULTURAL ANTHROPOLOGY	

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Take no more than six hours in a single discipline in Area II or Area IV.

Code	Title	Semester Hours
Area V Required Multi-Discipline/Other		
CM 220	INTRO PUBLIC RELATIONS	3
CM 231	FOUNDATIONS OF HUMAN COMMUNICA	3
ECN 406	SPORTS ECONOMICS	3
Total Multi-Discipline		9
Business Admin Minor		
ACC 210	ACCOUNTING FOR BUSINESS	4
ECN 142	PRINC OF MACROECONOMICS	3
ECN 143	PRINC OF MICROECONOMICS	3
FIN 301	PRINCIPLES OF FINANCE	3
MSC 287	BUSINESS STATISTICS I	3
MGT 301	MANAGING ORGANIZATIONS	3
MKT 301	PRINCIPLES OF MARKETING	3
Total Business Admin Minor		22
Required Kinesiology Courses		
KIN 260	FOUNDATIONS OF KINESIOLOGY	
KIN 265	INTRO TO SPORT MGMT	
KIN 381	FACILITIES AND EQUIPMENT MGT	
KIN 382	SPORT LEADERSHIP	
KIN 383	SOCIOLOGY IN SPORT	
KIN 384	EVENT MANAGEMENT	

KIN 442	INTRO TO SPORT LAW
KIN 463	PSYCHOLOGICAL ASPECTS SPORT
KIN 470	SPORT MARKETING
KIN 471	SPORT FINANCE
KIN 472	ETHICS IN SPORT
KIN 491	SPORT & FITNESS MGT INTERNSHIP

Total KIN Courses **39**

Electives: Choose 12 hrs from this list:

Choose one KIN course

KIN 361	TEACHING TEAM SPORTS
KIN 362	TEACHING INDIVIDUAL ACTIVITIES
KIN 443	SP TOPICS IN SPORT ADMIN
KIN 445	PRINCIPLES OF COACHING

Choose one CM course

CM 205	INTRO TO JOURNALISM
CM 310	PERSUASION
CM 313	BUSINESS & PROFESSIONAL COMM
CM 331	COMMUNICATION THEORY
CM 405	ADVANCED MEDIA WRITING
CM 430	MASS MEDIA IN AMERICA
CM 444	ADVERTISING

6 hours as approved by advisor

Total Electives **12**

Total Credit Hours **120**

Sample four year plan for BS degree in Sport and Fitness Management

Note: This is only an example and variations are possible.

Year 1

		Semester Hours
Fall		
FYE 101D	CHARGER SUCCESS - EDUCATION	1
CM 113	Intro to Rhetorical Communication	3
EH 101	COLLEGE WRITING I	3
MA 110	FINITE MATHEMATICS (or higher)	3
PY 101	GENERAL PSYCHOLOGY I	3
Fine Arts elective-see Requirements tab for options		3
Term Semester Hours:		16

Spring

ECN 142	PRINC OF MACROECONOMICS	3
EH 102	COLLEGE WRITING II	3
PY 201	LIFE-SPAN DEVELOPMENT	3
KIN 260	FOUNDATIONS OF KINESIOLOGY	3
Science elective-see Requirements tab for options		4
Term Semester Hours:		16

Year 2

Fall		
CM 220	INTRO PUBLIC RELATIONS	3
ECN 143	PRINC OF MICROECONOMICS	3
KIN 265	INTRO TO SPORT MGMT	3

Literature elective-see		3
Requirements tab for options		
Science elective-see		4
Requirements tab for options		
Term Semester Hours:		16
Spring		
ACC 210	ACCOUNTING FOR BUSINESS	4
CM 231	FOUNDATIONS OF HUMAN COMMUNICA	3
History elective-see		3
Requirements tab for options		
KIN elective-see		3
Requirements tab for options		
2nd Literature course-see		3
Requirements tab for options		
Term Semester Hours:		16
Year 3		
Fall		
KIN 381	FACILITIES AND EQUIPMENT MGT	3
KIN 442	INTRO TO SPORT LAW	3
MGT 301	MANAGING ORGANIZATIONS	3
MSC 287	BUSINESS STATISTICS I	3
CM elective-see		3
Requirements tab for options		
Term Semester Hours:		15
Spring		
FIN 301	PRINCIPLES OF FINANCE	3
KIN 382	SPORT LEADERSHIP	3
KIN 383	SOCIOLOGY IN SPORT	3
KIN 472	ETHICS IN SPORT	3
MKT 301	PRINCIPLES OF MARKETING	3
Term Semester Hours:		15
Year 4		
Fall		
ECN 406	SPORTS ECONOMICS	3
KIN 384	EVENT MANAGEMENT	3
KIN 470	SPORT MARKETING	3
KIN 471	SPORT FINANCE	3
Elective-approved by advisor		3
Term Semester Hours:		15
Spring		
KIN 463	PSYCHOLOGICAL ASPECTS SPORT	3
KIN 491	SPORT FITNESS MGT INTERNSHIP	6
Elective-approved by advisor		3
Term Semester Hours:		12
Total Semester Hours:		121

College of Engineering

102 Engineering Building
Telephone: 256.824.6474
Email: engineering@uah.edu

Dean: Shankar Mahalingam, PhD

Associate Dean for Undergraduate Education: Jennifer M. English, PhD

Mission & Vision

The *mission* of the College of Engineering is to advance knowledge through research and education in core engineering disciplines. The College promotes ethical, innovative, and multidisciplinary approaches in an environment of collaboration with local and global partners to address society's technological problems.

The *vision* of the College of Engineering is to attain national and international recognition through innovative, multi-disciplinary research and education, while promoting professional integrity, and inspiring students to become leaders in their profession.

Degree Programs

The College of Engineering offers seven undergraduate programs built around a core consisting of courses in mathematics, the physical sciences, liberal arts, and engineering. Students may pursue one of the following engineering degree programs that leads to a Bachelor of Science degree:

- Aerospace Engineering (BSAE) (p. 370)
- Chemical Engineering (BSCHE) (p. 306)
- Civil Engineering (BSCE) (p. 318)
- Computer Engineering (BSCPE) (p. 343)
- Cybersecurity (BSCBS) (<https://catalog.uah.edu/undergrad/colleges-departments/engineering/electrical-computer-engineering/cybersecurity/>)
- Electrical Engineering (BSEE) (p. 350)
- Industrial and Systems Engineering (BSISE) (p. 361)
- Mechanical Engineering (BSME) (p. 373)

History & Objectives

UAH has been an independent and autonomous campus since 1968 with the first engineering degrees awarded in Electrical Engineering. The College of Engineering was established as an independent college in 1981 and is now the largest of the seven academic colleges at UAH. Over 10,000 undergraduate and graduate degrees have been awarded in the College of Engineering's history. Close proximity to the Marshall Space Flight Center, the U.S. Army Research, Development & Engineering Command and Redstone Arsenal, and much of Alabama's fastest growing technological industry gives the College of Engineering a special character that leads to outstanding educational opportunities for its students. This special setting, combined with high quality research-active faculty, affords maximum growth potential for students interested in pursuing a career in engineering.

The goals of the College of Engineering are to:

- Enhance the national and international recognition of the research activities of the College to advance towards the top 50 engineering colleges/schools
- Be recognized nationally for graduating highly sought after professionals with excellent engineering skills, integrity, and a strong work ethic
- Improve the quality, diversity, and number of students at all levels with an emphasis on increasing full time student enrollment
- Create an engaging educational environment fostering a highly diverse group focusing on nurturing innovation and leadership through core engineering and multidisciplinary research and education

Working with students, our faculty conduct both fundamental and applied research in disciplinary and cross disciplinary fields, developing solutions to many grand challenges. The College of Engineering is strongly committed to the advising of both undergraduate and graduate engineering students.

Undergraduate Engineering Advising

The College of Engineering is committed to student success, which starts with effective and supportive academic advising. Engineering students are advised by a team of professional advisors from the Center for Undergraduate Engineering Education (CUE²) which is located in Room 157 of the Engineering Building. The CUE² advisors will work with you throughout your entire undergraduate career to define and implement sound educational plans that are consistent with your personal goals and career plans. Our advisors are also available to answer questions about degree requirements as well as academic policies and procedures. They can also suggest enrichment opportunities or make referrals to academic and other campus support resources. They're here to offer guidance and support.

More information about CUE² advisors as well as a host of advising and curricular information for UAH engineering students may be found on the Undergraduate Engineering website (<http://www.uah.edu/eng/departments/undergraduate-engineering/>). Prospective students may email the CUE² office at engineering@uah.edu.

Admissions

Freshman Students

Each applicant is evaluated based on individual merit and demonstrated success in a rigorous academic environment. High school coursework, grade point average, and ACT/SAT scores are weighed heavily; however, these criteria do not constitute the entire foundation for an admission decision. An

applicant with a grade point average of 2.9 and a composite score of 20 on the ACT or equivalent SAT, for example, is considered a strong candidate for admission.

Transfer Students

Students may transfer to the UAH College of Engineering from another two-year or four-year institution. Students must have a C grade point average (2.0 on a 4.0 scale) for all coursework previously attempted. Students must also provide an official transcript sent directly to the UAH Admissions office.

Transfer credit will be applied as appropriate to the specific engineering program and at the discretion of the College of Engineering. Students must earn a C in any transferred course that serves as a prerequisite to a course required for the engineering degree program.

Students transferring from a two-year, regionally accredited school may, at most, transfer 50% of the total number of hours (maximum of 64 hours) required for an undergraduate engineering degree. UAH follows the Alabama Articulation and General Studies Committee (<http://stars.troy.edu/>) agreement for students transferring credit from a State of Alabama community college. Transfer credit from other two-year institutions will be evaluated by the UAH Registrar's Office and the College of Engineering.

Students transferring from an ABET-accredited four-year institution may transfer no more than 70% of course work towards an engineering degree program. Students must also complete 12 of their last 18 semester hours towards their degree requirements at UAH. More information and requirements may be found at the UAH Admission website (<http://www.uah.edu/admissions/>).

Engineering Common First Year

The Engineering Common First Year is designed to motivate and engage engineering students. All Engineering students will take a common set of courses including FYE 101 for Engineers and ENG 101. The goals of the Common First Year program are to:

- Introduce students to UAH, the College of Engineering, and the fields of engineering
- Give students flexibility to choose a major at the end of the first year
- Keep students in a loosely defined cohort for the first year
- Emphasize the importance of computing for engineers
- Ensure that students have the skills necessary to be successful in second year engineering courses

Laptop Requirements

All engineering undergraduate students are required to have a laptop computer that meets certain requirements depending on their major. For some courses, the students will be required to use the laptop during class time. The requirements may be found here (<https://www.uah.edu/eng/departments/undergraduate-engineering/>).

Engineering Academic Progress Policy

It is important for engineering students to make good academic progress. Repeating courses increases the time and cost to earn a degree and can negatively impact a student's grade point average. The College of Engineering defines good academic progress as completing 66% or more of the courses for which a student is registered. Completion is defined as earning the minimum grade necessary to have the course satisfy a degree requirement. Withdrawing from course and receiving a W on the transcript is not considered completion.

Engineering students will be limited to three attempts of any math, science or engineering course that is required for the degree. If a student is not successful at completing a course on the third attempt (including Ws), the student will not be able to continue in any engineering degree program for which that course is required. Exceptions to this policy will be considered for unusual or emergency situations.

Chemical and Materials Engineering

117 Engineering Building

Telephone: 256.824.6810

Email: anu.subramanian@uah.edu

<http://www.uah.edu/eng/departments/cme/> (<http://www.uah.edu/eng/departments/cme/>)

Department Chair: Anu Subramanian

Chemical Engineering Program

Chemical engineering deals with any situation in which changes in the chemical composition or the physical state of matter (or both) are involved and, hence, finds unusually wide application. Heat and mass transfer, fluid mechanics, thermodynamics, chemical reaction kinetics, and process control constitute the heart of chemical engineering. Chemical engineers work in many diverse fields ranging from production of many basic chemical products required by today's industrial society to research on major technical and social problems, including energy resources development, space applications, pollution control, and biotechnology.

Students pursuing a UAH Chemical Engineering bachelor's degree may choose one of two concentrations:

1. Materials (p. 314)
2. Biotechnology (p. 310)

Program Educational Objectives

The program educational objectives (PEOS) are designed to prepare graduates to be successful in their professional careers and for them to have the skills needed to contribute to the economic advancement of their firms, their local region, the state and the nation. The PEOS are:

- Graduates have gained a core competency and are expected to advance professionally in positions of increasing technical and/or managerial responsibilities within their chosen field.
- Graduates are expected to engage in educational, business, or technical activities with an understanding of global and economic impacts, civic responsibility, and environmental and human safety.
- Graduates are expected to pursue life-long learning for continuous improvement which is a requisite for a successful engineer to become a leader in the work force or graduate education.

Majors in Chemical Engineering

- Chemical Engineering, BSChE - Biotechnology Concentration (p. 310)
- Chemical Engineering, BSChE - Materials Concentration (p. 314)

CHE 201 - INTRO CHEMICAL ENGR PROCESS

Semester Hours: 2

Introduction to industrial processes used in the production of commodity chemicals important to chemical engineers. Computer programming, spreadsheets, symbolic math, and drawing packages to model fundamental stages of these processes will be presented. Prerequisites with concurrency: ENG 101 and CH 123.

CHE 244 - INTRO TO CHEM ENGRG SYSTEMS

Semester Hours: 3

Introduction to basic analysis of chemical engineering systems, emphasizing material balances on physical and chemical process systems. Analysis includes single-component and multi-component systems, single-phase and multi-phase systems, single unit operations and complete flow sheet systems. Prerequisites: PH 111, CH 123, MA 201 and CHE 201.

CHE 294 - NATURE & PROPERTIES OF MATLS

Semester Hours: 3

Introduction to the fundamental nature and properties of materials including bonding, composition, and phase diagrams. Composite materials and aspects of materials processing, including diffusion, nucleation, and transformation diagrams, will be presented. Prerequisites: CH 121 and PH 111.

CHE 295 - NATURE & PROPERTIES MATLS LAB

Semester Hour: 1

Experiments include characterizing material structures, testing mechanical properties and mapping phase diagram boundaries. Emphasis on numerical and statistical analysis of the data. Written reports are required, and elements of materials design are presented.

CHE 299 - CHE MENTORING I

Semester Hours: 0

Yearly mentoring and advising from engineering faculty and staff. Prerequisite with concurrency: CHE 201.

CHE 342 - TRANSPORT PHENOMENA

Semester Hours: 3

Fundamental aspects of heat and mass transfer and the use of these basic principles in solving problems in transport operations. Heat transfer with phase change. Diffusive and convective mass transfer with applications. Prerequisites: CH 341 and CHE 244 and MAE 310 w/concurrency.

CHE 344 - CHEM ENGR THERMODYNAMICS

Semester Hours: 3

Thermodynamics of phase equilibria, chemical reactions and thermodynamic analysis of chemical processes, with emphasis on topics of special interest to chemical engineers. Prerequisites: CHE 244 and CH 341.

CHE 347 - QUANTITATIVE MODELING FOR CHE

Semester Hours: 3

Modeling and analysis of physical phenomena that arise in chemical engineering and an introduction to computer-aided design. Prerequisites: CHE 244, and MA 238.

CHE 359 - INDEPENDENT STUDIES IN CHE

Semester Hours: 1-3

Independent studies or research on a topic that requires the application of basic principles in chemical engineering. A written report, analytical or experimental analysis, and oral presentation will be required. Prerequisites: CHE 244 and CHE 294.

CHE 399 - CHE MENTORING II

Semester Hours: 0

Yearly mentoring and advising from engineering faculty and staff. Prerequisites: CHE 299 and CHE 244.

CHE 439 - UNIT OPERATIONS I

Semester Hours: 2

Experimental studies cover fluid mechanics and heat transfer in unit operations. Theoretical classes provide an introduction to engineering economy as well as standard laboratory practice, probability and statistical data analysis. Emphasis placed on written and oral laboratory report presentation techniques. Prerequisites: CHE 295, w/concurrency CHE 441.

CHE 440 - UNIT OPERATIONS II

Semester Hours: 2

Experimental studies covering reaction kinetics, mass separation, biotechnology, and special material properties. Applications of laboratory practices, probability and statistical data analysis, and ethics in professional practice. Emphasis placed on technical communications. Prerequisites: CHE 439, CHE 441, and w/concurrency CHE 443.

CHE 441 - CHEM KINETICS & REACTOR DESIGN

Semester Hours: 3

Fundamental principles of chemical kinetics and chemical reactor engineering along with the design of both thermal and catalytic reactors. (Same as CHE 541) Prerequisites: CHE 344 and CHE 347.

CHE 442L - LABORATORY

Semester Hours: 0

CHE 443 - MASS TRANSFER OPERATIONS

Semester Hours: 3

Theory of mass transfer phenomena, with applications to both stage-wise and diffusion controlled distillation, gas absorption/desorption, humidification, and extraction processes. Prerequisites: CHE 342, CHE 344, and MAE 310.

CHE 445 - CHEMICAL PROCESS CONTROL

Semester Hours: 3

Fundamental principles of chemical process control; control system design for chemical processes. Prerequisite: CHE 441 and CHE 446.

CHE 446 - ANAL & DESIGN TRANSPORT EQUIP

Semester Hours: 3

Theory of transport phenomena from a unified approach to momentum, heat and mass transfer. Application of theory to the design of various transport equipment. Prerequisites: CHE 342 and CHE 443.

CHE 448 - CHEMICAL ENGINEERING DESIGN

Semester Hours: 3

Capstone design course. Design of chemical engineering components, concluding with an overall team design effort using modern CAD techniques includes preliminary design, simulation, and economic evaluation of a chemical production flow sheet, and a study of ethical issues. Prerequisites: CHE 441, CHE 443, CHE 445, CHE 446 and CHE 399.

CHE 459 - ADVD INDEPENDENT STUD CHE

Semester Hours: 1-3

Independent studies or research on a topic that requires a solid background in the foundations of chemical engineering. A written report, analytical or experimental analysis, and oral presentation will be required. Prerequisites: CHE 347 and either CH 363 or CH 440.

CHE 460 - INTRO TO BIOPROCESS ENGRG

Semester Hours: 3

Application of engineering principles to analysis of and development and design of processes using biological catalysts including enzymes, plant and animal cells, and genetically engineered cells. Other topics include fermentation and biological mass transport processes. (Same as CHE 560). Prerequisite: CH 361.

CHE 461 - BIOSEPARATIONS

Semester Hours: 3

Characteristics of separation processes used in biotechnology industries including removal of insolubles, isolation and purification of thermally sensitive products, and preparation for customer use. Applications for biological separations, recombinant DNA techniques, and protein engineering. (Same as CHE 561). Prerequisite: CHE 460.

CHE 485 - PROCESS SAFETY & TOXICOLOGY

Semester Hours: 3

Fundamentals of process safety and aspects of toxicology. Requires the application of chemical engineering concepts to review and analyze case studies to learn from industrial accidents. Introduces regulatory and design concepts. Prerequisite: CHE 448.

CHE 494 - APPLIED MATERIALS ENGINEERING

Semester Hours: 3

Synthesis and processing methods of materials. Selection and use of materials performance factors for design of structural and functional components. Use of computational methods in solving open-ended design problems using nature and properties of materials will be emphasized. (Same as CHE 594) Prerequisites: CHE 294 and CHE 344.

CHE 495 - POLYMER ENGINEERING

Semester Hours: 3

Engineering principles of polymers and their role in manufacturing processes. Aspects of polymer phenomena and their relationship to processing of structural and functional components. (Same as CHE 595) Prerequisites: CH 341 and CH 440.

Chemical Engineering, BSChE

To obtain a Bachelor of Science degree in Chemical Engineering, students are required to complete the general education requirements for engineering majors and the following courses:

Code	Title	Semester Hours
Charger Foundations		
College General Education Requirements		36
Additional Basic Sciences Semester Hours		
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	4
CH 331 & CH 335	ORGANIC CHEMISTRY I and ORGANIC CHEMISTRY LAB I	4
CH 332	ORGANIC CHEMISTRY II	3
CH 341	PHYSICAL CHEMISTRY I	3
BYS 311	INTRO MOLECULAR UNDST BIO SYST	3
Engineering Core for Chemical Engineering		
CHE 244	INTRO TO CHEM ENGRG SYSTEMS	3
CHE 294	NATURE & PROPERTIES OF MATLS	3
EE 213	ELECTRICAL CIRCUIT ANALYSIS I	3
MAE 271	STATICS	3
Chemical Engineering Option		
CHE 201	INTRO CHEMICAL ENGR PROCESS	2
CHE 295	NATURE & PROPERTIES MATLS LAB	1
CHE 342	TRANSPORT PHENOMENA	3
CHE 344	CHEM ENGR THERMODYNAMICS	3
MAE 310	FLUID MECHANICS I	3
CHE 347	QUANTITATIVE MODELING FOR CHE	3

CHE 439	UNIT OPERATIONS I	2
CHE 440	UNIT OPERATIONS II	2
CHE 441	CHEM KINETICS & REACTOR DESIGN	3
CHE 443	MASS TRANSFER OPERATIONS	3
CHE 445	CHEMICAL PROCESS CONTROL	3
CHE 446	ANAL & DESIGN TRANSPORT EQUIP	3
CHE 448	CHEMICAL ENGINEERING DESIGN	3
CHE 485	PROCESS SAFETY & TOXICOLOGY	3
Total Semester Hours		102

Suggested Schedule for Full-Time Students

Year 1

Fall		Semester Hours
MA 171	CALCULUS A	4
CH 121	GENERAL CHEMISTRY I	3
CH 125	GENERAL CHEMISTRY LAB I	1
FYE 101	CHARGER SUCCESS	1
EH 101	COLLEGE WRITING I	3
CHE 201	INTRO CHEMICAL ENGR PROCESS	2
HSBS/HFA		3
Term Semester Hours:		17

Spring

MA 172	CALCULUS B	4
PH 111	GEN PHYSICS W/CALCULUS I	3
PH 114	GENERAL PHYSICS LAB I	1
EH 102	COLLEGE WRITING II	3
CH 123	GENERAL CHEMISTRY II	3
CH 126	GENERAL CHEMISTRY LAB II	1
Term Semester Hours:		15

Year 2

Fall		
MA 201	CALCULUS C	4
PH 112	GEN PHYSICS W/CALC II	3-4
PH 115	GENERAL PHYSICS LAB II	1
CH 331	ORGANIC CHEMISTRY I	3
CH 335	ORGANIC CHEMISTRY LAB I	1
HSBS/HFA		3
Term Semester Hours:		15-16

Spring

MA 238	APPL DIFFERENTIAL EQUATIONS	3
CH 332	ORGANIC CHEMISTRY II	3
MAE 271	STATICS	3
BYS 311	INTRO MOLECULAR UNDSST BIO SYST	3
CHE 244	INTRO TO CHEM ENGRG SYSTEMS	3
HSBS/HFA		3
Term Semester Hours:		18

Year 3

Fall		
MAE 310	FLUID MECHANICS I	3
CHE 347	QUANTITATIVE MODELING FOR CHE	3
CH 341	PHYSICAL CHEMISTRY I	3
CHE 294	NATURE PROPERTIES OF MATLS	3

CHE 295	NATURE PROPERTIES MATLS LAB	1
CHE Con Class 1		3
Term Semester Hours:		16
Spring		
EE 213	ELECTRICAL CIRCUIT ANALYSIS I	3
CHE 342	TRANSPORT PHENOMENA	3
CHE 344	CHEM ENGR THERMODYNAMICS	3
HSBS/HFA		3
Term Semester Hours:		12
Year 4		
Fall		
CHE 443	MASS TRANSFER OPERATIONS	3
CHE 446	ANAL DESIGN TRANSPORT EQUIP	3
CHE 441	CHEM KINETICS REACTOR DESIGN	3
CHE 439	UNIT OPERATIONS I	2
CHE Con Class 2		3
Term Semester Hours:		14
Spring		
CHE 443	MASS TRANSFER OPERATIONS	3
CHE 448	CHEMICAL ENGINEERING DESIGN	3
CHE 445	CHEMICAL PROCESS CONTROL	3
CHE 440	UNIT OPERATIONS II	2
CHE Con Class 3		3
Technical Elective		3
Term Semester Hours:		17
Total Semester Hours:		124-125

Chemical Engineering, BSChE - Biotechnology Concentration

To obtain a Bachelor of Science degree in Chemical Engineering (biotechnology option), students are required to complete the following courses:

Code	Title	Semester Hours
Freshman Composition		3-6
EH 101	COLLEGE WRITING I	
EH 102	COLLEGE WRITING II	
Humanities and Fine Arts		9
Fine Art: Choose one		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
MU 100	INTRO TO MUSIC LITERATURE	
Literature: Choose one or two ¹		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 242	MYTHOLOGY	
Humanities: Choose one		3
PHL 101	INTRODUCTION TO PHILOSOPHY	
PHL 102	INTRO TO ETHICS	
PHL 103	INTRODUCTION TO LOGIC	
PHL 150	TECH, SCIENCE & HUMAN VALUES	

Any 100 or 200 level Foreign Language ³

WGS 200	INTRO WOMEN'S & GENDER STUDIES	
Mathematics and Natural Sciences		12
Mathematics		4
MA 171	CALCULUS A ²	
Natural Sciences		8
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
History and Social and Behavioral Sciences		9
History: Choose one or two ¹		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Science: Choose one or two		3-6
PY 101	GENERAL PSYCHOLOGY I	
SOC 100	INTRO TO SOCIOLOGY	
SOC 102	ANALYSIS OF SOCIAL PROBLEMS	
SOC 105	INTRO CULTURAL ANTHROPOLOGY	
SOC 206	MARRIAGE AND FAMILY	
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
ESS 105	WORLD REGIONAL GEOGRAPHY	
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	

Code	Title	Semester Hours
Additional Basic Mathematics and Sciences Semester Hours		
MA 172	CALCULUS B	4
MA 201	CALCULUS C	4
MA 238	APPL DIFFERENTIAL EQUATIONS	3
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	4
PH 112	GEN PHYSICS W/CALC II	3
PH 115	GENERAL PHYSICS LAB II	1
CH 331 & CH 335	ORGANIC CHEMISTRY I and ORGANIC CHEMISTRY LAB I	4
CH 332	ORGANIC CHEMISTRY II	3
Engineering		
FYE 101	CHARGER SUCCESS	1
ENG 101	INTRO COMPUTING ENGINEERS	3
CHE 299	CHE MENTORING I	0
CHE 399	CHE MENTORING II	0
Chemical Engineering		
CHE 201	INTRO CHEMICAL ENGR PROCESS	2
CHE 244	INTRO TO CHEM ENGRG SYSTEMS	3
MAE 271	STATICS	3
CHE 294	NATURE & PROPERTIES OF MATLS	3

CHE 295	NATURE & PROPERTIES MATLS LAB	1
BYS 311	INTRO MOLECULAR UNDS BIO SYST	3
CH 351	PHYS CHEM IN PRACTICE	3
CHE 342	TRANSPORT PHENOMENA	3
CHE 344	CHEM ENGR THERMODYNAMICS	3
MAE 310	FLUID MECHANICS I	3
CHE 347	QUANTITATIVE MODELING FOR CHE	3
CHE 439	UNIT OPERATIONS I	2
CHE 440	UNIT OPERATIONS II	2
CHE 441	CHEM KINETICS & REACTOR DESIGN	3
CHE 443	MASS TRANSFER OPERATIONS	3
CHE 445	CHEMICAL PROCESS CONTROL	3
CHE 446	ANAL & DESIGN TRANSPORT EQUIP	3
CHE 448	CHEMICAL ENGINEERING DESIGN	3
CHE 485	PROCESS SAFETY & TOXICOLOGY	3

Biotechnology Concentration

CH 361	GENERAL BIOCHEMISTRY	3
CHE 460	INTRO TO BIOPROCESS ENGRG	3
CHE 461	BIOSEPARATIONS	3

Technical Elective

Select one course: EE 213, ISE 390, CE 449 or course approved by CHE Department	3
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Total Semester Hours	130
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- ¹ Students must take one literature and one history course. Students must also take either a second literature or history course to complete a sequence. (EH 207 + EH 208, EH 209 + EH 210, HY 103 + HY 104, or HY 221 + HY 222)
- ² Based on Math placement (<http://www.uah.edu/science/departments/math/undergraduate-students/placement/>), prerequisite (MA 112 and/or MA 113) Mathematics courses may be required.
- ³ For choices see the World Languages and Culture (p. 205) department.

Suggested Schedule for Full-Time Students**Year 1****Fall** **Semester Hours**

MA 171	CALCULUS A	4
CH 121	GENERAL CHEMISTRY I	3
CH 125	GENERAL CHEMISTRY LAB I	1
EH 101	COLLEGE WRITING I	3
ENG 101	INTRO COMPUTING ENGINEERS	3
Fine Arts/Humanities/Social Behavioral Science		3

For course list see Requirements tab

Term Semester Hours: 17

Spring

FYE 101	CHARGER SUCCESS	1
MA 172	CALCULUS B	4
CH 123	GENERAL CHEMISTRY II	3
CH 126	GENERAL CHEMISTRY LAB II	1
PH 111	GEN PHYSICS W/CALCULUS I	3
PH 114	GENERAL PHYSICS LAB I	1
EH 102	COLLEGE WRITING II	3

Term Semester Hours: 16

Year 2**Fall**

MA 201	CALCULUS C	4
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CHE 201	INTRO CHEMICAL ENGR PROCESS	2
PH 112	GEN PHYSICS W/CALC II	3
PH 115	GENERAL PHYSICS LAB II	1
CH 331	ORGANIC CHEMISTRY I	3
CH 335	ORGANIC CHEMISTRY LAB I	1
CHE 299	CHE MENTORING I	0
Fine Arts/Humanities/Social Behavioral Science		3
For course list see Requirements tab		
Term Semester Hours:		17
Spring		
MA 238	APPL DIFFERENTIAL EQUATIONS	3
CHE 244	INTRO TO CHEM ENGRG SYSTEMS	3
CH 332	ORGANIC CHEMISTRY II	3
BYS 311	INTRO MOLECULAR UNDS BIO SYST	3
CH 351	PHYS CHEM IN PRACTICE	3
Term Semester Hours:		15
Year 3		
Fall		
MAE 271	STATICS	3
CHE 294	NATURE PROPERTIES OF MATLS	3
CHE 295	NATURE PROPERTIES MATLS LAB	1
CHE 344	CHEM ENGR THERMODYNAMICS	3
CHE 347	QUANTITATIVE MODELING FOR CHE	3
CH 361	GENERAL BIOCHEMISTRY	3
CHE 399	CHE MENTORING II	0
Term Semester Hours:		16
Spring		
MAE 310	FLUID MECHANICS I	3
CHE 342	TRANSPORT PHENOMENA	3
CHE 439	UNIT OPERATIONS I	2
CHE 441	CHEM KINETICS REACTOR DESIGN	3
Technical Elective (see approved list)		3
Fine Arts/Humanities/Social Behavioral Science		3
For course list see Requirements tab		
Term Semester Hours:		17
Year 4		
Fall		
CHE 440	UNIT OPERATIONS II	2
CHE 443	MASS TRANSFER OPERATIONS	3
CHE 446	ANAL DESIGN TRANSPORT EQUIP	3
CHE 460	INTRO TO BIOPROCESS ENGRG	3
Fine Arts/Humanities/Social Behavioral Science		6
For course list see Requirements tab		
Term Semester Hours:		17
Spring		

CHE 445	CHEMICAL PROCESS CONTROL	3
CHE 448	CHEMICAL ENGINEERING DESIGN	3
CHE 461	BIOSEPARATIONS	3
CHE 485	PROCESS SAFETY TOXICOLOGY	3
Fine Arts/Humanities/Social Behavioral Science		3

For course list see Requirements tab

Term Semester Hours:	15
Total Semester Hours:	130

Chemical Engineering, BSChE - Materials Concentration

To obtain a Bachelor of Science degree in Chemical Engineering (materials concentration), students are required to complete the following courses:

Code	Title	Semester Hours
Freshman Composition		3-6
EH 101	COLLEGE WRITING I	
EH 102	COLLEGE WRITING II	
Humanities and Fine Arts		9
Fine Art: Choose one		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
MU 100	INTRO TO MUSIC LITERATURE	
Literature: Choose one or two ¹		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 242	MYTHOLOGY	
Humanities: Choose one		3
PHL 101	INTRODUCTION TO PHILOSOPHY	
PHL 102	INTRO TO ETHICS	
PHL 103	INTRODUCTION TO LOGIC	
PHL 150	TECH, SCIENCE & HUMAN VALUES	
Any 100 or 200 level Foreign Language ³		
WGS 200	INTRO WOMEN'S & GENDER STUDIES	
Mathematics and Natural Sciences		12
Mathematics		4
MA 171	CALCULUS A ²	
Natural Sciences		8
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
History and Social and Behavioral Sciences		9
History: Choose one or two ¹		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Science: Choose one or two		3-6

PY 101	GENERAL PSYCHOLOGY I
SOC 100	INTRO TO SOCIOLOGY
SOC 102	ANALYSIS OF SOCIAL PROBLEMS
SOC 105	INTRO CULTURAL ANTHROPOLOGY
SOC 206	MARRIAGE AND FAMILY
PSC 101	INTRO TO AMERICAN GOVERNMENT
PSC 102	INTRO TO COMPARATIVE POLITICS
ESS 105	WORLD REGIONAL GEOGRAPHY
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY
ECN 142	PRINC OF MACROECONOMICS
ECN 143	PRINC OF MICROECONOMICS
GS 200	GLOBAL SYSTEMS AND CULTURES

Code	Title	Semester Hours
Additional Basic Sciences Semester Hours		
MA 172	CALCULUS B	4
MA 201	CALCULUS C	4
MA 238	APPL DIFFERENTIAL EQUATIONS	3
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	4
CH 331 & CH 335	ORGANIC CHEMISTRY I and ORGANIC CHEMISTRY LAB I	4
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	4
CH 332	ORGANIC CHEMISTRY II	3
Engineering		
FYE 101	CHARGER SUCCESS	1
ENG 101	INTRO COMPUTING ENGINEERS	3
CHE 299	CHE MENTORING I	0
CHE 399	CHE MENTORING II	0
Chemical Engineering		
CHE 201	INTRO CHEMICAL ENGR PROCESS	2
CHE 244	INTRO TO CHEM ENGRG SYSTEMS	3
MAE 271	STATICS	3
CHE 294	NATURE & PROPERTIES OF MATLS	3
CHE 295	NATURE & PROPERTIES MATLS LAB	1
BYS 311	INTRO MOLECULAR UNDS BIO SYST	3
CHE 342	TRANSPORT PHENOMENA	3
CH 351	PHYS CHEM IN PRACTICE	3
CHE 344	CHEM ENGR THERMODYNAMICS	3
MAE 310	FLUID MECHANICS I	3
CHE 347	QUANTITATIVE MODELING FOR CHE	3
CHE 439	UNIT OPERATIONS I	2
CHE 440	UNIT OPERATIONS II	2
CHE 441	CHEM KINETICS & REACTOR DESIGN	3
CHE 443	MASS TRANSFER OPERATIONS	3
CHE 445	CHEMICAL PROCESS CONTROL	3
CHE 446	ANAL & DESIGN TRANSPORT EQUIP	3
CHE 448	CHEMICAL ENGINEERING DESIGN	3
CHE 485	PROCESS SAFETY & TOXICOLOGY	3
Materials Concentration		
CH 440	POLYMER SYNTHESIS & CHARACTERI	3

CHE 494	APPLIED MATERIALS ENGINEERING	3
CHE 495	POLYMER ENGINEERING	3
Total Semester Hours		130

Technical Elective

Select one course: EE 213, ISE 390, CE 449 or course approved by CHE Department	3
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- 1 Students must take one literature and one history course. Students must also take either a second literature or history course to complete a sequence. (EH 207 + EH 208, EH 209 + EH 210, HY 103 + HY 104, or HY 221 + HY 222)
- 2 Based on Math placement (<http://www.uah.edu/science/departments/math/undergraduate-students/placement/>), prerequisite (MA 112 and/or MA 113) Mathematics courses may be required.
- 3 For choices see the World Languages and Culture (p. 205) department.

Suggested Schedule for Full-Time Students**Year 1**

Fall		Semester Hours
MA 171	CALCULUS A	4
CH 121	GENERAL CHEMISTRY I	3
CH 125	GENERAL CHEMISTRY LAB I	1
ENG 101	INTRO COMPUTING ENGINEERS	3
EH 101	COLLEGE WRITING I	3
Fine Arts/Humanities/Social Behavioral Science		3
Term Semester Hours:		17

Spring

FYE 101	CHARGER SUCCESS	1
MA 172	CALCULUS B	4
CH 123	GENERAL CHEMISTRY II	3
CH 126	GENERAL CHEMISTRY LAB II	1
PH 111	GEN PHYSICS W/CALCULUS I	3
PH 114	GENERAL PHYSICS LAB I	1
EH 102	COLLEGE WRITING II	3
Term Semester Hours:		16

Year 2

Fall		
MA 201	CALCULUS C	4
PH 112	GEN PHYSICS W/CALC II	3
PH 115	GENERAL PHYSICS LAB II	1
CHE 201	INTRO CHEMICAL ENGR PROCESS	2
CH 331	ORGANIC CHEMISTRY I	3
CH 335	ORGANIC CHEMISTRY LAB I	1
CHE 299	CHE MENTORING I	0
Fine Arts/Humanities/Social Behavioral Science		3
Term Semester Hours:		17

Spring

MA 238	APPL DIFFERENTIAL EQUATIONS	3
CHE 244	INTRO TO CHEM ENGRG SYSTEMS	3
CH 332	ORGANIC CHEMISTRY II	3
CH 351	PHYS CHEM IN PRACTICE	3
BYS 311	INTRO MOLECULAR UNDSST BIO SYST	3
Term Semester Hours:		15

Year 3**Fall**

MAE 271	STATICS	3
CHE 294	NATURE PROPERTIES OF MATLS	3
CHE 295	NATURE PROPERTIES MATLS LAB	1
CHE 344	CHEM ENGR THERMODYNAMICS	3
CHE 347	QUANTITATIVE MODELING FOR CHE	3
CH 440	POLYMER SYNTHESIS CHARACTERI	3
CHE 399	CHE MENTORING II	0
Term Semester Hours:		16
Spring		
MAE 310	FLUID MECHANICS I	3
CHE 342	TRANSPORT PHENOMENA	3
CHE 439	UNIT OPERATIONS I	2
CHE 441	CHEM KINETICS REACTOR DESIGN	3
Technical Elective (EE 213, ISE 390, CE 449 or course approved by CHE Dept)		3
Fine Arts/Humanities/Social Behavioral Science		3
Term Semester Hours:		17
Year 4		
Fall		
CHE 440	UNIT OPERATIONS II	2
CHE 443	MASS TRANSFER OPERATIONS	3
CHE 446	ANAL DESIGN TRANSPORT EQUIP	3
CHE 495	POLYMER ENGINEERING	3
Fine Arts/Humanities/Social Behavioral Science		6
Term Semester Hours:		17
Spring		
CHE 445	CHEMICAL PROCESS CONTROL	3
CHE 448	CHEMICAL ENGINEERING DESIGN	3
CHE 485	PROCESS SAFETY TOXICOLOGY	3
CHE 494	APPLIED MATERIALS ENGINEERING	3
Fine Arts/Humanities/Social Behavioral Science		3
Term Semester Hours:		15
Total Semester Hours:		130

Civil and Environmental Engineering

S201 Technology Hall

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URL: <http://www.uah.edu/eng/departments/cee> (<http://www.uah.edu/eng/departments/cee/>)

Chair: Michael Anderson, PhD

Civil Engineering Program

Civil engineers are involved in many fields including structural engineering, transportation, environmental systems, and geotechnical analysis. The modern civil engineer uses traditional design and analysis methods as well as advanced experimental and computational techniques. At UAH, students are exposed to all of these areas of civil engineering and introduced to techniques that will make them competent practicing professional engineers. The civil engineering curriculum consists of general engineering classes (required of all engineering students), the civil engineering core classes, and the civil engineering concentration selected. The concentration requirements may be met by completing either a broad civil engineering curriculum or by specializing in structural, transportation, or environmental engineering.

The department of Civil Engineering offers the Bachelor of Science in Civil Engineering with four possible concentrations: Structural, Environmental, Transportation, and General.

The structural engineering concentration provides students with a strong background in many aspects of structural analysis, foundations, reinforced concrete, steel design, bridge design, and advanced structural design. Students may take additional courses in such areas as advanced concrete design, design of wood structures, wind and seismic loads, advanced cementitious and composite materials, experimental mechanics, and finite element methods.

The environmental engineering concentration provides students with a strong foundation in environmental management and remediation. Within the framework of the program, students are introduced to environmental engineering aspects such as water quality, atmospheric pollution, hydrology, environmental systems, and environmental sampling.

The transportation engineering concentration provides students with the skills necessary to tackle tomorrow's data management and transportation issues. Students are introduced to various topics, including transportation modeling and simulation, application of GIS to transportation issues, use of traffic crash data, and urban transportation planning.

Mission

The mission of the Civil Engineering Program is to educate students with the fundamental knowledge and analytical skills necessary for successful careers in civil and environmental engineering. Through rigorous scholarship, innovative instruction and service, we advance knowledge to improve our global community.

Program Educational Objectives

Within a few years of graduation, Civil Engineering graduates will have:

- Developed creative solutions in their profession through application of civil engineering knowledge and skills,
- Attained successful careers and recognition as emerging leaders in industry and in the civil engineering community, and
- Impacted the global community by addressing societal needs through a combination of professional practice, research, and/or service.

Undergraduate Major in Civil Engineering

- Civil Engineering, BSCE (p. 321)
- Civil Engineering, BSCE - Environmental Concentration (p. 325)
- Civil Engineering, BSCE - Structural Concentration (p. 329)
- Civil Engineering, BSCE - Transportation Concentration (p. 332)

CE 211 - CIVIL ENGINEERING GRAPHICS

Semester Hours: 2

Fundamental concepts in computer-aided graphics as they apply to civil engineering. Topics include lettering, sketching, manipulation of elements, rotation of views and input of data. Students will gain engineering practice through AutoCad laboratory exercises. Prerequisite: ENG 101 with minimum grade of C-.

CE 271 - STATICS

Semester Hours: 3

Topics include: forces, resultant forces, moments, couples, equivalent forces systems, equilibrium, distributed loads, two force members, trusses, centroids, moments of inertia, shear and bending moment diagrams, static and kinematic friction. (Same as MAE 271). Prerequisite: ENG 101, PH 111 and MA 201 w/concurrency.

CE 272 - DYNAMICS

Semester Hours: 3

Kinematics and kinetics of a particle and systems of particles with applications to central force motion, impact, relative motion, vibrations, and variable mass systems. Dynamics of rigid body in plane motion, relative motion in rotating coordinates, and gyroscopic motion. (Same as MAE 272). Prerequisites: MA 201 and (CE 271 or MAE 271).

CE 284 - SURVEYING

Semester Hours: 2

Basic theory and practical field methods for engineering applications. Measurements and errors in surveying. Leveling, traversing, stadia, topographic surveys, mapping, and circular curves. 1.5 hour lecture and 2 hour lab. Consent of instructor/advisor. Prerequisite: CE 211.

CE 284L - SURVEYING LAB

Semester Hours: 0

CE 299 - CE MENTORING I

Semester Hours: 0

Yearly mentoring and advising from engineering faculty and staff. Prerequisite with concurrency: CE 271.

CE 307 - SYSTOLIC ARRAY PROCESSING

Semester Hours: 3

CE 321 - INTRO TO TRANSPORTATION ENG

Semester Hours: 3

Theory, design, and operation of various modes of transportation with emphasis on traffic flow. Prerequisites: CE 284 and MA 171.

CE 370 - MECHANICS OF MATERIALS

Semester Hours: 3

Design and analysis of simple structures for predetermined strength and deformation requirements. Topics include: theory of stress-strain, Hooke's Law, analysis of stresses and deformations in bodies loaded by axial, torsional, bending, and combined loads, and analysis of statically indeterminate systems. Same as MAE 370. Prerequisites: (CPE 211 or MAE 211) and (MAE 271 or CE 271) and MA 244, corequisite CE 375.

CE 370L - LABORATORY

Semester Hours: 0

CE 372 - SOIL MECHANICS & FOUNDATION

Semester Hours: 3

Index properties and characteristics of soils. Compaction shear, compressibility and permeability. Application to analysis and design of foundation elements. Laboratory included. Prerequisites: (CE 370 or MAE 370) and MAE 310.

CE 373 - SOIL MECHANICS LAB

Semester Hour: 1

Laboratory classification of soils. Determinations of soil properties.

CE 375 - MECHANICS OF MATERIALS LAB

Semester Hour: 1

Experimental verification of material properties and structural deformation under axial, torsional, and bending loads. Test procedures, use of instrumentation, interpretation of experimental results and comparison to theory. (Same as MAE 375). Corequisites: CE 370.

CE 380 - CIVIL ENGINEERING MATERIALS

Semester Hours: 3

Performance properties and selection criteria of various materials used in the practice of civil engineering including aggregates, Portland cement, concrete, bituminous materials, and timber. Emphasis will be placed on standard methods of testing and characterization. Includes a weekly lab. Prerequisites: CE 370 or MAE 370.

CE 380L - CE MATERIALS LAB

Semester Hours: 0

Standard methods of testing and characterization of various materials used in the practice of civil engineering. Determination of civil engineering materials properties.

CE 381 - STRUCTURAL ANALYSIS I

Semester Hours: 3

Reactions, shears, moments in determinate structures. Influence lines, energy methods in computing deformations. Introduction to indeterminate structures. Prerequisites: (CE 272 or MAE 272) and (CE 370 or MAE 370).

CE 399 - CE MENTORING II

Semester Hours: 0

Yearly mentoring and advising from engineering faculty and staff. Prerequisites: CE 299 and CE 272.

CE 411 - INTRO GEOGRAPHICAL INFO SYS

Semester Hours: 3

Introduces vector, raster, and tabular concepts. Topics include spatial relationships, map features, attributes, relational database, layers of data, data ingesting, digitizing from maps, projections, output, and availability of public data sets. Same as CE 511.

CE 412 - ADVANCED CE GRAPHICS

Semester Hours: 3

Trending geospatial and graphics technologies including 3-D land development workflows, GPS data acquisition and processing of aerial, lidar, and topographical surveys, terrain modeling, earthwork, sanitary, drainage, and transportation design methodologies within the graphical CAD environment. Prerequisite: CE 211.

CE 420 - URBAN TRANSPORTATION PLANNING

Semester Hours: 3

Planning of highways systems and terminals as part of a complete planning approach; public transportation system planning; transportation planning studies, projection analysis, plan formulation, and programming. Same as CE 520. Prerequisite: CE 321.

CE 422 - TRAFFIC ENGINEERING DESIGN

Semester Hours: 3

Driver, pedestrian and vehicle characteristics. Principles of traffic flow for improved highway traffic service and safety. Design freeways, rural roads, urban streets, traffic signals, signs, channelization, and other traffic control measures. Prerequisite: CE 321.

CE 441 - HYDRAULIC ENGINEERING DESIGN

Semester Hours: 3

Water-hammer analysis, open channel flow, hydraulic structures such as dams, spillways, stilling basins, flood control devices, locks, pipe-flow systems and water-supply facilities, computational methods. Prerequisite: MAE 310.

CE 449 - INTRO ENVIRONMENTAL ENGR

Semester Hours: 3

Engineering aspects of air, water, and thermal pollution. Hydrologic cycle, water sources and uses; industrial and other sources of primary and secondary pollutants. Transport process in environmental problems and their control. (Same as CE 549 and CHE 549) Prerequisites: MAE 310 and MAE 341.

CE 452 - CREDIT EXPERIENTIAL LEARNING

Semester Hours: 1-3

Students are engaged in research and creative projects as meaningful experiential learning opportunities. The course fosters cooperation between students and faculty in a research or creative endeavor, and enhances the students' education via active participation in a research, creative or scholarly project.

CE 456 - WATER QUALITY CONTROL PROC

Semester Hours: 3

Principles of public water-supply design. Source selection, collection, purification, and distribution for municipal use. Collection of waste waters, their treatment and disposal. (Same as CE 556). Prerequisite: CE 449.

CE 457 - HYDROLOGY

Semester Hours: 3

Occurrence and movements of water over the earth's surface for engineering planning and design. Relationship of precipitation to stream-flow with frequency analysis, flood routing, and unit hydrograph theory. (Same as CE 557) Prerequisite: MAE 310.

CE 458 - ENVIRONMENTAL ENGR DESIGN

Semester Hours: 3

Engineering design and project management of environmental quality/restoration systems. Design project focusing on: sanitary landfill, municipal incinerator, or groundwater/site remediation. Develops skills for technical communications, process design and decision making. (Same as CE 558) Prerequisite: CE 449.

CE 459 - SEL TOP IN CIVIL ENGR

Semester Hours: 1-6

Special topics in Civil Engineering.

CE 471 - ADVANCED SOIL MECHANICS

Semester Hours: 3

Continuum mechanics applied to soil behavior. Theoretical approaches to consolidation, shear strength, slope stability and soil stabilization. Prerequisite: CE 372.

CE 472 - SOIL DYNAMICS

Semester Hours: 3

Behavior of soils under dynamic, earthquake and blast loading. Analysis of foundation vibration and isolation. Prerequisite: CE 372.

CE 473 - EARTH STRUCTURES ENGRG

Semester Hours: 3

Earth structure design. Theories of earth pressures and the design of retaining wall systems including gravity, cantilever, mechanically stabilized earth, flexible-sheet pile, and anchored wall systems. Stability analyses for retaining walls, earth slopes, and embankment designs. (Same as CE 573) Prerequisites: CE 372 and CE 373.

CE 474 - APP MECHANICS OF SOLIDS

Semester Hours: 3

Stresses and strains at a point, theories of failures, stress concentration factors, thick-walled cylinders, torsion of noncircular members, curved beams, unsymmetrical bending and shear center. (Same as CE 574 and MAE 474 or MAE 574) Prerequisites: CE 370 or MAE 370.

CE 481 - STRUCTURAL ANALYSIS II

Semester Hours: 3

Reactions, shears, moments and deformations in complex structural systems. Statically indeterminate systems, advanced geometric and energy methods. Prerequisite: CE 381.

CE 483 - REINFORCED CONCRETE DESIGN

Semester Hours: 3

Theory and practice of reinforced concrete design. Theory and design of high strength concrete mixtures. Design of reinforced concrete beams, slabs, and columns using the ultimate strength design code of the American Concrete Institute. Same as CE 583. Prerequisites: CE 380 and CE 381.

CE 484 - STEEL DESIGN

Semester Hours: 3

Principles of design of steel structures using ASD methods. Analysis and design of structural elements using beams, columns, connection details. (Same as CE 584). Prerequisites: CE 381 and MA 244.

CE 485 - FOUNDATION ENGINEERING

Semester Hours: 3

Design of foundations with emphasis on reinforced concrete, footings, caissons, piles retaining walls, and mat foundations. Effect of bearing pressure on foundations. (Same as CE 585) Prerequisites: CE 372 and CE 483.

CE 487 - BRIDGE DESIGN

Semester Hours: 3

Bridge loads, load distribution, composite beam bridges, bridge bearings, reinforced and prestressed concrete slab and T-beam bridges, bridge evaluations and ratings, and upgrade methodology. (Same as CE 583) Prerequisite: CE 483.

CE 498 - CIVIL ENGINEERING DESIGN I

Semester Hour: 1

Planning and analysis for a preliminary civil engineering design project. Topics include fundamentals of management, public policy, cost estimation, environmental impacts, soils analysis, and ethical considerations. Part 1 of a 2-part course. Prerequisites: CE 321, CE 372, CE 483, and CE 399.

CE 499 - CIVIL ENGINEERING DESIGN II

Semester Hours: 2

Analysis and design of a complete civil engineering project including establishment of design criteria, cost estimates, specifications, and plans. Topics include ethical considerations in engineering design and practice. Emphasis on developing written and oral communication skills. Prerequisites: CE 483 and CE 498.

CE 499L - DESIGN II LABORATORY

Semester Hours: 0

Civil and Environmental Engineering, BSCE

To obtain a Bachelor of Science degree in Civil Engineering, students are required to complete the following courses:

Code	Title	Semester Hours
Freshman Composition		3-6
EH 101	COLLEGE WRITING I	
EH 102	COLLEGE WRITING II	
Humanities and Fine Arts		9
Fine Art: Choose one		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
MU 100	INTRO TO MUSIC LITERATURE	
Literature: Choose one or two ¹		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 242	MYTHOLOGY	
Humanities: Choose one		3
PHL 101	INTRODUCTION TO PHILOSOPHY	
PHL 102	INTRO TO ETHICS	
PHL 103	INTRODUCTION TO LOGIC	
PHL 150	TECH, SCIENCE & HUMAN VALUES	
Any 100 or 200 level Foreign Language ³		
WGS 200	INTRO WOMEN'S & GENDER STUDIES	
Mathematics and Natural Sciences		12
Mathematics		4
MA 171	CALCULUS A ²	
Natural Sciences		8
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
History and Social and Behavioral Sciences		9
History: Choose one or two ¹		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Science: Choose one or two		3-6
PY 101	GENERAL PSYCHOLOGY I	
SOC 100	INTRO TO SOCIOLOGY	
SOC 102	ANALYSIS OF SOCIAL PROBLEMS	
SOC 105	INTRO CULTURAL ANTHROPOLOGY	
SOC 206	MARRIAGE AND FAMILY	
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
ESS 105	WORLD REGIONAL GEOGRAPHY	
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	

Code	Title	Semester Hours
Additional Mathematics and Science		
MA 172	CALCULUS B	4
MA 201	CALCULUS C	4
MA 238	APPL DIFFERENTIAL EQUATIONS	3
MA 244	INTRO TO LINEAR ALGEBRA	3
PH 112	GEN PHYSICS W/CALC II	3
PH 115	GENERAL PHYSICS LAB II	1
BYS 119	PRINCIPLES OF BIOLOGY	4
Engineering		
FYE 101	CHARGER SUCCESS	1
ENG 101	INTRO COMPUTING ENGINEERS	3
CE 299	CE MENTORING I	0
CE 399	CE MENTORING II	0
Civil Engineering		
CE 211	CIVIL ENGINEERING GRAPHICS	2
CE 271	STATICS	3
CE 272	DYNAMICS	3
CE 284	SURVEYING	2
MAE 310	FLUID MECHANICS I	3
CE 321	INTRO TO TRANSPORTATION ENG	3
ISE 321	ENGINEERING ECONOMY	3
MAE 341	THERMODYNAMICS I	3
CE 370	MECHANICS OF MATERIALS	3
CE 375	MECHANICS OF MATERIALS LAB	1
CE 372	SOIL MECHANICS & FOUNDATION	3
CE 373	SOIL MECHANICS LAB	1
CE 380	CIVIL ENGINEERING MATERIALS	3
CE 381	STRUCTURAL ANALYSIS I	3
ISE 390	PROB & ENGR STATISTICS I	3
CE 422	TRAFFIC ENGINEERING DESIGN	3
CE 441	HYDRAULIC ENGINEERING DESIGN	3
CE 449	INTRO ENVIRONMENTAL ENGR	3
CE 483	REINFORCED CONCRETE DESIGN	3
CE 484	STEEL DESIGN	3
CE 485	FOUNDATION ENGINEERING	3
CE 498	CIVIL ENGINEERING DESIGN I	1
CE 499	CIVIL ENGINEERING DESIGN II	2
Civil Engineering General Concentration Electives		
Select 6 semester hours from any 400-level CE elective		6
Total Semester Hours		128

¹ Students must take one literature and one history course. Students must also take either a second literature or history course to complete a sequence. (EH 207 + EH 208, EH 209 + EH 210, HY 103 + HY 104, or HY 221 + HY 222)

² Based on Math placement (<http://www.uah.edu/science/departments/math/undergraduate-students/placement/>), prerequisite (MA 112 and/or MA 113) Mathematics courses may be required.

³ For choices see the World Languages and Culture (p. 205) department.

Suggested Schedule for Full-Time Students

Year 1

		Semester Hours
Fall		
MA 171	CALCULUS A	4
CH 121	GENERAL CHEMISTRY I	3
CH 125	GENERAL CHEMISTRY LAB I	1
ENG 101	INTRO COMPUTING ENGINEERS	3
EH 101	COLLEGE WRITING I	3
Fine Arts/Humanities/Social Behavioral Science		3
Term Semester Hours:		17
Spring		
MA 172	CALCULUS B	4
PH 111	GEN PHYSICS W/CALCULUS I	3
PH 114	GENERAL PHYSICS LAB I	1
FYE 101	CHARGER SUCCESS	1
EH 102	COLLEGE WRITING II	3
Fine Arts/Humanities/Social Behavioral Science		3
Term Semester Hours:		15

Year 2

Fall		
MA 201	CALCULUS C	4
PH 112	GEN PHYSICS W/CALC II	3
PH 115	GENERAL PHYSICS LAB II	1
MA 244	INTRO TO LINEAR ALGEBRA	3
CE 211	CIVIL ENGINEERING GRAPHICS	2
CE 271	STATICS	3
CE 284	SURVEYING	2
CE 299	CE MENTORING I	0
Term Semester Hours:		18
Spring		
MA 238	APPL DIFFERENTIAL EQUATIONS	3
CE 272	DYNAMICS	3
BYS 119	PRINCIPLES OF BIOLOGY	4
CE 370	MECHANICS OF MATERIALS	3
CE 375	MECHANICS OF MATERIALS LAB	1
Fine Arts/Humanities/Social Behavioral Science		3
Term Semester Hours:		17

Year 3

Fall		
MAE 341	THERMODYNAMICS I	3
ISE 321	ENGINEERING ECONOMY	3
ISE 390	PROB ENGR STATISTICS I	3
CE 381	STRUCTURAL ANALYSIS I	3
CE 399	CE MENTORING II	0
Fine Arts/Humanities/Social Behavioral Science		3
Term Semester Hours:		15
Spring		
MAE 310	FLUID MECHANICS I	3

CE 372	SOIL MECHANICS FOUNDATION	3
CE 373	SOIL MECHANICS LAB	1
CE 321	INTRO TO TRANSPORTATION ENG	3
CE 380	CIVIL ENGINEERING MATERIALS	3
Fine Arts/Humanities/Social Behavioral Science		3
Term Semester Hours:		16
Year 4		
Fall		
CE Con Class 1		3
CE 498	CIVIL ENGINEERING DESIGN I	1
CE 483	REINFORCED CONCRETE DESIGN	3
CE 449	INTRO ENVIRONMENTAL ENGR	3
CE 484	STEEL DESIGN	3
Fine Arts/Humanities/Social Behavioral Science		3
Term Semester Hours:		16
Spring		
CE Con Class 2		3
CE 441	HYDRAULIC ENGINEERING DESIGN	3
CE 422	TRAFFIC ENGINEERING DESIGN	3
CE 485	FOUNDATION ENGINEERING	3
CE 499	CIVIL ENGINEERING DESIGN II	2
Term Semester Hours:		14
Total Semester Hours:		128

Civil Engineering, BSCE - Environmental Track

To obtain a Bachelor of Science degree in Civil Engineering, students are required to complete the following courses:

Code	Title	Semester Hours
Freshman Composition		3-6
EH 101	COLLEGE WRITING I	
EH 102	COLLEGE WRITING II	
Humanities and Fine Arts		9
Fine Art: Choose one		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
MU 100	INTRO TO MUSIC LITERATURE	
Literature: Choose one or two ¹		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 242	MYTHOLOGY	
Humanities: Choose one		3
PHL 101	INTRODUCTION TO PHILOSOPHY	
PHL 102	INTRO TO ETHICS	
PHL 103	INTRODUCTION TO LOGIC	
PHL 150	TECH, SCIENCE & HUMAN VALUES	
Any 100 or 200 level Foreign Language ³		

WGS 200	INTRO WOMEN'S & GENDER STUDIES	
Mathematics and Natural Sciences		12
Mathematics		4
MA 171	CALCULUS A ²	
Natural Sciences		8
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
History and Social and Behavioral Sciences		9
History: Choose one or two ¹		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Science: Choose one or two		3-6
PY 101	GENERAL PSYCHOLOGY I	
SOC 100	INTRO TO SOCIOLOGY	
SOC 102	ANALYSIS OF SOCIAL PROBLEMS	
SOC 105	INTRO CULTURAL ANTHROPOLOGY	
SOC 206	MARRIAGE AND FAMILY	
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
ESS 105	WORLD REGIONAL GEOGRAPHY	
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
Code	Title	Semester Hours
Additional Mathematics and Science		
MA 172	CALCULUS B	4
MA 201	CALCULUS C	4
MA 238	APPL DIFFERENTIAL EQUATIONS	3
MA 244	INTRO TO LINEAR ALGEBRA	3
PH 112	GEN PHYSICS W/CALC II	3
PH 115	GENERAL PHYSICS LAB II	1
BYS 119	PRINCIPLES OF BIOLOGY	4
Engineering		
FYE 101	CHARGER SUCCESS	1
ENG 101	INTRO COMPUTING ENGINEERS	3
CE 299	CE MENTORING I	0
CE 399	CE MENTORING II	0
Civil Engineering		
CE 211	CIVIL ENGINEERING GRAPHICS	2
CE 271	STATICS	3
CE 272	DYNAMICS	3
CE 284	SURVEYING	2
MAE 310	FLUID MECHANICS I	3
CE 321	INTRO TO TRANSPORTATION ENG	3
ISE 321	ENGINEERING ECONOMY	3
MAE 341	THERMODYNAMICS I	3

CE 370	MECHANICS OF MATERIALS	3
CE 375	MECHANICS OF MATERIALS LAB	1
CE 372	SOIL MECHANICS & FOUNDATION	3
CE 373	SOIL MECHANICS LAB	1
CE 380	CIVIL ENGINEERING MATERIALS	3
CE 381	STRUCTURAL ANALYSIS I	3
ISE 390	PROB & ENGR STATISTICS I	3
CE 422	TRAFFIC ENGINEERING DESIGN	3
CE 441	HYDRAULIC ENGINEERING DESIGN	3
CE 449	INTRO ENVIRONMENTAL ENGR	3
CE 483	REINFORCED CONCRETE DESIGN	3
CE 484	STEEL DESIGN	3
CE 485	FOUNDATION ENGINEERING	3
CE 498	CIVIL ENGINEERING DESIGN I	1
CE 499	CIVIL ENGINEERING DESIGN II	2

Civil Engineering Environmental Concentration Electives

CE 456	WATER QUALITY CONTROL PROC	3
CE 457	HYDROLOGY	3

Total Semester Hours **128**

- Students must take one literature and one history course. Students must also take either a second literature or history course to complete a sequence. (EH 207 + EH 208, EH 209 + EH 210, HY 103 + HY 104, or HY 221 + HY 222)
- Based on Math placement (<http://www.uah.edu/science/departments/math/undergraduate-students/placement/>), prerequisite (MA 112 and/or MA 113) Mathematics courses may be required.
- For choices see the World Languages and Culture (p. 205) department.

Suggested Schedule for Full-Time Students

Year 1

Fall		Semester Hours
MA 171	CALCULUS A	4
CH 121	GENERAL CHEMISTRY I	3
CH 125	GENERAL CHEMISTRY LAB I	1
ENG 101	INTRO COMPUTING ENGINEERS	3
EH 101	COLLEGE WRITING I	3
Fine Arts/Humanities/Social Behavioral Science		3

Term Semester Hours: 17

Spring

MA 172	CALCULUS B	4
PH 111	GEN PHYSICS W/CALCULUS I	3
PH 114	GENERAL PHYSICS LAB I	1
FYE 101	CHARGER SUCCESS	1
EH 102	COLLEGE WRITING II	3
Fine Arts/Humanities/Social Behavioral Science		3

Term Semester Hours: 15

Year 2

Fall		
MA 201	CALCULUS C	4
PH 112	GEN PHYSICS W/CALC II	3
PH 115	GENERAL PHYSICS LAB II	1
MA 244	INTRO TO LINEAR ALGEBRA	3
CE 211	CIVIL ENGINEERING GRAPHICS	2

CE 271	STATICS	3
CE 284	SURVEYING	2
CE 299	CE MENTORING I	0
Term Semester Hours:		18
Spring		
MA 238	APPL DIFFERENTIAL EQUATIONS	3
CE 272	DYNAMICS	3
CE 370	MECHANICS OF MATERIALS	3
CE 375	MECHANICS OF MATERIALS LAB	1
BYS 119	PRINCIPLES OF BIOLOGY	4
Fine Arts/Humanities/Social Behavioral Science		3
Term Semester Hours:		17
Year 3		
Fall		
MAE 341	THERMODYNAMICS I	3
ISE 321	ENGINEERING ECONOMY	3
ISE 390	PROB ENGR STATISTICS I	3
CE 381	STRUCTURAL ANALYSIS I	3
CE 399	CE MENTORING II	0
Fine Arts/Humanities/Social Behavioral Science		3
Term Semester Hours:		15
Spring		
MAE 310	FLUID MECHANICS I	3
CE 372	SOIL MECHANICS FOUNDATION	3
CE 373	SOIL MECHANICS LAB	1
CE 321	INTRO TO TRANSPORTATION ENG	3
CE 380	CIVIL ENGINEERING MATERIALS	3
Fine Arts/Humanities/Social Behavioral Science		3
Term Semester Hours:		16
Year 4		
Fall		
CE Con Class 1		3
CE 498	CIVIL ENGINEERING DESIGN I	1
CE 483	REINFORCED CONCRETE DESIGN	3
CE 449	INTRO ENVIRONMENTAL ENGR	3
CE 484	STEEL DESIGN	3
Fine Arts/Humanities/Social Behavioral Science		3
Term Semester Hours:		16
Spring		
CE Con Class 2		3
CE 441	HYDRAULIC ENGINEERING DESIGN	3
CE 422	TRAFFIC ENGINEERING DESIGN	3
CE 485	FOUNDATION ENGINEERING	3
CE 499	CIVIL ENGINEERING DESIGN II	2
Term Semester Hours:		14
Total Semester Hours:		128

Civil Engineering, BSCE - Structural Track

To obtain a Bachelor of Science degree in Civil Engineering, students are required to complete the following courses:

Code	Title	Semester Hours
Freshman Composition		3-6
EH 101	COLLEGE WRITING I	
EH 102	COLLEGE WRITING II	
Humanities and Fine Arts		9
Fine Art: Choose one		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
MU 100	INTRO TO MUSIC LITERATURE	
Literature: Choose one or two ¹		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 242	MYTHOLOGY	
Humanities: Choose one		3
PHL 101	INTRODUCTION TO PHILOSOPHY	
PHL 102	INTRO TO ETHICS	
PHL 103	INTRODUCTION TO LOGIC	
PHL 150	TECH, SCIENCE & HUMAN VALUES	
Any 100 or 200 level Foreign Language ³		
WGS 200	INTRO WOMEN'S & GENDER STUDIES	
Mathematics and Natural Sciences		12
Mathematics		4
MA 171	CALCULUS A ²	
Natural Sciences		8
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
History and Social and Behavioral Sciences		9
History: Choose one or two ¹		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Science: Choose one or two		3-6
PY 101	GENERAL PSYCHOLOGY I	
SOC 100	INTRO TO SOCIOLOGY	
SOC 102	ANALYSIS OF SOCIAL PROBLEMS	
SOC 105	INTRO CULTURAL ANTHROPOLOGY	
SOC 206	MARRIAGE AND FAMILY	
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
ESS 105	WORLD REGIONAL GEOGRAPHY	
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	
ECN 142	PRINC OF MACROECONOMICS	

ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
Code	Title	Semester Hours
Additional Mathematics and Science		
MA 172	CALCULUS B	4
MA 201	CALCULUS C	4
MA 238	APPL DIFFERENTIAL EQUATIONS	3
MA 244	INTRO TO LINEAR ALGEBRA	3
PH 112	GEN PHYSICS W/CALC II	3
PH 115	GENERAL PHYSICS LAB II	1
BYS 119	PRINCIPLES OF BIOLOGY	4
Engineering		
FYE 101	CHARGER SUCCESS	1
ENG 101	INTRO COMPUTING ENGINEERS	3
CE 299	CE MENTORING I	0
CE 399	CE MENTORING II	0
Civil Engineering		
CE 211	CIVIL ENGINEERING GRAPHICS	2
CE 271	STATICS	3
CE 272	DYNAMICS	3
CE 284	SURVEYING	2
MAE 310	FLUID MECHANICS I	3
CE 321	INTRO TO TRANSPORTATION ENG	3
ISE 321	ENGINEERING ECONOMY	3
MAE 341	THERMODYNAMICS I	3
CE 370	MECHANICS OF MATERIALS	3
CE 375	MECHANICS OF MATERIALS LAB	1
CE 372	SOIL MECHANICS & FOUNDATION	3
CE 373	SOIL MECHANICS LAB	1
CE 380	CIVIL ENGINEERING MATERIALS	3
CE 381	STRUCTURAL ANALYSIS I	3
ISE 390	PROB & ENGR STATISTICS I	3
CE 422	TRAFFIC ENGINEERING DESIGN	3
CE 441	HYDRAULIC ENGINEERING DESIGN	3
CE 449	INTRO ENVIRONMENTAL ENGR	3
CE 483	REINFORCED CONCRETE DESIGN	3
CE 484	STEEL DESIGN	3
CE 485	FOUNDATION ENGINEERING	3
CE 498	CIVIL ENGINEERING DESIGN I	1
CE 499	CIVIL ENGINEERING DESIGN II	2
Civil Engineering Structural Concentration Electives		
CE 481	STRUCTURAL ANALYSIS II	3
CE 487	BRIDGE DESIGN	3
Total Semester Hours		128

¹ Students must take one literature and one history course. Students must also take either a second literature or history course to complete a sequence. (EH 207 + EH 208, EH 209 + EH 210, HY 103 + HY 104, or HY 221 + HY 222)

² Based on Math placement (<http://www.uah.edu/science/departments/math/undergraduate-students/placement/>), prerequisite (MA 112 and/or MA 113) Mathematics courses may be required.

³ For choices see the World Languages and Culture (p. 205) department.

Suggested Schedule for Full-Time Students

Year 1

Fall		Semester Hours
MA 171	CALCULUS A	4
CH 121	GENERAL CHEMISTRY I	3
CH 125	GENERAL CHEMISTRY LAB I	1
ENG 101	INTRO COMPUTING ENGINEERS	3
EH 101	COLLEGE WRITING I	3
Fine Arts/Humanities/Social Behavioral Science		3

Term Semester Hours: 17

Spring

MA 172	CALCULUS B	4
PH 111	GEN PHYSICS W/CALCULUS I	3
PH 114	GENERAL PHYSICS LAB I	1
FYE 101	CHARGER SUCCESS	1
EH 102	COLLEGE WRITING II	3
Fine Arts/Humanities/Social Behavioral Science		3

Term Semester Hours: 15

Year 2

Fall		
MA 201	CALCULUS C	4
PH 112	GEN PHYSICS W/CALC II	3
PH 115	GENERAL PHYSICS LAB II	1
MA 244	INTRO TO LINEAR ALGEBRA	3
CE 211	CIVIL ENGINEERING GRAPHICS	2
CE 271	STATICS	3
CE 284	SURVEYING	2
CE 299	CE MENTORING I	0

Term Semester Hours: 18

Spring

MA 238	APPL DIFFERENTIAL EQUATIONS	3
CE 272	DYNAMICS	3
CE 370	MECHANICS OF MATERIALS	3
CE 375	MECHANICS OF MATERIALS LAB	1
BYS 119	PRINCIPLES OF BIOLOGY	4
Fine Arts/Humanities/Social Behavioral Science		3

Term Semester Hours: 17

Year 3

Fall		
MAE 341	THERMODYNAMICS I	3
ISE 321	ENGINEERING ECONOMY	3
ISE 390	PROB ENGR STATISTICS I	3
CE 381	STRUCTURAL ANALYSIS I	3
CE 399	CE MENTORING II	0
Fine Arts/Humanities/Social Behavioral Science		3

Term Semester Hours: 15

Spring

MAE 310	FLUID MECHANICS I	3
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CE 372	SOIL MECHANICS FOUNDATION	3
CE 373	SOIL MECHANICS LAB	1
CE 321	INTRO TO TRANSPORTATION ENG	3
CE 380	CIVIL ENGINEERING MATERIALS	3
Fine Arts/Humanities/Social Behavioral Science		3
Term Semester Hours:		16
Year 4		
Fall		
CE Con Class 1		3
CE 498	CIVIL ENGINEERING DESIGN I	1
CE 483	REINFORCED CONCRETE DESIGN	3
CE 449	INTRO ENVIRONMENTAL ENGR	3
CE 484	STEEL DESIGN	3
Fine Arts/Humanities/Social Behavioral Science		3
Term Semester Hours:		16
Spring		
CE Con Class 2		3
CE 441	HYDRAULIC ENGINEERING DESIGN	3
CE 422	TRAFFIC ENGINEERING DESIGN	3
CE 485	FOUNDATION ENGINEERING	3
CE 499	CIVIL ENGINEERING DESIGN II	2
Term Semester Hours:		14
Total Semester Hours:		128

Civil Engineering, BSCE - Transportation Track

To obtain a Bachelor of Science degree in Civil Engineering, students are required to complete the following courses:

Code	Title	Semester Hours
Freshman Composition		3-6
EH 101	COLLEGE WRITING I	
EH 102	COLLEGE WRITING II	
Humanities and Fine Arts		9
Fine Art: Choose one		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
MU 100	INTRO TO MUSIC LITERATURE	
Literature: Choose one or two ¹		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 242	MYTHOLOGY	
Humanities: Choose one		3
PHL 101	INTRODUCTION TO PHILOSOPHY	
PHL 102	INTRO TO ETHICS	
PHL 103	INTRODUCTION TO LOGIC	
PHL 150	TECH, SCIENCE & HUMAN VALUES	
Any 100 or 200 level Foreign Language ³		

WGS 200	INTRO WOMEN'S & GENDER STUDIES	
Mathematics and Natural Sciences		12
Mathematics		4
MA 171	CALCULUS A ²	
Natural Sciences		8
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
History and Social and Behavioral Sciences		9
History: Choose one or two ¹		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Science: Choose one or two		3-6
PY 101	GENERAL PSYCHOLOGY I	
SOC 100	INTRO TO SOCIOLOGY	
SOC 102	ANALYSIS OF SOCIAL PROBLEMS	
SOC 105	INTRO CULTURAL ANTHROPOLOGY	
SOC 206	MARRIAGE AND FAMILY	
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
ESS 105	WORLD REGIONAL GEOGRAPHY	
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
Code	Title	Semester Hours
Additional Mathematics and Science		
MA 172	CALCULUS B	4
MA 201	CALCULUS C	4
MA 238	APPL DIFFERENTIAL EQUATIONS	3
MA 244	INTRO TO LINEAR ALGEBRA	3
PH 112	GEN PHYSICS W/CALC II	3
PH 115	GENERAL PHYSICS LAB II	1
BYS 119	PRINCIPLES OF BIOLOGY	4
Engineering		
FYE 101	CHARGER SUCCESS	1
ENG 101	INTRO COMPUTING ENGINEERS	3
CE 299	CE MENTORING I	0
CE 399	CE MENTORING II	0
Civil Engineering		
CE 211	CIVIL ENGINEERING GRAPHICS	2
CE 271	STATICS	3
CE 272	DYNAMICS	3
CE 284	SURVEYING	2
MAE 310	FLUID MECHANICS I	3
CE 321	INTRO TO TRANSPORTATION ENG	3
ISE 321	ENGINEERING ECONOMY	3
MAE 341	THERMODYNAMICS I	3

CE 370	MECHANICS OF MATERIALS	3
CE 375	MECHANICS OF MATERIALS LAB	1
CE 372	SOIL MECHANICS & FOUNDATION	3
CE 373	SOIL MECHANICS LAB	1
CE 380	CIVIL ENGINEERING MATERIALS	3
CE 381	STRUCTURAL ANALYSIS I	3
ISE 390	PROB & ENGR STATISTICS I	3
CE 422	TRAFFIC ENGINEERING DESIGN	3
CE 441	HYDRAULIC ENGINEERING DESIGN	3
CE 449	INTRO ENVIRONMENTAL ENGR	3
CE 483	REINFORCED CONCRETE DESIGN	3
CE 484	STEEL DESIGN	3
CE 485	FOUNDATION ENGINEERING	3
CE 498	CIVIL ENGINEERING DESIGN I	1
CE 499	CIVIL ENGINEERING DESIGN II	2

Civil Engineering Transportation Concentration Electives

CE 411	INTRO GEOGRAPHICAL INFO SYS	3
CE 420	URBAN TRANSPORTATION PLANNING	3

Total Semester Hours **128**

- 1 Students must take one literature and one history course. Students must also take either a second literature or history course to complete a sequence. (EH 207 + EH 208, EH 209 + EH 210, HY 103 + HY 104, or HY 221 + HY 222)
- 2 Based on Math placement (<http://www.uah.edu/science/departments/math/undergraduate-students/placement/>), prerequisite (MA 112 and/or MA 113) Mathematics courses may be required.
- 3 For choices see the World Languages and Culture (p. 205) department.

Suggested Schedule for Full-Time Students

Year 1

		Semester Hours
Fall		
MA 171	CALCULUS A	4
CH 121	GENERAL CHEMISTRY I	3
CH 125	GENERAL CHEMISTRY LAB I	1
ENG 101	INTRO COMPUTING ENGINEERS	3
EH 101	COLLEGE WRITING I	3
Fine Arts/Humanities/Social Behavioral Science		3

Term Semester Hours: **17**

Spring

MA 172	CALCULUS B	4
PH 111	GEN PHYSICS W/CALCULUS I	3
PH 114	GENERAL PHYSICS LAB I	1
FYE 101	CHARGER SUCCESS	1
EH 102	COLLEGE WRITING II	3
Fine Arts/Humanities/Social Behavioral Science		3

Term Semester Hours: **15**

Year 2

Fall		
MA 201	CALCULUS C	4
PH 112	GEN PHYSICS W/CALC II	3
PH 115	GENERAL PHYSICS LAB II	1
MA 244	INTRO TO LINEAR ALGEBRA	3
CE 211	CIVIL ENGINEERING GRAPHICS	2

CE 271	STATICS	3
CE 284	SURVEYING	2
CE 299	CE MENTORING I	0
Term Semester Hours:		18
Spring		
MA 238	APPL DIFFERENTIAL EQUATIONS	3
CE 272	DYNAMICS	3
CE 370	MECHANICS OF MATERIALS	3
CE 375	MECHANICS OF MATERIALS LAB	1
BYS 119	PRINCIPLES OF BIOLOGY	4
Fine Arts/Humanities/Social Behavioral Science		3
Term Semester Hours:		17
Year 3		
Fall		
MAE 341	THERMODYNAMICS I	3
ISE 321	ENGINEERING ECONOMY	3
ISE 390	PROB ENGR STATISTICS I	3
CE 381	STRUCTURAL ANALYSIS I	3
CE 399	CE MENTORING II	0
Fine Arts/Humanities/Social Behavioral Science		3
Term Semester Hours:		15
Spring		
MAE 310	FLUID MECHANICS I	3
CE 372	SOIL MECHANICS FOUNDATION	3
CE 373	SOIL MECHANICS LAB	1
CE 321	INTRO TO TRANSPORTATION ENG	3
CE 380	CIVIL ENGINEERING MATERIALS	3
Fine Arts/Humanities/Social Behavioral Science		3
Term Semester Hours:		16
Year 4		
Fall		
CE Con Class 1		3
CE 498	CIVIL ENGINEERING DESIGN I	1
CE 483	REINFORCED CONCRETE DESIGN	3
CE 449	INTRO ENVIRONMENTAL ENGR	3
CE 484	STEEL DESIGN	3
Fine Arts/Humanities/Social Behavioral Science		3
Term Semester Hours:		16
Spring		
CE Con Class 2		3
CE 441	HYDRAULIC ENGINEERING DESIGN	3
CE 422	TRAFFIC ENGINEERING DESIGN	3
CE 485	FOUNDATION ENGINEERING	3
CE 499	CIVIL ENGINEERING DESIGN II	2
Term Semester Hours:		14
Total Semester Hours:		128

Electrical and Computer Engineering

272 Engineering Building
 Telephone: 256.824.6316
 Email: ece@uah.edu

URL: <http://www.uah.edu/eng/departments/ece> (<http://www.uah.edu/eng/departments/ece/>)

Department Chair: Ravi Gorur, PhD

Mission

The mission of the Electrical and Computer Engineering Department is to develop and maintain high quality undergraduate and graduate programs in Computer, Cybersecurity, and Electrical Engineering to meet the needs of its constituents, and to participate in scholarly and productive research that contributes to the economic well-being and quality of life for the residents of Huntsville, the State of Alabama, and the citizens of the United States of America.

Computer, Cybersecurity, & Electrical Engineering Programs

The Department of Electrical and Computer Engineering (ECE) offers three undergraduate programs. The Computer Engineering program deals with the analysis, design, and application of both computer hardware and software and computer systems through a blend of Computer Engineering, Computer Science, and Electrical Engineering courses. The Cybersecurity Engineering program offers coursework that enables students to pursue careers in the cybersecurity and information assurance fields. The program provides a foundation in computer programming, computer hardware and software, digital circuits before delving into cybersecurity topics such as digital forensics, software reverse-engineering, network security and cybersecurity management. The Electrical Engineering program offers coursework that enables students to pursue careers in any of the many diverse facets of Electrical Engineering such as electronics, networks, power systems, instrumentation, communications, and controls.

The Departments of Electrical and Computer Engineering offer the following degree programs:

- Bachelor of Science in Computer Engineering (p. 343)
- Bachelor of Science in Cybersecurity Engineering (p. 346)
- Bachelor of Science in Electrical Engineering (p. 350)

Program Educational Objectives

*Within a few years of graduation, **computer engineering** graduates will have:*

- Established successful careers as computer engineers and received recognition as emerging leaders in government, industry and academia
- Created viable solutions through the application of their knowledge base and capacity for communicating ideas effectively to advance the state-of-the-art
- Demonstrated continuous professional development and pursued advanced-study opportunities

*Within a few years of graduation, **cybersecurity engineering** graduates will have:*

- Established successful careers as cybersecurity professionals and received recognition as emerging leaders in government, industry and academia
- Created viable solutions through the application of their knowledge base and capacity for communicating ideas effectively to advance the state-of-the-art
- Demonstrated continuous professional development and pursued advanced-study opportunities

*Within a few years of graduation, **electrical engineering** graduates will have:*

- Established successful careers as electrical engineers and received recognition as emerging leaders in government, industry and academia
- Created viable solutions through the application of their knowledge base and capacity for communicating ideas effectively to advance the state-of-the-art
- Demonstrated continuous professional development and pursued advanced-study opportunities

Majors in Computer, Cybersecurity, and Electrical Engineering

- Computer Engineering, BSCpE (p. 343)
- Cybersecurity Engineering, BSCBS (p. 346)
- Electrical Engineering, BSEE (p. 350)

CPE 211 - INTRO COMPUTER PROG FOR ENGR

Semester Hours: 3

Advanced programming in a high level language such as C++ with an emphasis on practice in solving engineering problems using top-down design and algorithms. Prerequisites: ENG 101 and MA 171 with concurrency.

CPE 211L - LABORATORY

Semester Hours: 0

This lab is the 0-credit lab component of the 3 credit course.

CPE 212 - FUNDAMENTALS SOFTWARE ENGRG

Semester Hours: 3

Introduction to structured programming using C++. Search and sort algorithms. Introduction to data structures. Applications to engineering related problems. Prerequisite: CPE 211.

CPE 221 - COMPUTER ORGANIZATION

Semester Hours: 3

Functional organization of stored-program digital computers including number representation, assembly language programming, computer hardware, micro-operations, and control logic; microprocessor architecture. Prerequisite: CPE 211 and EE 202 w/concurrency.

CPE 299 - CPE MENTORING I

Semester Hours: 0

Yearly mentoring and advising from engineering faculty and staff. Prerequisite w/ concurrency: CPE 211.

CPE 322 - DIGITAL HDWR DESIGN FUNDMNTLS

Semester Hours: 3

Advanced concepts in Boolean algebra, use of hardware description languages as a practical means to implement hybrid sequential and combinational designs, digital logic simulation, rapid prototyping techniques, and design for testability concepts. Focuses on the actual design and implementation of sizeable digital design problems using representative Computer Aided Design (CAD) tools. Laboratory required. Prerequisite: CPE 221.

CPE 323 - INTRO TO EMBEDDED COMPUTER SYS

Semester Hours: 3

Hardware and software aspects in building embedded computer systems. Includes methods to evaluate design tradeoffs of different technology choices and technology capabilities and limitations of system components necessary to design and implement an embedded system and interface it to the outside world. Laboratory required. Prerequisite: CPE 221.

CPE 324 - ADV LOGIC DESIGN LABORATORY

Semester Hour: 1

Laboratory component of CPE 322 includes experimentation of fundamental concepts in digital logic design. Use of hardware description languages as a practical means to implement hybrid sequential and combinational digital designs, digital logic simulation, and rapid prototyping techniques. Prerequisite: CPE 322.

CPE 325 - EMBEDDED SYSTEMS LAB

Semester Hour: 1

Laboratory component of CPE 323 includes experience working with modern integrated software development environments and hardware platforms to solve practical problems.

CPE 348 - INTRO TO COMPUTER NETWORKS

Semester Hours: 3

Introduction to the concepts and architecture of computer networks. Review of communication protocols using the Internet and the TCP/IP model as major examples. High-speed networking, congestion control, data compression, security and distributed processing. Prerequisites: CPE 211 and CPE 221.

CPE 353 - SOFTWARE DESIGN & ENGINEERING

Semester Hours: 3

Hands-on experience developing a substantial software project using software design tools such as SQL database system and the Qt graphical interface development environment. Introduction to a software process including requirements elicitation and testing techniques. Prerequisites CPE 212 and CS 317 (with concurrency).

CPE 381 - FUND SIGNALS & SYS FOR COMP EN

Semester Hours: 3

Introduction to the fundamental concepts in continuous and discrete signals and systems, and methods of signal and system analysis for computer engineers. No credit for EE or OPE students. Prerequisites: EE 213 and MA 238.

CPE 399 - CPE MENTORING II

Semester Hours: 0

Yearly mentoring and advising from engineering faculty and staff. Prerequisites: CPE 299 and CPE 212.

CPE 412 - INTRO TO PARALLEL PROGRAMMING

Semester Hours: 3

Introduction to processing in parallel and distributed computing environments. Design and analysis of parallel algorithms. Parallel programming environments: Pthreads for shared memory multiprocessor systems and PVM/MPI for distributed networked computers. (Same as CPE 512) Prerequisites: CPE 212 and CS 317.

CPE 423 - HARDWARE/SOFTWARE CO-DESIGN

Semester Hours: 3

Study and design of Systems On A Chip (SOC). Emphasis on Field Programmable realizations of SOC systems. (Same as CPE 523) Prerequisites: CPE 322 and CPE 426.

CPE 426 - VLSI HARDWARE DESC LANG/MODL/S

Semester Hours: 3

Modern VLSI design techniques and tools, such as silicon compilers, (V)HDL modeling languages, placement and routing tools, synthesis tools, and simulators. Students will design, simulate, and layout using both programmable logic families and ASIC libraries. (Same as CPE 526) Prerequisites: EE 202 and EE 315.

CPE 427 - VLSI DESIGN I

Semester Hours: 3

Introduction to VLSI design using CAD tools, CMOS logic, switch level modeling, circuit characterization, logic design in CMOS, systems design methods, test subsystem design, design examples, student design project. Laboratory required. (Same as CPE 527) Prerequisites: EE 202 and EE 315.

CPE 427L - LABORATORY

Semester Hours: 0

Students enrolling in CPE 427L must enroll concurrently in CPE 427.

CPE 431 - INTRO COMPUTER ARCHITECTURE

Semester Hours: 3

Study of existing computer structures. Computer organization with emphasis on busing systems, storage systems, and instruction sets. Performance models and measures, pipelining, cache and virtual memory, introduction to parallel processing. (Same as CPE 531) Prerequisites: CPE 322 and CPE 323.

CPE 434 - OPERATING SYSTEMS

Semester Hours: 3

Study of the fundamentals of operating systems. Emphasis on processes, file management, interprocess communication, input-output, virtual memory, networking and security. Course must be taken concurrently with CPE 435. Prerequisites: CPE 221 and CPE 353/.

CPE 435 - OPERATING SYSTEMS LABORATORY

Semester Hour: 1

Laboratory component of Operating Systems course. Experiments include implementation of device drivers, process and thread management, virtual memory management, dynamic memory management, file-systems. Students must take this course concurrently with CPE 434.

CPE 436 - INTERNALS OF MODERN OPER SYS

Semester Hours: 3

In-depth study of the design of modern operating systems such as Unix, NT and Linux. Emphasis on the internals and implementation details of interrupt processing, real-time clocks, device independent I/O, process management, memory management, file management. (Same as CPE 536) Prerequisite: CPE 434.

CPE 449 - INTRO TO CYBERSECURITY ENGINRG

Semester Hours: 3

Introduction to cryptography and computer security through hardware and physical security to a knowledge of audit methods, security management, and public law. Includes skills such as business process analysis, software security, IAE evaluation, and IAE testing. (Same as CPE 549) Prerequisite: CPE 348 or CPE 448.

CPE 449L - INTRO CYBERSECURITY ENG LAB

Semester Hours: 0

Students enrolling in CPE 449 must enroll concurrently in CPE 449L.

CPE 453 - SENIOR SOFTWARE STUDIO

Semester Hours: 3

Basic concepts of software engineering. Software project management including specifications, design, implementation, testing and documentation. Software design and management tools. Includes a multi-student software project. Prerequisites: CPE 353 and CS 317.

CPE 455 - SECURE SOFTWARE DEVELOPMENT

Semester Hours: 3

Overview of methodologies for development of high-assurance software. Major topics include analysis of security and safety risks, software certification criteria, the software development lifecycle, risk mitigation, design and coding best practices, verification techniques, and auditing of software for insecure and unsafe coding constructs. Prerequisites: CPE 353 or CS 307.

CPE 457 - SOFTWARE REVERSE ENGINEERING

Semester Hours: 3

This course provides fundamental knowledge of software reverse engineering. The course provides the ability (a) to understand software of unknown origin or software for which source code is unavailable, (b) to determine how something works, (c) to discover data used by software, and (d) to aid in the analysis of software. The course introduces tools for reverse engineering, including disassemblers, debuggers, monitors, virtual machines and modern tools for software analysis. Prerequisites: CPE 353 and CS 307.

CPE 459 - SYSTEMS SECURITY

Semester Hours: 3

This course (1) introduces cyber physical, industrial control, embedded, and Supervisory Control and Data Acquisition (SCADA) control systems, (2) examines common vulnerabilities and threats associated with these systems, and (3) examine techniques to defend these systems from cyber-attacks. Prerequisite: CPE 348.

CPE 490 - SPECIAL TOPICS IN COMP ENGR

Semester Hours: 1-3

Topics will vary. The course may be repeated when topics vary. Consent of advisor.

CPE 490L - SPECIAL TOPICS LABORATORY

Semester Hours: 0

CPE 495 - COMPUTER ENGINEERING DESIGN I

Semester Hours: 3

First course in the senior capstone design sequence. Application of techniques to the design of electronic systems that have digital hardware and software components. Application of engineering courses to solve real-world design problems. Must be taken in the same academic year as CPE 496. Prerequisites: CPE 323, CPE 353, EE 315, EE 322 and EE 399.

CPE 496 - COMPUTER ENGINEERING DESIGN II

Semester Hours: 3

Second course in the senior capstone design sequence. Must be taken in the same academic year as CPE 495. Prerequisite: CPE 495.

CPE 497 - COMPUTER ENGR INTERNSHIP

Semester Hours: 1-3

Active involvement in an engineering project in an engineering enterprise, professional organization, or government agency that has particular interest and relevance to the student. Junior/senior standing and approval from Engineering Faculty advisor.

CPE 498 - CYBERSECURITY CAPSTONE

Semester Hours: 3

Students will participate in a team based cybersecurity project which is a culminating experience for the cybersecurity degree. For a target system, student teams will conduct and document a risk assessment, then design, implement, and test cybersecurity controls to mitigate threats to the system.

Prerequisites: CS 465, CE 440, IS 450 and CPE 399.

CPE 499 - PROJECT IN COMPUTER ENGRG

Semester Hours: 3

Individual design project under the direction of an ECE faculty member. Senior standing and permission of instructor required.

EE 202 - INTRO DIGITAL LOGIC DSGN

Semester Hours: 3

Engineering approaches to design and analysis of digital logic circuits. Boolean algebra, Karnaugh maps, design using Hardware Description Languages, digital computer building blocks, standard logic (SSI MSI) vs. programmable logic (PLD, PGA0, finite state machine design. Prerequisites: ENG 101.

EE 203 - DIGITAL LOGIC DESIGN LAB

Semester Hour: 1

Experiments in applying Boolean logic concepts to digital design. The course introduces students to small-scale prototyping and simulation techniques that are used to implement and evaluate digital combinational and sequential logic designs. Prerequisite: EE 202.

EE 213 - ELECTRICAL CIRCUIT ANALYSIS I

Semester Hours: 3

Basic concepts of DC and AC circuit theory and analysis. Includes both DC and AC power. Prerequisites: MA 201 and PH 112 both w/concurrency.

EE 223 - DES & MOD ELEC CIR & SYS

Semester Hours: 3

Electrical circuit and systems design and modeling. Includes using modern tools (i.e. Matlab and simulink) to design and model circuits. Introduces and reinforces engineering design principles. Prerequisites: EE 202 & EE 213.

EE 299 - EE MENTORING I

Semester Hours: 0

Yearly mentoring and advising from engineering faculty and staff. Prerequisite w/ concurrency: CPE 211.

EE 307 - ELECTRICITY & MAGNETISM

Semester Hours: 3

Basic concepts of electrostatics, electric potential theory, electric fields and currents, fields of moving charge, magnetic fields, time varying electromagnetic fields, Maxwell's equations. Prerequisites: EE 213, MA 238 and MA 244.

EE 308 - ELECTROMAGNETIC ENGR

Semester Hours: 3

Review of Maxwell's equations, uniform plane waves in different types of media, reflection, and transmission of uniform plane waves, transmission lines, waveguides, and antennas. Prerequisites: EE 307.

EE 310 - SOLID STATE FUNDAMENTALS

Semester Hours: 3

Introduction to semiconductors including crystalline structure, energy bands and charge carriers, excess carriers, and thermal properties. Introduction to semiconductor junctions, the bipolar junction transistor, the MOSFET. Prerequisites: PH 113 and MA 238.

EE 315 - INTRO ELECTRONIC ANAL & DESIGN

Semester Hours: 3

Properties of diode, bipolar transistors, FET and operational amplifiers, analysis of DC and AC small-signal operation and circuit models for the design and analysis of electronic circuits. Prerequisite: EE 213.

EE 316 - ELE CIRCUITS & ELTRNC DSGN LAB

Semester Hour: 1

Electric circuit experiments including first and second order DC circuits, maximum power transfer, impedance measurements, transformers, measurement of electronic device characteristics and design and testing of operational amplifier circuits and single-stage amplifiers using MOSFETs and BJTs. Prerequisite: EE 315.

EE 382 - ANALY METH CONTINUOUS TIME SYS

Semester Hours: 3

Fourier Series, Fourier and Laplace transforms with emphasis on their physical interpretation. System representation by transfer functions and impulse response functions. Convolution integral. Transient response. Modeling and simulation. Prerequisites: EE 213, MA 238 and MA 244.

EE 383 - ANALY METH MULTIVARIABLE

Semester Hours: 3

Discrete time signals and systems, sampling techniques, Z and discrete Fourier transforms, multivariable systems. Introduction to digital signal processing. Prerequisite: EE 382.

EE 384 - DIG SIGNAL PROCESS LAB

Semester Hour: 1

Design and programming of digital processing algorithms such as DFT, FFT, IIR, and FIR filtering. Prerequisites: EE 383 or CPE 381.

EE 385 - RANDOM SIGNALS & NOISE

Semester Hours: 3

Random variables and probabilities description of signals. Introduction to random processes; autocorrelations, cross correlation, power spectral density. Noise analysis, thermal, shot, white, and colored. Response of electrical systems to random inputs. Prerequisites: EE 382 or CPE 381.

EE 386 - INTRO CONTROL/ROBOTIC SYS

Semester Hours: 3

Theory and analytical techniques for modeling, analysis and control of dynamical systems. Transfer functions, block-diagrams, frequency response, stability criteria, series and feedback controller design, and digital control. Introduction to the dynamic analysis and control of robotic systems. Prerequisites: EE 382 or CPE 381.

EE 399 - EE MENTORING II

Semester Hours: 0

Yearly mentoring and advising from engineering faculty and staff. Prerequisites: EE 299 and EE 223.

EE 401 - REAL-TIME DIGITAL SIGNAL PROCE

Semester Hours: 3

Introduction to digital signal processor architectures, applications, assembly language programming, and development tools for designing and implementing DSP systems. Prerequisites: EE 383 or CPE 381.

EE 410 - SELECTED TOPICS/ECE

Semester Hours: 1-6

Special topics in Electrical Engineering.

EE 410L - SELECTED TOPIC LABORATORY

Semester Hours: 0

EE 411 - ELECTRIC POWER SYSTEM

Semester Hours: 3

Power generation, transmission and distribution. Three-phase circuits, conventional and renewable power systems, transformers and motors, protection and control. Prerequisite: EE 382.

EE 412 - SR DSGN PROJ ELECT ENGR

Semester Hours: 1-6

Individual design project under the direction of an ECE faculty member. Senior standing and permission of instructor.

EE 414 - ANALOG & DIGITAL FILTER DESIGN

Semester Hours: 3

Analog filter design via Butterworth, Chebyshev, and elliptical approximation. Active filter design using operational amplifiers. Digital filter design methods. Prerequisites: EE 315 and EE 383.

EE 416 - ELECTRONICS II

Semester Hours: 3

Integrated circuits and micro-devices related to multistage amplifiers, oscillators, design specifications, operational amplifiers, and microunits. Computer simulation. Prerequisites: EE 313 and EE 315.

EE 421 - ANTENNA DESIGN & ANALYSIS

Semester Hours: 3

Covers analytical methods and mathematical foundations for solving antenna radiation problems, based on Maxwell's equations. Different types of antennas will be studied, including wire, phased array, aperture, microstrip, and reflector antennas. Prerequisite: EE 308.

EE 423 - COMM SYS & SIMULATION W/ LAB

Semester Hours: 3

Modern test equipment and computer-based simulation methods are used to conduct experiments in the area of communication systems. Includes experiments to investigate signal modulation and demodulation, and filters. (Same as EE 523) Prerequisite: EE 426.

EE 424 - INTRO DATA COMMUN NETWORKS

Semester Hours: 3

Overview of historic development of modern telephone and data communication system, system architecture, standards, broadband switching systems, modems, protocols, personal and mobile communications, digital modulation techniques. (Same as EE 504) Prerequisites: EE 383 and EE 385.

EE 426 - COMMUNICATION THEORY

Semester Hours: 3

Signals and systems including the Hilbert transform, cross and auto correlation, power density spectrum, and the Wiener-Khintchine theorem. Filter design. Linear and nonlinear modulation and demodulation methods and circuits. Phase lock and frequency feedback techniques. (Same as EE 506). Prerequisites: EE 382 or CPE 381.

EE 436 - DIGITAL ELECTRONICS

Semester Hours: 3

Introduction to digital electronics. The Metal-Oxide-Semiconductor (MOS) transistor. MOS inverters and gate circuits. Bipolar junction transistors, ECL inverters, and bipolar digital gates. Semiconductor Memories. (Same as EE 516) Prerequisites: EE 202 and EE 315.

EE 437 - ELECTRONICS MANUF PROCESSES

Semester Hours: 3

Concepts, facilities, and technology utilized in the manufacture of electronic components and products. Includes printed wiring board fabrication and component mounting methods, automation, quality and reliability, product testing, and economic issues. Senior standing. (Same as ISE 437 and EE 537).

EE 451 - OPTOELECTRONICS

Semester Hours: 3

Basic concepts for understanding electro-optic devices and systems. Blackbody radiation; light sources; quantum and thermal detectors, noise in detectors; optical heterodyning; acousto-optic, magneto-optic, and electro-optic modulation. (Same as OPE 451) Prerequisites: EE 307 and EE 315.

EE 453 - LASER SYSTEMS

Semester Hours: 3

Spontaneous and stimulated emission, population inversion, optical resonators, three- and four-level systems, Q-switching and mode-locking, semiconductor lasers, integrated optic waveguides and couplers, scanning systems, high-power industrial application. Prerequisite: EE 307.

EE 454 - OPTICAL FIBER COMMUNICA

Semester Hours: 3

Introduction to optical fibers and their transmission characteristics, optical fiber measurements, sources and detectors, noise considerations for digital and analog communication, optical fiber systems. (Same as OPE 454) Prerequisites: (EE 307 or PH 432) and (EE 382 or CPE 381).

EE 486 - INTRO MODERN CONTROL SYSTEMS

Semester Hours: 3

Modern control theory including techniques for modeling, analysis and control of MIMO dynamic systems, state-variable feedback control design and state observers. Kalman-filtering. Fundamentals of nonlinear systems analysis and discrete-time system modeling, analysis and control. Prerequisites: EE 386.

EE 494 - EE DESIGN PROJECTS

Semester Hours: 3

Senior Capstone Course. Design, simulation, and construction of technical projects. Review of legal, economic, and ethical issues. Students work as individuals or teams to design, implement, test, and evaluate their projects. Oral presentation and written reports are required. Senior Standing. Prerequisites: ISE 321, EE 308, EE 310, EE 313, EE 315, CPE 323, EE 383, EE 386 and EE 399.

EE 497 - ELEC ENGR INTERNSHIP

Semester Hours: 1-3

Active involvement in an engineering project in an engineering enterprise, professional organization, or government agency that has particular interest and relevance in the student. Junior/senior standing and Approval of Engineering Faculty Advisor.

Computer Engineering, BSCpE

To obtain a Bachelor of Science degree in Computer Engineering, students are required to complete the following courses:

Code	Title	Semester Hours
Freshman Composition		3-6
EH 101	COLLEGE WRITING I	
EH 102	COLLEGE WRITING II	
Humanities and Fine Arts		9
Fine Art: Choose one		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
MU 100	INTRO TO MUSIC LITERATURE	
Literature: Choose one or two ¹		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 242	MYTHOLOGY	
Humanities: Choose one		3
PHL 101	INTRODUCTION TO PHILOSOPHY	
PHL 102	INTRO TO ETHICS	
PHL 103	INTRODUCTION TO LOGIC	
PHL 150	TECH, SCIENCE & HUMAN VALUES	
Any 100 or 200 level Foreign Language ³		
WGS 200	INTRO WOMEN'S & GENDER STUDIES	
Mathematics and Natural Sciences		12
Mathematics		4
MA 171	CALCULUS A ²	
Natural Sciences		8
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
History and Social and Behavioral Sciences		9
History: Choose one or two ¹		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Science: Choose one or two		3-6
PY 101	GENERAL PSYCHOLOGY I	
SOC 100	INTRO TO SOCIOLOGY	
SOC 102	ANALYSIS OF SOCIAL PROBLEMS	
SOC 105	INTRO CULTURAL ANTHROPOLOGY	
SOC 206	MARRIAGE AND FAMILY	

PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
ESS 105	WORLD REGIONAL GEOGRAPHY	
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
Code	Title	Semester Hours
Additional Mathematics		
MA 172	CALCULUS B	4
MA 201	CALCULUS C	4
MA 238	APPL DIFFERENTIAL EQUATIONS	3
MA 244	INTRO TO LINEAR ALGEBRA	3
PH 112	GEN PHYSICS W/CALC II	3
PH 115	GENERAL PHYSICS LAB II	1
Engineering		
FYE 101	CHARGER SUCCESS	1
ENG 101	INTRO COMPUTING ENGINEERS	3
CPE 299	CPE MENTORING I	0
CPE 399	CPE MENTORING II	0
Computer Science		
CS 214	INTRO DISCRETE STRUCTURE	3
CS 317	INTRO DESIGN/ANALYSIS OF ALG	3
Computer Engineering		
CPE 211	INTRO COMPUTER PROG FOR ENGR	3
EE 202	INTRO DIGITAL LOGIC DSGN	3
CPE 212	FUNDAMENTALS SOFTWARE ENGRG	3
EE 213	ELECTRICAL CIRCUIT ANALYSIS I	3
CPE 221	COMPUTER ORGANIZATION	3
EE 315	INTRO ELECTRONIC ANAL & DESIGN	3
EE 316	ELE CIRCUITS & ELTRNC DSGN LAB	1
CPE 322 & CPE 324	DIGITAL HDWR DESIGN FUNDMNTLS and ADV LOGIC DESIGN LABORATORY	4
CPE 323 & CPE 325	INTRO TO EMBEDDED COMPUTER SYS and EMBEDDED SYSTEMS LAB	4
CPE 348	INTRO TO COMPUTER NETWORKS	3
CPE 353	SOFTWARE DESIGN & ENGINEERING	3
CPE 381	FUND SIGNALS & SYS FOR COMP EN	3
EE 384	DIG SIGNAL PROCESS LAB	1
EE 385 or ISE 390	RANDOM SIGNALS & NOISE PROB & ENGR STATISTICS I	3
CPE 431	INTRO COMPUTER ARCHITECTURE	3
CPE 434 & CPE 435	OPERATING SYSTEMS and OPERATING SYSTEMS LABORATORY	4
CPE 495	COMPUTER ENGINEERING DESIGN I	3
CPE 496	COMPUTER ENGINEERING DESIGN II	3
Computer Engineering Electives		
Select 12 semester hours of 300-level or above CPE, EE, CS or other upper-level courses approved by the Department		12
Total Semester Hours		128

¹ Students must take one literature and one history course. Students must also take either a second literature or history course to complete a sequence. (EH 207 + EH 208, EH 209 + EH 210, HY 103 + HY 104, or HY 221 + HY 222)

- ² Based on Math placement (<http://www.uah.edu/science/departments/math/undergraduate-students/placement/>), prerequisite (MA 112 and/or MA 113) Mathematics courses may be required.
- ³ For choices see the World Languages and Culture (p. 205) department.

Suggested Schedule for Full-Time Students

Year 1

		Semester Hours
Fall		
MA 171	CALCULUS A	4
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	4
ENG 101	INTRO COMPUTING ENGINEERS	3
EH 101	COLLEGE WRITING I	3
Fine Arts/Humanities/Social Behavioral Science		3
Term Semester Hours:		17
Spring		
MA 172	CALCULUS B	4
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	4
FYE 101	CHARGER SUCCESS	1
EH 102	COLLEGE WRITING II	3
Fine Arts/Humanities/Social Behavioral Science		3
Term Semester Hours:		15

Year 2

Fall		
MA 201	CALCULUS C	4
MA 244	INTRO TO LINEAR ALGEBRA	3
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	4
CPE 211	INTRO COMPUTER PROG FOR ENGR	3
EE 202	INTRO DIGITAL LOGIC DSGN	3
CPE 299	CPE MENTORING I	0
Term Semester Hours:		17
Spring		
MA 238	APPL DIFFERENTIAL EQUATIONS	3
CPE 212	FUNDAMENTALS SOFTWARE ENGRG	3
CS 214	INTRO DISCRETE STRUCTURE	3
CPE 221	COMPUTER ORGANIZATION	3
EE 213	ELECTRICAL CIRCUIT ANALYSIS I	3
Term Semester Hours:		15

Year 3

Fall		
EE 315	INTRO ELECTRONIC ANAL DESIGN	3
CS 317	INTRO DESIGN/ANALYSIS OF ALG	3
CPE 353	SOFTWARE DESIGN ENGINEERING	3
CPE 323 & CPE 325	INTRO TO EMBEDDED COMPUTER SYS and EMBEDDED SYSTEMS LAB	4
CPE 399	CPE MENTORING II	0
Fine Arts/Humanities/Social Behavioral Science		3
Term Semester Hours:		16

Spring

CPE 381	FUND SIGNALS SYS FOR COMP EN	3
CPE 322 & CPE 324	DIGITAL HDWR DESIGN FUNDMNTLS and ADV LOGIC DESIGN LABORATORY	4
EE 316	ELE CIRCUITS ELTRNC DSGN LAB	1
ISE 390 or EE 385	PROB ENGR STATISTICS I or RANDOM SIGNALS & NOISE	3
Fine Arts/Humanities/Social Behavioral Science		6
Term Semester Hours:		17
Year 4		
Fall		
CPE 495	COMPUTER ENGINEERING DESIGN I	3
CPE 431	INTRO COMPUTER ARCHITECTURE	3
CPE Elective I		3
CPE Elective II		3
EE 384	DIG SIGNAL PROCESS LAB	1
Fine Arts/Humanities/Social Behavioral Science		3
Term Semester Hours:		16
Spring		
CPE 496	COMPUTER ENGINEERING DESIGN II	3
CPE 434 & CPE 435	OPERATING SYSTEMS and OPERATING SYSTEMS LABORATORY	4
CPE 348	INTRO TO COMPUTER NETWORKS	3
CPE Elective III		3
CPE Elective IV		3
Term Semester Hours:		16
Total Semester Hours:		129

Cybersecurity Engineering, BSCBS

To obtain a Bachelor of Science degree in Cybersecurity Engineering, students are required to complete the following courses:

Code	Title	Semester Hours
Freshman Composition		3-6
EH 101	COLLEGE WRITING I	
EH 102	COLLEGE WRITING II	
Humanities and Fine Arts		9
Fine Art: Choose one		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
MU 100	INTRO TO MUSIC LITERATURE	
Literature: Choose one or two ¹		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 242	MYTHOLOGY	
Humanities: Choose one		3
PHL 101	INTRODUCTION TO PHILOSOPHY	
PHL 102	INTRO TO ETHICS	
PHL 103	INTRODUCTION TO LOGIC	

PHL 150	TECH, SCIENCE & HUMAN VALUES	
Any 100 or 200 level Foreign Language ³		
WGS 200	INTRO WOMEN'S & GENDER STUDIES	
Mathematics and Natural Sciences		12
Mathematics		4
MA 171	CALCULUS A ²	
Natural Sciences		8
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
History and Social and Behavioral Sciences		9
History: Choose one or two ¹		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Science: Choose one or two		3-6
PY 101	GENERAL PSYCHOLOGY I	
SOC 100	INTRO TO SOCIOLOGY	
SOC 102	ANALYSIS OF SOCIAL PROBLEMS	
SOC 105	INTRO CULTURAL ANTHROPOLOGY	
SOC 206	MARRIAGE AND FAMILY	
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
ESS 105	WORLD REGIONAL GEOGRAPHY	
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
Code	Title	Semester Hours
Additional Mathematics		
MA 172	CALCULUS B	4
MA 201	CALCULUS C	4
MA 244	INTRO TO LINEAR ALGEBRA	3
PH 112	GEN PHYSICS W/CALC II	3
PH 115	GENERAL PHYSICS LAB II	1
Engineering		
FYE 101	CHARGER SUCCESS	1
ENG 101	INTRO COMPUTING ENGINEERS	3
CPE 299	CPE MENTORING I	0
CPE 399	CPE MENTORING II	0
Computer Science		
CS 214	INTRO DISCRETE STRUCTURE	3
CS 317	INTRO DESIGN/ANALYSIS OF ALG	3
Cybersecurity Engineering		
CPE 211	INTRO COMPUTER PROG FOR ENGR	3
EE 202	INTRO DIGITAL LOGIC DSGN	3
CPE 212	FUNDAMENTALS SOFTWARE ENGRG	3
CPE 221	COMPUTER ORGANIZATION	3

CPE 323 & CPE 325	INTRO TO EMBEDDED COMPUTER SYS and EMBEDDED SYSTEMS LAB	4
CPE 348	INTRO TO COMPUTER NETWORKS	3
CPE 353 or CS 307	SOFTWARE DESIGN & ENGINEERING OBJECT ORIENT/PROG C++	3
CPE 434 & CPE 435	OPERATING SYSTEMS and OPERATING SYSTEMS LABORATORY	4
ISE 390	PROB & ENGR STATISTICS I	3
CPE 449	INTRO TO CYBERSECURITY ENGINRG	3
IS 450	CYBERSECURITY MANAGEMENT	3
CS 465	NETWORK SECURITY	3
CS 480	MOBILE DIGITAL FORENSICS	3
CPE 455	SECURE SOFTWARE DEVELOPMENT	3
CPE 457	SOFTWARE REVERSE ENGINEERING	3
CPE 459	SYSTEMS SECURITY	3
CPE 488		3
CPE 498	CYBERSECURITY CAPSTONE	3
Cybersecurity Engineering Electives		
Select 6 semester hours of 300-level or above CPE, EE, CS or other upper-level courses approved by Department		6
Total Semester Hours		124

- ¹ Students must take one literature and one history course. Students must also take either a second literature or history course to complete a sequence. (EH 207 + EH 208, EH 209 + EH 210, HY 103 + HY 104, or HY 221 + HY 222)
- ² Based on Math placement (<http://www.uah.edu/science/departments/math/undergraduate-students/placement/>), prerequisite (MA 112 and/or MA 113) Mathematics courses may be required.
- ³ For choices see the World Languages and Culture (p. 205) Department.

Suggested Schedule for Full-Time Students

Year 1

Fall		Semester Hours
MA 171	CALCULUS A	4
CH 121 & CH 125 or BYS 119	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I or PRINCIPLES OF BIOLOGY	4
ENG 101	INTRO COMPUTING ENGINEERS	3
EH 101	COLLEGE WRITING I	3
Fine Arts/Humanities/Social Behavioral Science		3
Term Semester Hours:		17
Spring		
MA 172	CALCULUS B	4
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	4
FYE 101	CHARGER SUCCESS	1
EH 102	COLLEGE WRITING II	3
Fine Arts/Humanities/Social Behavioral Science		3
Term Semester Hours:		15

Year 2

Fall		
MA 201	CALCULUS C	4
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	4
CPE 211	INTRO COMPUTER PROG FOR ENGR	3

EE 202	INTRO DIGITAL LOGIC DSGN	3
CPE 299	CPE MENTORING I	0
Fine Arts/Humanities/Social Behavioral Science		3
Term Semester Hours:		17
Spring		
MA 244	INTRO TO LINEAR ALGEBRA	3
CPE 212	FUNDAMENTALS SOFTWARE ENGRG	3
CS 214	INTRO DISCRETE STRUCTURE	3
CPE 221	COMPUTER ORGANIZATION	3
EE 203	DIGITAL LOGIC DESIGN LAB	1
Fine Arts/Humanities/Social Behavioral Science		3
Term Semester Hours:		16
Year 3		
Fall		
CS 317	INTRO DESIGN/ANALYSIS OF ALG	3
CPE 353	SOFTWARE DESIGN ENGINEERING	3
or CS 307	or OBJECT ORIENT/PROG C++	
CPE 323 & CPE 325	INTRO TO EMBEDDED COMPUTER SYS and EMBEDDED SYSTEMS LAB	4
CPE 399	CPE MENTORING II	0
ISE 390	PROB ENGR STATISTICS I	3
Fine Arts/Humanities/Social Behavioral Science		3
Term Semester Hours:		16
Spring		
CPE 455	SECURE SOFTWARE DEVELOPMENT	3
CPE 434 & CPE 435	OPERATING SYSTEMS and OPERATING SYSTEMS LABORATORY	4
CPE 348	INTRO TO COMPUTER NETWORKS	3
CBS Elective I		3
Fine Arts/Humanities/Social Behavioral Science		3
Term Semester Hours:		16
Year 4		
Fall		
CS 465	NETWORK SECURITY	3
CPE 457	SOFTWARE REVERSE ENGINEERING	3
IS 450	CYBERSECURITY MANAGEMENT	3
CPE 449	INTRO TO CYBERSECURITY ENGINRG	3
CPE 488		3
Term Semester Hours:		15
Spring		
CPE 498	CYBERSECURITY CAPSTONE	3
CPE 459	SYSTEMS SECURITY	3
CS 480	MOBILE DIGITAL FORENSICS	3
CBS Elective II		3
Term Semester Hours:		12
Total Semester Hours:		124

Electrical Engineering, BSEE

To obtain a Bachelor of Science degree in Electrical Engineering, students are required to complete the following courses:

Code	Title	Semester Hours
Freshman Composition		3-6
EH 101	COLLEGE WRITING I	
EH 102	COLLEGE WRITING II	
Humanities and Fine Arts		9
Fine Art: Choose one		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
MU 100	INTRO TO MUSIC LITERATURE	
Literature: Choose one or two ¹		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 242	MYTHOLOGY	
Humanities: Choose one		3
PHL 101	INTRODUCTION TO PHILOSOPHY	
PHL 102	INTRO TO ETHICS	
PHL 103	INTRODUCTION TO LOGIC	
PHL 150	TECH, SCIENCE & HUMAN VALUES	
Any 100 or 200 level Foreign Language ³		
WGS 200	INTRO WOMEN'S & GENDER STUDIES	
Mathematics and Natural Sciences		12
Mathematics		4
MA 171	CALCULUS A ²	
Natural Sciences		8
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
History and Social and Behavioral Sciences		9
History: Choose one or two ¹		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Science: Choose one or two		3-6
PY 101	GENERAL PSYCHOLOGY I	
SOC 100	INTRO TO SOCIOLOGY	
SOC 102	ANALYSIS OF SOCIAL PROBLEMS	
SOC 105	INTRO CULTURAL ANTHROPOLOGY	
SOC 206	MARRIAGE AND FAMILY	
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
ESS 105	WORLD REGIONAL GEOGRAPHY	
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	
ECN 142	PRINC OF MACROECONOMICS	

ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
Code	Title	Semester Hours
Additional Mathematics and Sciences		
MA 172	CALCULUS B	4
MA 201	CALCULUS C	4
MA 238	APPL DIFFERENTIAL EQUATIONS	3
MA 244	INTRO TO LINEAR ALGEBRA	3
PH 112	GEN PHYSICS W/CALC II	3
PH 115	GENERAL PHYSICS LAB II	1
PH 113	GEN PHYSICS W/CALC III	3
PH 116	GENERAL PHYSICS LAB III	1
Engineering		
FYE 101	CHARGER SUCCESS	1
ENG 101	INTRO COMPUTING ENGINEERS	3
EE 299	EE MENTORING I	0
EE 399	EE MENTORING II	0
Electrical Engineering		
CPE 211	INTRO COMPUTER PROG FOR ENGR	3
EE 202	INTRO DIGITAL LOGIC DSGN	3
EE 203	DIGITAL LOGIC DESIGN LAB	1
EE 213	ELECTRICAL CIRCUIT ANALYSIS I	3
CPE 221	COMPUTER ORGANIZATION	3
EE 223	DES & MOD ELEC CIR & SYS	3
EE 307	ELECTRICITY & MAGNETISM	3
EE 308	ELECTROMAGNETIC ENGR	3
EE 310	SOLID STATE FUNDAMENTALS	3
EE 315	INTRO ELECTRONIC ANAL & DESIGN	3
EE 316	ELE CIRCUITS & ELTRNC DSGN LAB	1
ISE 321	ENGINEERING ECONOMY	3
CPE 323 & CPE 325	INTRO TO EMBEDDED COMPUTER SYS and EMBEDDED SYSTEMS LAB	4
EE 382	ANALY METH CONTINUOUS TIME SYS	3
EE 383	ANALY METH MULTIVARIABLE	3
EE 384	DIG SIGNAL PROCESS LAB	1
EE 385	RANDOM SIGNALS & NOISE	3
EE 386	INTRO CONTROL/ROBOTIC SYS	3
EE 494	EE DESIGN PROJECTS	3
Electrical Engineering Electives ⁴		
Select one ECE approved track (see approved list at CUE2 website):		6
Select 6 hours of 300-level or above EE or CPE courses approved by the ECE Dept (CPE 212 is also allowed)		6
Technical Elective		
Select 3 hours at the 200-level or above from the College of Science or Engineering (Note: ESS 210 is not allowed)		3
Total Semester Hours		128

¹ Students must take one literature and one history course. Students must also take either a second literature or history course to complete a sequence. (EH 207 + EH 208, EH 209 + EH 210, HY 103 + HY 104, or HY 221 + HY 222)

² Based on Math placement (<http://www.uah.edu/science/departments/math/undergraduate-students/placement/>), prerequisite (MA 112 and/or MA 113) Mathematics courses may be required.

³ For choices see the World Languages and Culture (p. 205) department.

⁴ For the Optics and Photonics Concentration, track elective courses must be OPT 341 and OPT 342; choose more electives from EE 416, EE 436, EE 453, or EE 454.

Suggested Schedule for Full-Time Students

Year 1

		Semester Hours
Fall		
MA 171	CALCULUS A	4
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	4
ENG 101	INTRO COMPUTING ENGINEERS	3
EH 101	COLLEGE WRITING I	3
Fine Arts/Humanities/Social Behavioral Science		3
Term Semester Hours:		17
Spring		
MA 172	CALCULUS B	4
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	4
FYE 101	CHARGER SUCCESS	1
EH 102	COLLEGE WRITING II	3
Fine Arts/Humanities/Social Behavioral Science		3
Term Semester Hours:		15

Year 2

Fall		
MA 201	CALCULUS C	4
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	4
EE 202	INTRO DIGITAL LOGIC DSGN	3
EE 213	ELECTRICAL CIRCUIT ANALYSIS I	3
CPE 211	INTRO COMPUTER PROG FOR ENGR	3
EE 299	EE MENTORING I	0
Term Semester Hours:		17
Spring		
MA 238	APPL DIFFERENTIAL EQUATIONS	3
MA 244	INTRO TO LINEAR ALGEBRA	3
EE 223	DES MOD ELEC CIR SYS	3
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	4
CPE 221	COMPUTER ORGANIZATION	3
EE 203	DIGITAL LOGIC DESIGN LAB	1
Term Semester Hours:		17

Year 3

Fall		
EE 307	ELECTRICITY MAGNETISM	3
EE 310	SOLID STATE FUNDAMENTALS	3
EE 315	INTRO ELECTRONIC ANAL DESIGN	3
EE 382	ANALY METH CONTINUOUS TIME SYS	3
CPE 323 & CPE 325	INTRO TO EMBEDDED COMPUTER SYS and EMBEDDED SYSTEMS LAB	4
EE 399	EE MENTORING II	0
Term Semester Hours:		16

Spring

EE 315	INTRO ELECTRONIC ANAL DESIGN	3
EE 383	ANALY METH MULTIVARIABLE	3
EE 386	INTRO CONTROL/ROBOTIC SYS	3
EE 316	ELE CIRCUITS ELTRNC DSGN LAB	1
EE 385	RANDOM SIGNALS NOISE	3
EE 308	ELECTROMAGNETIC ENGR	3
Term Semester Hours:		16
Year 4		
Fall		
EE Track Elective I		3
EE Elective		3
ISE 321	ENGINEERING ECONOMY	3
Fine Arts/Humanities/Social Behavioral Science		6
Term Semester Hours:		15
Spring		
EE 494	EE DESIGN PROJECTS	3
EE Track Elective II		3
Technical Elective		3
EE 384	DIG SIGNAL PROCESS LAB	1
Fine Arts/Humanities/Social Behavioral Science		6
Term Semester Hours:		16
Total Semester Hours:		129

Engineering Clusters

Engineering clusters are offered by several College of Engineering programs. The request for a cluster is initiated with the non-engineering student's advisor. Students must meet any prerequisites for the courses in the cluster.

Industrial & Systems Engineering Cluster (21 Semester Hours)

Code	Title	Semester Hours
ISE 224	INTRO INDUSTRIAL & SYSTEMS	3
ISE 321	ENGINEERING ECONOMY	3
ISE 340	OPERATIONS RESEARCH	3
ISE 390	PROB & ENGR STATISTICS I	3
ISE 391	PROB/ENGR STAT II	3
ISE 423	INTR STATISTICAL QUALITY CONTR	3
ISE 430	MANUF SYS & FACILITIES DESIGN	3
Total Semester Hours		21

Mechanical Engineering Cluster (21 Semester Hours)

Code	Title	Semester Hours
ENG 101	INTRO COMPUTING ENGINEERS	3
MAE 211	INTRO COMPUTATIONAL TOOLS	2
MAE 271	STATICS	3
MAE 272	DYNAMICS	3
MAE 310	FLUID MECHANICS I	3
MAE 341	THERMODYNAMICS I	3

MAE 370	MECHANICS OF MATERIALS	3
Total Semester Hours		20

Electrical Systems Cluster (20 Semester Hours)

Code	Title	Semester Hours
ENG 101	INTRO COMPUTING ENGINEERS	3
EE 213	ELECTRICAL CIRCUIT ANALYSIS I	3
EE 315	INTRO ELECTRONIC ANAL & DESIGN	3
EE 316	ELE CIRCUITS & ELTRNC DSGN LAB	1
EE 382	ANALY METH CONTINUOUS TIME SYS	3
EE 383	ANALY METH MULTIVARIABLE	3
EE 384	DIG SIGNAL PROCESS LAB	1
EE 386	INTRO CONTROL/ROBOTIC SYS	3
Total Semester Hours		20

Circuits/Digital Electronics Cluster (20 Semester Hours)

Code	Title	Semester Hours
EE 213	ELECTRICAL CIRCUIT ANALYSIS I	3
EE 223	DES & MOD ELEC CIR & SYS	3
EE 310	SOLID STATE FUNDAMENTALS	3
EE 315	INTRO ELECTRONIC ANAL & DESIGN	3
EE 316	ELE CIRCUITS & ELTRNC DSGN LAB	1
EE 382	ANALY METH CONTINUOUS TIME SYS	3
EE 384	DIG SIGNAL PROCESS LAB	1
EE 436	DIGITAL ELECTRONICS	3
Total Semester Hours		20

Music Technology Cluster (23 Semester Hours)

Code	Title	Semester Hours
ENG 101	INTRO COMPUTING ENGINEERS	3
EE 202	INTRO DIGITAL LOGIC DSGN	3
EE 213	ELECTRICAL CIRCUIT ANALYSIS I	3
EE 223	DES & MOD ELEC CIR & SYS	3
EE 315	INTRO ELECTRONIC ANAL & DESIGN	3
EE 316	ELE CIRCUITS & ELTRNC DSGN LAB	1
EE 382	ANALY METH CONTINUOUS TIME SYS	3
EE 383	ANALY METH MULTIVARIABLE	3
EE 384	DIG SIGNAL PROCESS LAB	1
Total Semester Hours		23

Industrial and Systems Engineering and Engineering Management

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 Telephone: 256.824.6256
 Email: ise@uah.edu (ise@uah.edu)
 Chair: James Swain

Industrial and Systems Engineering

Industrial & Systems Engineering is a branch of engineering dealing with the optimization of complex processes or systems. It is concerned with the development, improvement, implementation and evaluation of integrated systems of people, money, knowledge, information, equipment, energy, materials, analysis and synthesis, as well as the mathematical, physical, and social sciences together with the principles and methods of engineering

design to specify, predict, and evaluate the results to be obtained from such systems or processes. Its underlying concepts overlap considerably with certain business-oriented disciplines such as operations management.

Depending on the sub-specialties involved, industrial engineering may also be known as, or overlap with, operations management, management science, operations research, systems engineering, manufacturing engineering, ergonomics or human factors engineering, safety engineering, or others, depending on the viewpoint or motives of the user. For example, in health care, the engineers known as health management engineers or health systems engineers are, in essence, industrial engineers by another name.

The Industrial and Systems Engineering Department offers the following degree programs:

- Industrial and Systems Engineering, BSISE (p. 361)

Mission

To provide integrated, applications-oriented education and research programs in the areas of industrial engineering, systems engineering, and engineering management to support the needs of students and organizations in the Huntsville area and beyond.

ISE Program Educational Objectives

To realize the mission of the department, the following educational objectives have been adopted for the undergraduate program. These objectives cover the fundamentals of both engineering and the humanities that characterize a university education, plus the specialized knowledge of industrial and systems engineering needed for a successful career in industry, the government, or academia.

- Graduates will have utilized a foundation in the knowledge and skills of industrial and systems engineering to improve lives and advance professionally in positions of increasing responsibility within their chosen field.
- Graduates will have become effective collaborators and innovators, leading or participating in efforts to address social, technical, and business challenges.
- Graduates will have engaged in lifelong learning and professional development through self-study, continuing education, or graduate and professional studies.

Major in Industrial and Systems Engineering

- BSISE, Industrial Engineering Track (p. 357)
- BSISE, Systems Engineering Track (p. 361)

ISE 224 - INTRO INDUSTRIAL & SYSTEMS

Semester Hours: 3

Overview of industrial engineering concepts. Includes history and development of classical industrial engineering; documentation and computational methods; basic work methods and measurement; manufacturing systems; and economic decision analysis. Prerequisites: ENG 101.

ISE 299 - ISE MENTORING I

Semester Hours: 0

Yearly mentoring and advising from engineering faculty and staff. Prerequisite w/ concurrency: ISE 224.

ISE 321 - ENGINEERING ECONOMY

Semester Hours: 3

Economic evaluation of engineering alternatives. Interest, time-value of investments, depreciation and income taxes, break-even cost analysis. Sophomore standing.

ISE 324 - WORK DESIGN

Semester Hours: 3

Principles of methods analysis and ergonomics to fit a task and workstation to the human operator including work measurement and tools, work sampling, job analysis, anthropometric data, and workplace design. Laboratory exercises focus on the implementation of lean principles. (Same as PY 324) Prerequisites: ISE 390 or PY 300.

ISE 327 - MANAGEMENT SYSTEMS ANALYSIS

Semester Hours: 3

Formal organization structures and functions. Analysis of organization planning leading toward the accomplishment of goals. Techniques for making decisions within formal organizations, together with ethical constraints. Emphasis on technical writing. Prerequisite: ISE 390.

ISE 328 - INTRO SYSTEMS ENGINEERING

Semester Hours: 3

Development of a systems framework for the design and realization of systems, with emphasis on the conception, design and management of systems in complex environments. Topics include systems concepts, requirements, architecture, evaluation, integration, trades, and object oriented methods and concepts.

ISE 340 - OPERATIONS RESEARCH

Semester Hours: 3

Fundamental methods, models and computational techniques of operations research. Linear programming including transportation, assignment of simplex algorithms. Queuing theory. Prerequisites: ISE 390 and MA 244.

ISE 390 - PROB & ENGR STATISTICS I

Semester Hours: 3

Engineering uses of probability, discrete and continuous probability distributions including the binomial, Poisson, hypergeometric, normal, uniform, lognormal, and exponential distributions. Statistical sampling, distributions of means, variances, and proportions. Hypothesis testing and confidence intervals. Prerequisite: MA 201.

ISE 391 - PROB/ENGR STAT II

Semester Hours: 3

Continuation of ISE 390 with regression analysis, analytics of variance, and nonparametric statistics. Introduction to design of engineering experiments, and computer-based solution of large-scale problems. Prerequisite: ISE 390.

ISE 399 - ISE MENTORING II

Semester Hours: 0

Yearly mentoring and advising from engineering faculty and staff. Prerequisites: ISE 299 and ISE 391.

ISE 402 - INDUSTRIAL & ORGANIZA PSY

Semester Hours: 3

Application of basic principles of learning, motivation, and perception to typical industrial and organizational problems. Senior standing. (Same as PY 402/502).

ISE 403 - HUMAN FACTORS PSYCHOLOGY

Semester Hours: 3

Study of human performance in human-technology-environment systems. Consideration of human capabilities and limitations as related to controls and displays, and the role of human cognition in decision-making and training effectiveness. Senior standing. (Same as PY 403/503).

ISE 423 - INTR STATISTICAL QUALITY CONTR

Semester Hours: 3

Introduces statistical theory and techniques to control quality of manufacturing products. Provides a solid foundation in Statistical Quality Control. The Six Sigma methodology is also introduced in this course. Students can take the certification exam to earn Green Belt in Six Sigma. Prerequisite: ISE 391.

ISE 426 - DSGN & ANALY OF EXPERIM

Semester Hours: 3

Advanced topics in statistical experiments with emphasis on the design aspect. Factorial designs, including fractional replication and confounding. Includes computer laboratory exercises. (Same as ISE 526). Prerequisite: ISE 391.

ISE 428 - SYSTEMS ANALYSIS & DESIGN I

Semester Hours: 3

Philosophy and methods of industrial and non-industrial systems analysis and design. Methods of systems definition, analysis, simplification, evaluation, and optimization. Design project required. Ethics and technical writing are emphasized. Senior Standing. Prerequisites: ISE 124, ISE 321, ISE 340, ISE 391, and ISE 399.

ISE 429 - SYS ANALYSIS/DESIGN II

Semester Hours: 3

Continuation of design project begun in ISE 428. Prerequisite: ISE 428.

ISE 430 - MANUF SYS & FACILITIES DESIGN

Semester Hours: 3

Modern manufacturing systems design with emphasis on facility location and plant layout. Includes classical systems, just-in-time systems, principles of integrated manufacturing systems design, and an analysis of process flow and productivity, and available space to determine facility layout. (Same as ISE 530).

ISE 433 - PROD & INVENTORY CONTROL SYS

Semester Hours: 3

Inventory models including classical optimal economic order quantity models, manufacturing resource planning systems, production scheduling, material requirements, and purchase order control. Emphasis on manufacturing system revisions, continuous process improvement, and implementation of lean principles. Prerequisite: ISE 390.

ISE 436 - INTRO TO ADDITIVE MFG

Semester Hours: 3

Overview course on additive manufacturing technologies, including 3D printing, prototyping, powder deposition, powder spraying, laminate materials manufacturing, ultrasonic consolidation, and other topics. Focus on design for manufacturing. Prerequisite: CE 211 or MAE 211.

ISE 437 - ELECTRONICS MANUF PROCESSES

Semester Hours: 3

Concepts, facilities, and technology utilized in the manufacture of electronic components and products. Includes printed wiring board fabrication and component mounting methods, automation, quality and reliability, product testing, and economic issues. Senior Standing. (Same as ISE 537).

ISE 439 - SELECTED TOPICS/ISE

Semester Hours: 1-3

ISE 447 - INTRO TO SYSTEMS SIMULATION

Semester Hours: 3

Philosophy and elements of digital, discrete-event simulation. Emphasis on modeling and analysis of stochastic systems, including probabilistic models, output analysis, and the use of simulation software. (Same as ISE 547) Prerequisites: CPE 112 and ISE 391.

ISE 480 - SYSTEMS ENGINEERING MODELING

Semester Hours: 3

The main goal of this course is to teach the student Model Based Systems Engineering (MBSE) fundamentals with application to real-world systems engineering problems. Students will learn (1) core systems engineering concepts and processes; (2) System Modeling Language (SysML) fundamentals and its use to develop and execute system models on a SysML based tool and (3) Architecture and physical model execution, simulation and integration.

BSISE, Industrial Engineering Track

To obtain a Bachelor of Science degree in Industrial and Systems Engineering, in the Industrial Engineering Track, students are required to complete the following courses:

Code	Title	Semester Hours
Freshman Composition		3-6
EH 101	COLLEGE WRITING I	
EH 102	COLLEGE WRITING II	
Humanities and Fine Arts		9
Fine Art: Choose one		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
MU 100	INTRO TO MUSIC LITERATURE	
Literature: Choose one or two ¹		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	

EH 242	MYTHOLOGY	
Humanities: Choose one		3
PHL 101	INTRODUCTION TO PHILOSOPHY	
PHL 102	INTRO TO ETHICS	
PHL 103	INTRODUCTION TO LOGIC	
PHL 150	TECH, SCIENCE & HUMAN VALUES	
Any 100 or 200 level Foreign Language ³		
WGS 200	INTRO WOMEN'S & GENDER STUDIES	
Mathematics and Natural Sciences		12
Mathematics		4
MA 171	CALCULUS A ²	
Natural Sciences		8
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
History and Social and Behavioral Sciences		9
History: Choose one or two ¹		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Science: Choose one or two		3-6
PY 101	GENERAL PSYCHOLOGY I	
SOC 100	INTRO TO SOCIOLOGY	
SOC 102	ANALYSIS OF SOCIAL PROBLEMS	
SOC 105	INTRO CULTURAL ANTHROPOLOGY	
SOC 206	MARRIAGE AND FAMILY	
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
ESS 105	WORLD REGIONAL GEOGRAPHY	
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
Code	Title	Semester Hours
Additional Mathematics and Science		
MA 172	CALCULUS B	4
MA 201	CALCULUS C	4
MA 238	APPL DIFFERENTIAL EQUATIONS	3
MA 244	INTRO TO LINEAR ALGEBRA	3
PH 112	GEN PHYSICS W/CALC II	3
PH 115	GENERAL PHYSICS LAB II	1
Select one of the following science electives:		
CH 123	GENERAL CHEMISTRY II	3
PH 113	GEN PHYSICS W/CALC III	3
BYS 119	PRINCIPLES OF BIOLOGY	4
Any 300 or 400 Mathematics		
Engineering		
FYE 101	CHARGER SUCCESS	1
ENG 101	INTRO COMPUTING ENGINEERS	3

ISE 299	ISE MENTORING I	0
ISE 399	ISE MENTORING II	0
Industrial and Systems Engineering		
ISE 224	INTRO INDUSTRIAL & SYSTEMS	3
MAE 271	STATICS	3
EE 213	ELECTRICAL CIRCUIT ANALYSIS I	3
ISE 321	ENGINEERING ECONOMY	3
ISE 327	MANAGEMENT SYSTEMS ANALYSIS	3
ISE 340	OPERATIONS RESEARCH	3
MAE 341	THERMODYNAMICS I	3
MAE 370	MECHANICS OF MATERIALS	3
MAE 375	MECHANICS OF MATERIALS LAB	1
ISE 390	PROB & ENGR STATISTICS I	3
ISE 391	PROB/ENGR STAT II	3
ISE 428	SYSTEMS ANALYSIS & DESIGN I	3
ISE 429	SYS ANALYSIS/DESIGN II	3
ISE 447	INTRO TO SYSTEMS SIMULATION	3
Industrial and Systems Engineering Track		
MAE 211	INTRO COMPUTATIONAL TOOLS	2
or CE 211	CIVIL ENGINEERING GRAPHICS	
ISE 324	WORK DESIGN	3
ISE 423	INTR STATISTICAL QUALITY CONTR	3
ISE 430	MANUF SYS & FACILITIES DESIGN	3
ISE 433	PROD & INVENTORY CONTROL SYS	3
Technical Elective (200+ level Science/Engineering course approved by advisor)		3
Choose a minimum of 3 hours from the following courses (or others approved by the ISE Faculty):		
MA 385	INTRO TO PROBABILITY & STATIST	3
ISE 402	INDUSTRIAL & ORGANIZA PSY	3
ISE 403	HUMAN FACTORS PSYCHOLOGY	3
ISE 426	DSGN & ANALY OF EXPERIM	3
ISE 437	ELECTRONICS MANUF PROCESSES	3
May select a maximum of 6 hours from the following:		
EH 301	TECHNICAL WRITING	3
ACC 211	PRINC OF FINANCIAL ACCOUNTING	3
MKT 301	PRINCIPLES OF MARKETING	3
MGT 301	MANAGING ORGANIZATIONS	3
MGT 363	HUMAN RESOURCE & LABOR REL MGT	3
MGT 462	EMPLOYMENT LAW FOR MANAGERS	3
Total Semester Hours		127

- ¹ Students must take one literature and one history course. Students must also take either a second literature or history course to complete a sequence. (EH 207 + EH 208, EH 209 + EH 210, HY 103 + HY 104, or HY 221 + HY 222)
- ² Based on Math placement (<http://www.uah.edu/science/departments/math/undergraduate-students/placement/>), prerequisite (MA 112 and/or MA 113) Mathematics courses may be required.
- ³ For choices see the World Languages and Culture (p. 205) department.

Suggested Schedule for Full-Time Students

Year 1

Fall		Semester Hours
MA 171	CALCULUS A	4
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	4
EH 101	COLLEGE WRITING I	3

ENG 101	INTRO COMPUTING ENGINEERS	3
Fine Arts/Humanities/Social Behavioral Science		3
Term Semester Hours:		17
Spring		
MA 172	CALCULUS B	4
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	4
FYE 101	CHARGER SUCCESS	1
EH 102	COLLEGE WRITING II	3
Fine Arts/Humanities/Social Behavioral Science		3
Term Semester Hours:		15
Year 2		
Fall		
MA 201	CALCULUS C	4
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	4
ISE 224	INTRO INDUSTRIAL SYSTEMS	3
ISE 390	PROB ENGR STATISTICS I	3
ISE 321	ENGINEERING ECONOMY	3
ISE 299	ISE MENTORING I	0
Term Semester Hours:		17
Spring		
MA 238	APPL DIFFERENTIAL EQUATIONS	3
MAE 271	STATICS	3
MA 244	INTRO TO LINEAR ALGEBRA	3
CE 211	CIVIL ENGINEERING GRAPHICS	2
or MAE 211	or INTRO COMPUTATIONAL TOOLS	
ISE 391	PROB/ENGR STAT II	3
Fine Arts/Humanities/Social Behavioral Science		3
Term Semester Hours:		17
Year 3		
Fall		
ISE 324	WORK DESIGN	3
ISE 340	OPERATIONS RESEARCH	3
ISE 399	ISE MENTORING II	0
MAE 341	THERMODYNAMICS I	3
EE 213	ELECTRICAL CIRCUIT ANALYSIS I	3
MAE 370	MECHANICS OF MATERIALS	3
MAE 375	MECHANICS OF MATERIALS LAB	1
Term Semester Hours:		16
Spring		
ISE 327	MANAGEMENT SYSTEMS ANALYSIS	3
ISE 423	INTR STATISTICAL QUALITY CONTR	3
ISE Elective		3
Science Elective		3
Fine Arts/Humanities/Social Behavioral Science		3
Term Semester Hours:		15
Year 4		
Fall		

ISE 428	SYSTEMS ANALYSIS DESIGN I	3
ISE 430	MANUF SYS FACILITIES DESIGN	3
ISE 447	INTRO TO SYSTEMS SIMULATION	3
ISE Elective		3
Technical Elective		3
Term Semester Hours:		15
Spring		
ISE 429	SYS ANALYSIS/DESIGN II	3
ISE 433	PROD INVENTORY CONTROL SYS	3
ISE Elective		3
Fine Arts/Humanities/Social Behavioral Science		6
Term Semester Hours:		15
Total Semester Hours:		127

BSISE, Systems Engineering Track

To obtain a Bachelor of Science degree in Industrial and Systems Engineering, in the Systems Engineering Track, students are required to complete the following courses:

Code	Title	Semester Hours
Freshman Composition		3-6
EH 101	COLLEGE WRITING I	
EH 102	COLLEGE WRITING II	
Humanities and Fine Arts		9
Fine Art: Choose one		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
MU 100	INTRO TO MUSIC LITERATURE	
Literature: Choose one or two ¹		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 242	MYTHOLOGY	
Humanities: Choose one		3
PHL 101	INTRODUCTION TO PHILOSOPHY	
PHL 102	INTRO TO ETHICS	
PHL 103	INTRODUCTION TO LOGIC	
PHL 150	TECH, SCIENCE & HUMAN VALUES	
Any 100 or 200 level Foreign Language ³		
WGS 200	INTRO WOMEN'S & GENDER STUDIES	
Mathematics and Natural Sciences		12
Mathematics		4
MA 171	CALCULUS A ²	
Natural Sciences		8
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
History and Social and Behavioral Sciences		9
History: Choose one or two ¹		3-6

HY 103	WORLD HISTORY TO 1500
HY 104	WORLD HISTORY SINCE 1500
HY 221	UNITED STATES TO 1877
HY 222	UNITED STATES SINCE 1877

Social and Behavioral Science: Choose one or two 3-6

PY 101	GENERAL PSYCHOLOGY I
SOC 100	INTRO TO SOCIOLOGY
SOC 102	ANALYSIS OF SOCIAL PROBLEMS
SOC 105	INTRO CULTURAL ANTHROPOLOGY
SOC 206	MARRIAGE AND FAMILY
PSC 101	INTRO TO AMERICAN GOVERNMENT
PSC 102	INTRO TO COMPARATIVE POLITICS
ESS 105	WORLD REGIONAL GEOGRAPHY
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY
ECN 142	PRINC OF MACROECONOMICS
ECN 143	PRINC OF MICROECONOMICS
GS 200	GLOBAL SYSTEMS AND CULTURES

Code	Title	Semester Hours
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Additional Mathematics and Science

MA 172	CALCULUS B	4
MA 201	CALCULUS C	4
MA 238	APPL DIFFERENTIAL EQUATIONS	3
MA 244	INTRO TO LINEAR ALGEBRA	3
PH 112	GEN PHYSICS W/CALC II	3
PH 115	GENERAL PHYSICS LAB II	1

Select one of the following science electives:

CH 123	GENERAL CHEMISTRY II	3
PH 113	GEN PHYSICS W/CALC III	3
BYS 119	PRINCIPLES OF BIOLOGY	4

Any 300 or 400 Mathematics

Engineering

FYE 101	CHARGER SUCCESS	1
ENG 101	INTRO COMPUTING ENGINEERS	3
ISE 299	ISE MENTORING I	0
ISE 399	ISE MENTORING II	0

Industrial and Systems Engineering

ISE 224	INTRO INDUSTRIAL & SYSTEMS	3
MAE 271	STATICS	3
EE 213	ELECTRICAL CIRCUIT ANALYSIS I	3
ISE 321	ENGINEERING ECONOMY	3
ISE 327	MANAGEMENT SYSTEMS ANALYSIS	3
ISE 340	OPERATIONS RESEARCH	3
MAE 341	THERMODYNAMICS I	3
MAE 370	MECHANICS OF MATERIALS	3
MAE 375	MECHANICS OF MATERIALS LAB	1
ISE 390	PROB & ENGR STATISTICS I	3
ISE 391	PROB/ENGR STAT II	3
ISE 428	SYSTEMS ANALYSIS & DESIGN I	3
ISE 429	SYS ANALYSIS/DESIGN II	3
ISE 447	INTRO TO SYSTEMS SIMULATION	3

Systems Engineering Track

MAE 211 or OR CPE 211	INTRO COMPUTATIONAL TOOLS	2
ISE 423	INTR STATISTICAL QUALITY CONTR	3
ISE 328	INTRO SYSTEMS ENGINEERING	3
ISE 426	DSGN & ANALY OF EXPERIM	3
ISE 480	SYSTEMS ENGINEERING MODELING	3
Technical Elective (200+ level Science/Engineering course approved by advisor)		3
Select System Track Option/Courses		
MAE Systems (MAE 200, MAE 272 and (MAE 284 & MAE 488) or (MAE 330 & MAE 343)		
Elec & Embedded Comp Systems (EE 202, CPE 221, CPE 348 and (CPE 212, CPE 323/325 or CPE 449)		
Control Systems (EE 382, EE 383, EE 386, EE 486)		
Total Semester Hours		127

- ¹ Students must take one literature and one history course. Students must also take either a second literature or history course to complete a sequence. (EH 207 + EH 208, EH 209 + EH 210, HY 103 + HY 104, or HY 221 + HY 222)
- ² Based on Math placement (<http://www.uah.edu/science/departments/math/undergraduate-students/placement/>), prerequisite (MA 112 and/or MA 113) Mathematics courses may be required.
- ³ For choices see the World Languages and Culture (p. 205) department.

Year 1

Fall		Semester Hours
MA 171	CALCULUS A	4
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	4
EH 101	COLLEGE WRITING I	3
ENG 101	INTRO COMPUTING ENGINEERS	3
Fine Arts/Humanities/Social Behavioral Science		3
Term Semester Hours:		17
Spring		
MA 172	CALCULUS B	4
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	4
EH 102	COLLEGE WRITING II	3
FYE 101	CHARGER SUCCESS	1
Fine Arts/Humanities/Social Behavioral Science		3
Term Semester Hours:		15

Year 2

Fall		
MA 201	CALCULUS C	4
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	4
ISE 224	INTRO INDUSTRIAL SYSTEMS	3
ISE 390	PROB ENGR STATISTICS I	3
ISE 321	ENGINEERING ECONOMY	3
ISE 299	ISE MENTORING I	0
Term Semester Hours:		17
Spring		
MA 238	APPL DIFFERENTIAL EQUATIONS	3
MAE 271	STATICS	3
MA 244	INTRO TO LINEAR ALGEBRA	3
CE 211 or MAE 211	CIVIL ENGINEERING GRAPHICS or INTRO COMPUTATIONAL TOOLS	2

ISE 391	PROB/ENGR STAT II	3
Fine Arts/Humanities/Social Behavioral Science		3
Term Semester Hours:		17
Year 3		
Fall		
ISE 340	OPERATIONS RESEARCH	3
MAE 341	THERMODYNAMICS I	3
EE 213	ELECTRICAL CIRCUIT ANALYSIS I	3
MAE 370	MECHANICS OF MATERIALS	3
MAE 375	MECHANICS OF MATERIALS LAB	1
ISE 399	ISE MENTORING II	0
Technical Elective		3
Term Semester Hours:		16
Spring		
ISE 327	MANAGEMENT SYSTEMS ANALYSIS	3
ISE 426	DSGN ANALY OF EXPERIM	3
Systems Track Elective		3
Science Elective		3
Fine Arts/Humanities/Social Behavioral Science		3
Term Semester Hours:		15
Year 4		
Fall		
ISE 328	INTRO SYSTEMS ENGINEERING	3
ISE 428	SYSTEMS ANALYSIS DESIGN I	3
ISE 447	INTRO TO SYSTEMS SIMULATION	3
Systems Track Electives		6
Term Semester Hours:		15
Spring		
ISE 429	SYS ANALYSIS/DESIGN II	3
ISE 480	SYSTEMS ENGINEERING MODELING	3
Systems Track Elective		3
Fine Arts/Humanities/Social Behavioral Science		6
Term Semester Hours:		15
Total Semester Hours:		127

Mechanical and Aerospace Engineering

N274 Technology Hall
 Telephone: 256.824.6154
 Email: mae@uah.edu (mae@uah.edu)
 Chair: D. Keith Hollingsworth, PhD

Mechanical and Aerospace Programs

Aerospace Engineering is a diverse and rapidly changing field that consists of four fundamental technical disciplines: aerodynamics, structures and materials, propulsion, and flight mechanics and control. Aerospace engineers have traditionally applied their knowledge of these disciplines to the design and development of high performance flight systems such as aircraft, rotorcraft, spacecraft, missiles and rockets.

Mechanical Engineering applies the principles of physics and materials science for design, analysis and manufacturing of mechanical and thermal systems. Mechanical engineers use core concepts: mechanics, kinematics, thermodynamics, and fluid mechanics and tools: computer-aided design and modeling to design and build machines, weapons, medical devices, and robotics.

The Department of Mechanical and Aerospace Engineering offers the following degree programs:

- Bachelor of Science in Aerospace Engineering (p. 370)
- Bachelor of Science in Mechanical Engineering (p. 373)

Mission Statement

The mission of the Department of Mechanical and Aerospace Engineering is to provide undergraduate and graduate education, research, and public service in the mechanical and aerospace engineering disciplines and to support the mechanical and aerospace engineering needs of Huntsville, the State of Alabama, the region, our nation, and the international community.

Program Educational Objectives

Within a few years of graduation, Aerospace and Mechanical Engineering graduates will have:

- attained successful careers and recognition as young leaders in industry and in the community;
- created innovative solutions through the application of their knowledge base and capacity for critical thinking;
- established collaborative working relationships wherein they communicate their ideas effectively; and
- pursued continuous professional development and advanced-study opportunities.

Majors in Mechanical and Aerospace Engineering

- Aerospace Engineering, BSAE (p. 370)
- Mechanical Engineering, BSME (p. 373)

MAE 115 - INTRODUCTION TO MACHINING

Semester Hour: 1

Safety and familiarity with the machine shop environment, equipment, tools, and practices. Correlate student design with consequences of design choice. Basic turning, milling, welding, and sheet metal operations. Programming and operation of numerically controlled machines.

MAE 200 - PRINC AERONAUTICS & ASTRONAUTI

Semester Hours: 3

Fundamental concepts of aerospace engineering including the history of flight, standard atmosphere, fluid and flow properties, lift and drag, propulsion, and structures; elementary aircraft performance, stability and control; basic astronautics and space environment; and aerospace vehicle design.

Prerequisites: PH 111, ENG 101, MA 172. Prerequisite with concurrency: MAE 211.

MAE 211 - INTRO COMPUTATIONAL TOOLS

Semester Hours: 2

Computer-aided design and solid modeling concepts including: model definition through constraints and dimensioning, and development of subassemblies and assemblies. Prerequisites: ENG 101 and MA 171.

MAE 271 - STATICS

Semester Hours: 3

Topics include: forces, resultant forces, moments, couples equivalent force systems, equilibrium, distributed loads, two force members, trusses, centroids, moments of inertia, shear and bending moment diagrams, static and kinematic friction. (Same as CE 271) Prerequisites: PH 111, MA 201 and ENG 101.

MAE 272 - DYNAMICS

Semester Hours: 3

Kinematics and kinetics of a particle and of systems of particles with applications to central force motion, impact, relative motion, vibrations, and variable mass systems. Dynamics of rigid body in plan motion, relative motion in rotating coordinates, and gyroscopic motion. (Same as CS 362) Prerequisites: (CE 271 or MAE 271) and MA 201.

MAE 284 - NUMERICAL METHODS

Semester Hours: 3

Use computational tools to solve mathematical problems of engineering interest. Discussion and application of root finding and optimization techniques. Other topics include curve fitting, Gauss Elimination, LA decomposition, and Cholesky decomposition, numerical integration and numerical differentiation. Solving initial and boundary value problems. Course includes a lab experience using modern computational tools. Prerequisites: MA 244, ENG 101, MAE 211 and MA 238.

MAE 284L - NUMERICAL METHODS LAB

Semester Hours: 0

MAE 299 - MAE MENTORING I

Semester Hours: 0

Yearly mentoring and advising from engineering faculty and staff. Prerequisite w/ concurrency: MAE 271.

MAE 310 - FLUID MECHANICS I

Semester Hours: 3

Fluid properties and fundamental principles governing fluid behavior. Fluid statics, basic equations in integral form and differential form, potential flow, dimensional analysis, and internal incompressible viscous flows. Prerequisites: (CE 271 or MAE 271) and MA 238.

MAE 311 - PRIN MEASUREMENT & INSTRUMEN

Semester Hours: 3

Instrumentation and techniques for measurement of mechanical phenomena. Calibration, standards, computerized data acquisition, error analysis, signal conditioning, dynamic response, and experimental design. Laboratory included. Prerequisites: EE 213 and MAE 284.

MAE 311L - PRINC MEASUREMENT & INSTR LAB

Semester Hours: 0

MAE 330 - FUNDAMENTALS AERODYNAMICS

Semester Hours: 3

Fundamentals of incompressible flow, conservation laws, potential flow, similarity, airfoil and finite wing lift and drag, thin airfoil and panel methods, introduction to viscous flows and boundary layers, and modern airfoil and wing design. Prerequisites: MAE 200, MAE 272 and MA 238 (all with minimum grade of C-). Corequisite: MAE 331.

MAE 330L - LABORATORY

Semester Hours: 0

This lab is a 0 credit lab component of the 4 credit MAE 330 course.

MAE 331 - AERODYNAMICS LAB

Semester Hour: 1

Demonstration of fundamental aerodynamic principles through wind tunnel testing including comparison of theory to experimental results. Corequisite: MAE 330.

MAE 341 - THERMODYNAMICS I

Semester Hours: 3

Basic laws of energy that apply in all branches of engineering and science. Properties of matter, state variables, reversible processes, first and second laws of thermodynamics with applications to closed and open systems. Availability of energy and irreversibility. Prerequisites: CH 121, PH 112, and MA 201.

MAE 342 - THERMODYNAMICS II

Semester Hours: 3

Continuation of MAE 341. Thermodynamic cycles, thermodynamic relations among properties, chemical reactions, and phase and chemical equilibrium. Prerequisites: MAE 341 and MA 238.

MAE 343 - COMPRESSIBLE AERODYNAMICS

Semester Hours: 3

Compressible flow including area change, friction, and heat transfer. Fundamentals of acoustic waves, 1- and 2-D shock and expansion waves, shock-expansion theory, and linearized flow with applications to inlets, nozzles, wind tunnels, and supersonic flow over aerodynamic bodies and wings. Prerequisites: MAE 200, MAE 341 and MA 238 (all with minimum grade of C-).

MAE 345 - HONORS THERMODYNAMICS COLQ

Semester Hour: 1

Students in this course will be expected to participate in assigned readings and discussions to develop an understanding of the context behind the fundamental concepts and principles of thermodynamics. Through reflections students will be encouraged to apply this knowledge to develop their own creative ideas. Prerequisites with concurrency: MAE 341 or CHE 344.

MAE 364 - KINEMATICS/DYNAM MACHINE

Semester Hours: 3

Kinematics and dynamics of planar machinery including principles of mechanisms, cam design, gears and epicycle gear trains, determination of velocity and acceleration in mechanisms. Inertia forces in machines, balancing of rotating masses and reciprocating masses, and vibration analysis. Prerequisites: MAE 211 and (MAE 272 or CE 272).

MAE 364L - KINEMATICS/DYN MACHINE LAB

Semester Hours: 0

MAE 370 - MECHANICS OF MATERIALS

Semester Hours: 3

Design and analysis of simple structures for predetermined strength and deformation requirements. Topics include: theory of stress-strain, Hooke's Law, analysis of stresses and deformations in bodies loaded by axial, torsional, bending, and combined loads, and analysis of statically indeterminate systems. Same as MAE 370. Prerequisites: (CPE 211 or MAE 211) and (MAE 271 or CE 271) and MA 244, corequisite MAE 375.

MAE 370L - LABORATORY

Semester Hours: 0

MAE 371 - AEROSPACE STRUCTURES

Semester Hours: 3

Analysis and design of lightweight aerospace structures including sandwich structures, stiffened panels, and tubing stress and deflection analysis. Design of members in tension, torsion, and bending. Space structures. Prerequisites: MAE 200 and (MAE 370 or CE 370).

MAE 375 - MECHANICS OF MATERIALS LAB

Semester Hour: 1

Experimental verification of material properties and structural deformation under axial, torsional, and bending loads. Test procedures, use of instrumentation, interpretation of experimental results and comparison to theory. (Same as CE 375). Corequisites: MAE 370.

MAE 378 - MATERIALS & MFG PROCESS

Semester Hours: 3

Engineering properties of materials, sources of information for properties of materials, cost considerations for material selection, manufacturing processes, casting, forming, machining, cost considerations for machining operations. One or more field trips included. (Same as ISE 378).

Prerequisites: MAE 370 or CE 370.

MAE 395 - SEL TOPICS:MECH & AEROSPACE EG

Semester Hours: 1-3

Special topics in Mechanical or Aerospace Engineering.

MAE 399 - MAE MENTORING II

Semester Hours: 0

Yearly mentoring and advising from engineering faculty and staff. Prerequisites: MAE 299 and MAE 272.

MAE 425 - DESIGN OF MACHINE ELEMENTS/A&M

Semester Hours: 3

MAE 440 - ROCKET PROPULSION I

Semester Hours: 3

Introduction to the operation, analysis, and design of liquid and solid rockets. Incorporates design and realization of a thermal system, in which students work in teams to design a rocket motor or component. Prerequisite: MAE 343.

MAE 441 - AIRBREATHING PROPULSION

Semester Hours: 3

Air breathing propulsion systems with emphasis on gas turbine engines for air-and rotor-craft. Includes thermodynamic power cycles, components design, and engine performance analysis. Incorporates a turbine engine design and realization team project. Prerequisite: MAE 343.

MAE 444 - INTRO TO ELECTRIC PROPULSION

Semester Hours: 3

Elements of electrically-driven rocket propulsion for applications from low earth orbit to the outer planets will be discussed. The physics of ionizing and heating gases and plasmas for electrothermal, electrostatic and electromagnetic acceleration will be studied. Characteristics of Resistojet, Arcjet, Magnetoplasmadynamic thrusters, Electrothermal, Pulsed plasma, Electrostatic, and Hall thrusters will be covered. Review thruster system performance, power requirements and selection for space missions. Overview of current research efforts, including thruster systems, physics, and performance. Prerequisite: MAE 420.

MAE 449 - AEROSPACE LABORATORY

Semester Hours: 2

Experimental investigation of aerospace structures, airfoils and bodies in subsonic flow, and performance of various aerospace propulsion systems. An experiment design project is included. Concurrent registration in MAE 449L is required.

MAE 450 - INTRO TO HEAT & MASS TRANSFER

Semester Hours: 3

Principles of heat and mass transfer; application of principles to problems in conductive, convective, and radioactive heat transfer and mass transfer; laminar and turbulent flow processes; boiling and condensation; heat exchangers. Prerequisites: MAE 283, MAE 311, MAE 341 and (MAE 310 or MAE 330). Corequisite: MAE 451.

MAE 450L - INTRO HEAT & MASS TRANSFER LAB

Semester Hours: 0

MAE 451 - HEAT & MASS TRANSFER LAB

Semester Hour: 1

Experimental measurements and analysis of heat and mass transfer mechanisms, processes and systems. Test procedures, use of instrumentation, interpretation of experimental results and comparison to theory. Corequisite: MAE 450.

MAE 455 - DESIGN OF THERMAL SYSTEMS

Semester Hours: 3

Heat transfer, thermodynamics, and fluid mechanics applied to analysis and design of systems for storage and transport, and exchange of thermal energy. Modeling of thermal equipment, simulation of system performance, optimization of system design, and comprehensive design of thermal systems. Prerequisites: MAE 342 and MAE 450.

MAE 461 - VIBRATIONS ELASTIC SYS

Semester Hours: 3

Formulation of the equations of motion of discrete and continuous systems, analytical and numerical methods of solution, eigenvalue problems and dynamic response. Prerequisite: MAE 488.

MAE 463 - INTERMEDIATE DYNAMICS

Semester Hours: 3

Kinematics and dynamics of particles, system of particles, and rigid-bodies. Variational principles and Lagrangian mechanics. Prerequisites: MAE 272 and MAE 488.

MAE 466 - MECH & DSGN MACH ELEMENT

Semester Hours: 3

Detailed design and selection of machine elements such as gears, shafts, and bearings. Analysis of stresses and deformations under combined static and dynamic loads, stress concentrations, and fatigue. Prerequisites: MAE 364 and (MAE 370 or CE 370).

MAE 468 - ELEMENTS OF SPACECRAFT DESIGN

Semester Hours: 3

Fundamentals of spacecraft engineering and design. Topics include: orbital mechanics, space environment, attitude determination and control, communications, space structures, thermal control, propulsion and power, and systems and mission design. Prerequisites: MAE 371 and (MAE 272 or CE 272).

MAE 471 - ADV AEROSPACE STR & MTRLS

Semester Hours: 3

Composite materials and applications in aerospace structures including: material types and properties and fabrication techniques, micromechanics, constitutive behavior, and classical laminated plate theory. Introduction to failure concepts, sandwich panels and finite element modeling of 1-and 2-D aerospace structures. Prerequisites: MAE 311 and MAE 371.

MAE 474 - APP MECHANICS OF SOLIDS

Semester Hours: 3

Stresses and strains at a point, theories of failures, stress concentration factors, thick-walled cylinders, torsion of noncircular members, curved beams, unsymmetrical bending, and shear center. Prerequisites: MAE 370 or CE 370.

MAE 477 - EXP TECH SOLID MECHANICS

Semester Hours: 3

Experimental methods to determine stress, strain, displacement, velocity, and acceleration in various media. Theory and laboratory applications of electrical resistance strain gages, brittle coatings, and photo elasticity. Application of transducers and experimental analysis of engineering systems. Prerequisites: MAE 370 or CE 370.

MAE 480 - AIRCRAFT STABILITY & CONTROL

Semester Hours: 3

The stability and control of aerodynamic vehicles. The design of aircraft to obtain good flying characteristics. The complete governing equations and analog solutions of linearized equations. Prerequisites: MAE 430 and MAE 488.

MAE 488 - ANALY ENGINEERING SYSTEM

Semester Hours: 3

Development of mathematical engineering models of physical systems including: mechanical, electrical, and fluid systems and combined systems. Determination of the dynamic response of physical systems. Prerequisites: EE 213, MAE 284 and (MAE 272 or CE 272).

MAE 489 - COMPUTER AIDED ENGR

Semester Hours: 3

Analysis of design of structural, thermal, and dynamical systems using finite element and finite difference computer programs. Practical guidelines for discrete modeling; analysis of modeling errors. Comparison of exact and approximate solutions to boundary value problems. Prerequisites: MAE 370 or CE 370 and MAE 284 w/concurrency.

MAE 490 - SENIOR DESIGN I

Semester Hours: 3

Application of basic design principles including: design methodology, decision making, creativity, product liability, human factors, patents, ethics, and technical writing. Students will be assigned to a multi-disciplinary teams to develop design project requirements and initial concepts. Prerequisites: ISE 321, MAE 311, MAE 341 and [(MAE 310, MAE 364, MAE 375 & MAE 371) or (MAE 330, MAE 331, MAE 343, MAE 371, MAE 375)] and MAE 399.

MAE 491 - SENIOR DESIGN II

Semester Hours: 3

Continuation of MAE 490. Students work on multi-disciplinary teams to design, fabricate, test and demonstrate the performance of various mechanisms, products and vehicles according to customer requirements. Oral presentations and written detailed documentation of the project must also be completed. Prerequisite: MAE 490.

MAE 492 - MISSION DESIGN & DEVELOPMNT

Semester Hours: 3

Senior Capstone Course Option. Students work design teams to develop missions of interest to NASA, DoD and industry. Includes defining the mission architecture and associated vehicles and components required to meet the customer requirements. Prerequisites: MAE 490.

MAE 493 - ROCKET DESIGN

Semester Hours: 3

Senior Capstone Course Option. Design, build, test and fly a high-powered rocket with a payload to a specified altitude. Students work on multi-disciplinary teams to design payloads, avionics, recovery systems, structures and other sub-systems and then integrate them into the final vehicle. Prerequisites: MAE 490.

MAE 494 - AIRCRAFT DESIGN

Semester Hours: 3

Senior Capstone Course Option. Design, build, and test an unmanned aircraft to meet specified requirements. Students work on multi-disciplinary teams. Systems engineering aspects including simulation, fabrication, integration, scheduling and cost estimation are also emphasized. Prerequisite: MAE 490.

MAE 495 - SEL TOPICS:MECH & AEROSPACE EG

Semester Hours: 1-4

MAE 496 - IND STUDY:MECH & AEROSPACE EG

Semester Hours: 1-4

Special independent project in a topic of Mechanical or Aerospace Engineering. Must work with a MAE faculty member with project approved by MAE department chair.

MAE 499 - UNDERGRADUATE THESIS

Semester Hours: 3

Required for students completing an Honors Program Bachelors Thesis. Senior standing and permission of thesis advisor required.

Aerospace Engineering, BSAE

To obtain a Bachelor of Science degree in Aerospace Engineering, students are required to complete the general education requirements for engineering majors and the following courses:

Code	Title	Semester Hours
Freshman Composition		3-6
EH 101	COLLEGE WRITING I	
EH 102	COLLEGE WRITING II	
Humanities and Fine Arts		9
Fine Art: Choose one		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
MU 100	INTRO TO MUSIC LITERATURE	
Literature: Choose one or two ¹		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 242	MYTHOLOGY	
Humanities: Choose one		3
PHL 101	INTRODUCTION TO PHILOSOPHY	
PHL 102	INTRO TO ETHICS	
PHL 103	INTRODUCTION TO LOGIC	
PHL 150	TECH, SCIENCE & HUMAN VALUES	
Any 100 or 200 level Foreign Language ³		
WGS 200	INTRO WOMEN'S & GENDER STUDIES	
Mathematics and Natural Sciences		12
Mathematics		4
MA 171	CALCULUS A ²	
Natural Sciences		8
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
History and Social and Behavioral Sciences		9
History: Choose one or two ¹		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Science: Choose one or two		3-6
PY 101	GENERAL PSYCHOLOGY I	
SOC 100	INTRO TO SOCIOLOGY	
SOC 102	ANALYSIS OF SOCIAL PROBLEMS	
SOC 105	INTRO CULTURAL ANTHROPOLOGY	
SOC 206	MARRIAGE AND FAMILY	
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
ESS 105	WORLD REGIONAL GEOGRAPHY	
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	

ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
Code	Title	Semester Hours
Additional Mathematics and Science		
MA 172	CALCULUS B	4
MA 201	CALCULUS C	4
MA 238	APPL DIFFERENTIAL EQUATIONS	3
MA 244	INTRO TO LINEAR ALGEBRA	3
PH 112	GEN PHYSICS W/CALC II	3
PH 115	GENERAL PHYSICS LAB II	1
Select one of the following science electives:		3-4
CH 123	GENERAL CHEMISTRY II	
PH 113	GEN PHYSICS W/CALC III	
BYS 119	PRINCIPLES OF BIOLOGY	
Any 300 of 400 Mathematics		
Engineering		
FYE 101	CHARGER SUCCESS	1
ENG 101	INTRO COMPUTING ENGINEERS	3
MAE 299	MAE MENTORING I	0
MAE 399	MAE MENTORING II	0
Aerospace Engineering		
MAE 200	PRINC AERONAUTICS & ASTRONAUTI	3
MAE 211	INTRO COMPUTATIONAL TOOLS	2
EE 213	ELECTRICAL CIRCUIT ANALYSIS I	3
MAE 271	STATICS	3
MAE 272	DYNAMICS	3
MAE 284	NUMERICAL METHODS	3
ISE 321	ENGINEERING ECONOMY	3
MAE 311	PRIN MEASUREMENT & INSTRUMEN	3
MAE 330 & MAE 331	FUNDAMENTALS AERODYNAMICS and AERODYNAMICS LAB	4
MAE 341	THERMODYNAMICS I	3
MAE 343	COMPRESSIBLE AERODYNAMICS	3
MAE 370 & MAE 375	MECHANICS OF MATERIALS and MECHANICS OF MATERIALS LAB	4
MAE 371	AEROSPACE STRUCTURES	3
MAE 440	ROCKET PROPULSION I (or)	3
MAE 441	AIRBREATHING PROPULSION	3
MAE 468	ELEMENTS OF SPACECRAFT DESIGN	3
MAE 471	ADV AEROSPACE STR & MTRLs	3
MAE 480	AIRCRAFT STABILITY & CONTROL	3
MAE 488	ANALY ENGINEERING SYSTEM	3
MAE 490	SENIOR DESIGN I	3
MAE 491	SENIOR DESIGN II	3
Aerospace Technical Electives		
Select 6 semester hours from the MAE Approved Technical Electives List		6
AE students may not take both MA 385 and ISE 390 for credit. AE students may not take MAE 310 for credit.		
Total Semester Hours		128

¹ Students must take one literature and one history course. Students must also take either a second literature or history course to complete a sequence. (EH 207 + EH 208, EH 209 + EH 210, HY 103 + HY 104, or HY 221 + HY 222)

² Based on Math placement (<http://www.uah.edu/science/departments/math/undergraduate-students/placement/>), prerequisite (MA 112 and/or MA 113) Mathematics courses may be required.

³ For choices see the World Languages and Culture (p. 205) department.

Suggested Pathway for Aerospace Engineering

Year 1

		Semester Hours
Fall		
MA 171	CALCULUS A	4
CH 121	GENERAL CHEMISTRY I	3
CH 125	GENERAL CHEMISTRY LAB I	1
ENG 101	INTRO COMPUTING ENGINEERS	3
EH 101	COLLEGE WRITING I	3
Fine Arts/Humanities/Social Behavioral Science		3
Term Semester Hours:		17
Spring		
MA 172	CALCULUS B	4
PH 111	GEN PHYSICS W/CALCULUS I	3
PH 114	GENERAL PHYSICS LAB I	1
FYE 101	CHARGER SUCCESS	1
EH 102	COLLEGE WRITING II	3
Fine Arts/Humanities/Social Behavioral Science		3
Term Semester Hours:		15

Year 2

Fall		
MA 201	CALCULUS C	4
PH 112	GEN PHYSICS W/CALC II	3
PH 115	GENERAL PHYSICS LAB II	1
MA 244	INTRO TO LINEAR ALGEBRA	3
MAE 271	STATICS	3
MAE 211	INTRO COMPUTATIONAL TOOLS	2
MAE 299	MAE MENTORING I	0
Term Semester Hours:		16
Spring		
MA 238	APPL DIFFERENTIAL EQUATIONS	3
MAE 272	DYNAMICS	3
MAE 284	NUMERICAL METHODS	3
MAE 370 & MAE 375	MECHANICS OF MATERIALS and MECHANICS OF MATERIALS LAB	4
MAE 200	PRINC AERONAUTICS ASTRONAUTI	3
Term Semester Hours:		16

Year 3

Fall		
MAE 341	THERMODYNAMICS I	3
MAE 330 & MAE 331	FUNDAMENTALS AERODYNAMICS and AERODYNAMICS LAB	4
MAE 371	AEROSPACE STRUCTURES	3
EE 213	ELECTRICAL CIRCUIT ANALYSIS I	3
MAE 399	MAE MENTORING II	0
Science Elective		3
Term Semester Hours:		16
Spring		

MAE 343	COMPRESSIBLE AERODYNAMICS	3
MAE 311	PRIN MEASUREMENT INSTRUMEN	3
ISE 321	ENGINEERING ECONOMY	3
MAE 488	ANALY ENGINEERING SYSTEM	3
Fine Arts/Humanities/Social Behavioral Science		6
Term Semester Hours:		18
Year 4		
Fall		
MAE 490	SENIOR DESIGN I	3
MAE 480	AIRCRAFT STABILITY CONTROL	3
MAE 440	ROCKET PROPULSION I	3
or MAE 441	or AIRBREATHING PROPULSION	
Technical Elective		3
Fine Arts/Humanities/Social Behavioral Science		3
Term Semester Hours:		15
Spring		
MAE 471	ADV AEROSPACE STR MTRLs	3
MAE 468	ELEMENTS OF SPACECRAFT DESIGN	3
MAE 491	SENIOR DESIGN II	3
Technical Elective		3
Fine Arts/Humanities/Social Behavioral Science		3
Term Semester Hours:		15
Total Semester Hours:		128

Mechanical Engineering, BSME

To obtain a Bachelor of Science degree in Mechanical Engineering, students are required to complete the following courses:

Code	Title	Semester Hours
Freshman Composition		3-6
EH 101	COLLEGE WRITING I	
EH 102	COLLEGE WRITING II	
Humanities and Fine Arts		9
Fine Art: Choose one		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
MU 100	INTRO TO MUSIC LITERATURE	
Literature: Choose one or two ¹		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 242	MYTHOLOGY	
Humanities: Choose one		3
PHL 101	INTRODUCTION TO PHILOSOPHY	
PHL 102	INTRO TO ETHICS	
PHL 103	INTRODUCTION TO LOGIC	
PHL 150	TECH, SCIENCE & HUMAN VALUES	

Any 100 or 200 level Foreign Language ³

WGS 200	INTRO WOMEN'S & GENDER STUDIES	
Mathematics and Natural Sciences		12
Mathematics		4
MA 171	CALCULUS A ²	
Natural Sciences		8
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
History and Social and Behavioral Sciences		9
History: Choose one or two ¹		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Science: Choose one or two		3-6
PY 101	GENERAL PSYCHOLOGY I	
SOC 100	INTRO TO SOCIOLOGY	
SOC 102	ANALYSIS OF SOCIAL PROBLEMS	
SOC 105	INTRO CULTURAL ANTHROPOLOGY	
SOC 206	MARRIAGE AND FAMILY	
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
ESS 105	WORLD REGIONAL GEOGRAPHY	
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	

Code	Title	Semester Hours
Additional Mathematics and Science		
MA 172	CALCULUS B	4
MA 201	CALCULUS C	4
MA 238	APPL DIFFERENTIAL EQUATIONS	3
MA 244	INTRO TO LINEAR ALGEBRA	3
PH 112	GEN PHYSICS W/CALC II	3
PH 115	GENERAL PHYSICS LAB II	1
Select one of the following electives:		3-4
BYS 119	PRINCIPLES OF BIOLOGY	
CH 123	GENERAL CHEMISTRY II	
PH 113	GEN PHYSICS W/CALC III	
Any 300 or 400 level Mathematics		
Engineering		
FYE 101	CHARGER SUCCESS	1
ENG 101	INTRO COMPUTING ENGINEERS	3
MAE 299	MAE MENTORING I	0
MAE 399	MAE MENTORING II	0
Mechanical Engineering		
MAE 211	INTRO COMPUTATIONAL TOOLS	2
EE 213	ELECTRICAL CIRCUIT ANALYSIS I	3
MAE 271	STATICS	3

MAE 272	DYNAMICS	3
MAE 284	NUMERICAL METHODS	3
MAE 310	FLUID MECHANICS I	3
MAE 311	PRIN MEASUREMENT & INSTRUMEN	3
ISE 321	ENGINEERING ECONOMY	3
MAE 341	THERMODYNAMICS I	3
MAE 342	THERMODYNAMICS II	3
MAE 364	KINEMATICS/DYNAM MACHINE	3
MAE 370 & MAE 375	MECHANICS OF MATERIALS and MECHANICS OF MATERIALS LAB	4
MAE 378	MATERIALS & MFG PROCESS	3
MAE 450	INTRO TO HEAT & MASS TRANSFER	3
MAE 455	DESIGN OF THERMAL SYSTEMS	3
MAE 466	MECH & DSGN MACH ELEMENT	3
MAE 488	ANALY ENGINEERING SYSTEM	3
MAE 489	COMPUTER AIDED ENGR	3
MAE 490	SENIOR DESIGN I	3
MAE 491	SENIOR DESIGN II	3

Mechanical Engineering Technical Electives

Select 6 semester hours from the MAE Approved Technical Electives List 6

ME students may not take both MA 385 AND ISE 390 for credit. ME students may not take MAE 330/331 for credit.

Total Semester Hours 128

- ¹ Students must take one literature and one history course. Students must also take either a second literature or history course to complete a sequence (EH 207 + EH 208, EH 209 + EH 210, HY 103 + HY 104, or HY 221 + HY 222).
- ² Based on Math placement, prerequisite (MA 112 and/or MA 113) Mathematics courses may be required.
- ³ For choices see the World Languages and Cultures department.

Suggested Schedule for Full-Time Students**Year 1**

Fall		Semester Hours
MA 171	CALCULUS A	4
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	4
EH 101	COLLEGE WRITING I	3
ENG 101	INTRO COMPUTING ENGINEERS	3
HSBS/HFA		3
Term Semester Hours:		17
Spring		
MA 172	CALCULUS B	4
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	4
FYE 101	CHARGER SUCCESS	1
EH 102	COLLEGE WRITING II	3
HSBS/HFA		3
Term Semester Hours:		15

Year 2

Fall		
MA 201	CALCULUS C	4
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	4
MA 244	INTRO TO LINEAR ALGEBRA	3
MAE 211	INTRO COMPUTATIONAL TOOLS	2

MAE 271	STATICS	3
MAE 299	MAE MENTORING I	0
Term Semester Hours:		16
Spring		
MA 238	APPL DIFFERENTIAL EQUATIONS	3
MAE 272	DYNAMICS	3
MAE 284	NUMERICAL METHODS	3
ISE 321	ENGINEERING ECONOMY	3
HSBS/HFA		3
Science Elective		3
Term Semester Hours:		18
Year 3		
Fall		
MAE 341	THERMODYNAMICS I	3
MAE 310	FLUID MECHANICS I	3
MAE 370 & MAE 375	MECHANICS OF MATERIALS and MECHANICS OF MATERIALS LAB	4
EE 213	ELECTRICAL CIRCUIT ANALYSIS I	3
MAE 399	MAE MENTORING II	0
HSBS/HFA		3
Term Semester Hours:		16
Spring		
MAE 311	PRIN MEASUREMENT INSTRUMEN	3
MAE 342	THERMODYNAMICS II	3
MAE 364	KINEMATICS/DYNAM MACHINE	3
MAE 378	MATERIALS MFG PROCESS	3
HSBS/HFA		3
Term Semester Hours:		15
Year 4		
Fall		
MAE 450 & MAE 451	INTRO TO HEAT & MASS TRANSFER and HEAT & MASS TRANSFER LAB	4
MAE 466	MECH DSGN MACH ELEMENT	3
MAE 489	COMPUTER AIDED ENGR	3
MAE 490	SENIOR DESIGN I	3
Technical Elective		3
Term Semester Hours:		16
Spring		
MAE 455	DESIGN OF THERMAL SYSTEMS	3
MAE 488	ANALY ENGINEERING SYSTEM	3
MAE 491	SENIOR DESIGN II	3
Technical Elective		3
HSBS/HFA		3
Term Semester Hours:		15
Total Semester Hours:		128

Honors College

Dr. William S. Wilkerson, Dean
 104 Frank Franz Hall
 Telephone: 256.824.6450
[uah.edu/honors](http://www.uah.edu/honors/) (<http://www.uah.edu/honors/>)

The Honors College at the University of Alabama in Huntsville provides academically talented undergraduate students with an elite college experience at a large research university. It offers enriched coursework, research opportunities, and a community of like-minded students.

The Honors College serves students in all the colleges. While students are encouraged to join the Honors College at the beginning of their freshman year to gain full advantage of its benefits and enhanced curriculum, the College welcomes qualified current UAH or transfer students. All interested students must apply through the Honors College website: [uah.edu/honors](http://www.uah.edu/honors/) (<http://www.uah.edu/honors/>). Minimum requirements are a 28 ACT and a 3.5 high school GPA. In special cases, because of the holistic review of the application, students who fall below the minimum GPA standards may be accepted. Current and transfer students must have a college GPA of 3.25 or higher and must complete the full application.

The Honors College grants either an Honors Diploma or an Honors Certificate, depending on the number of Honors Credits earned. The Diploma and the Certificate are in the student's chosen field or fields and appear on both the physical Diploma and the official transcript. The Honors Diploma or the Certificate add little extra coursework to the degree: both are mostly accomplished by taking Honors sections of courses students would already take. Please see the tabs above for more information about the requirements for the Diploma and the Certificate.

Whether students seek the Honors Diploma or the Certificate, they must complete an Honors Capstone Project or Thesis. This is independent work students typically do in their major field. It is done under close faculty supervision, and it can be either a traditional research thesis or a project, such as a computer application, an art installation, or a collection of stories. More information about the Capstone can be found at [uah.edu/honors](http://www.uah.edu/honors/) (<http://www.uah.edu/honors/>).

Honors courses come in three kinds:

1. Self-standing Honors Sections, which replace courses students would already take. These are smaller, more intensive, but not more work. They are designated with an "H" section number ("PHL 101-H1" vs. "PHL 101-01").
2. Honors contract courses: any course can be made an Honors Course if the instructor and the student agree on a way to enrich the course and obtain the Honors Dean's signature on the contract. The electronic forms for this contract can be found on the Honors College website.
3. Courses offered by the Honors College. These can be special, interdisciplinary seminars, such as "The Art of Writing Science" or "Poverty in the U.S.," or they can take the form of the Honors Internship or Honors Capstone course. See the tab above to see Honors offerings for this academic year.

Honors Diploma Requirements

The following summarizes the requirements for receiving the Honors Diploma. For college specific information, refer to the Honors Advising webpage or the Honors Student Handbook at uah.edu/honors (<http://uah.edu/honors/>).

- **First-time freshmen pursue the Honors Diploma**
- **24 or more semester hours of Honors course credit**
- **Satisfactory completion of the Honors Capstone Project or Thesis**
- **An overall 3.25 GPA at graduation**
- **Required courses:**
 - EH 105: Honors English Seminar - 3 semester hours
 - HON 101: Intro to Honors Research
 - 300/400 level Honors courses – 6 semester hours
 - Honors Capstone Thesis/Project course - (3 semester hours in HON or your department)
- Remaining Honors courses may come in the following categories:
 - Honors sections of regular courses (ex: PHL 101)
 - Specially designed courses just for Honors (ex: EH 209/EH 210)
 - Honors lab sections including lecture credit (ex: BYS 119/BYS 119L)
 - Honors Special Seminars
 - Honors Contracts
 - Honors Internships

For more information on Honors courses, see the Honors College Handbook (https://www.uah.edu/images/administrative/Honors/Information/honors_college_handbook_2017-2018.pdf).

Honors Certificate Requirements

Students who want to participate in the Honors College but who may not be able to complete the entire 24 honors credit hour requirement have the choice to pursue the Honors Certificate of Completion of Upper-Level Requirements. Please talk to the Honors Office first; you may still be able to complete the full Honors Diploma. Requirements for the Certificate are as follows:

- **12-23 semester hours of Honors courses**
- **Satisfactory completion of the Honors Capstone Project or Thesis**

- **An overall 3.25 GPA at graduation**
- **Additional requirements involve:**
 - 3 hours from any 300 or 400 level course (or Honors contract)

For more information on Honors courses, please see the Honors College Handbook (https://www.uah.edu/images/administrative/Honors/Information/honors_college_handbook_2017-2018.pdf).

Honors Courses

HON 101 - INTRO TO HONORS RESEARCH

Semester Hour: 1

Introduction to research methods and information literacy for new Honors Students. Helps students transition to research and coursework commensurate with Honors College standards.

HON 201 - SCHOLARSHIPS GRAD SCHOOL

Semester Hour: 1

Assist select Honors Students to prepare and apply for prestigious national scholarships and top graduate programs.

HON 301 - HONORS SPECIAL SEMINAR

Semester Hours: 1-2

Intensive, discussion-based, interdisciplinary exploration of contemporary topics in the sciences, social sciences, humanities, and engineering. Topics will be decided by instructors and will vary by term. May be team taught. Open only to Honors Students.

HON 399 - HONORS INTERDISCIPLINARY SEM

Semester Hours: 3

Interdisciplinary study of a selected topic. The seminar will facilitate serious appraisal of an issue that crosses disciplinary boundaries and that can be explored using different scholarly methodologies. Prerequisites: Admission to the Honors College.

HON 400 - HONORS INTERNSHIP

Semester Hours: 1-6

Active involvement in a business enterprise, professional organization, or government agency that has particular interest and relevance to the student's course of study. The outside entity must identify a mentor who will keep regular contact with the student. Requires the student to maintain a log of activities and produce a semester-end report. Course grade will be given on a satisfactory (S)/unsatisfactory (U) basis. Approval of the Honors College Dean. Prerequisites: Admission to the Honors College.

HON 401 - HON ENGINEERING CAPSTONE

Semester Hour: 1

Course provides support and mentoring for Honors Students wishing to use their Engineering Senior Design course to complete their Honors Capstone.

HON 499 - HONORS THESIS

Semester Hours: 1-3

Individual research under direction of a faculty advisor. May be taken for up to 6 semester hours of credit. Prerequisites: Admission to the Honors College.

Honors Sections offered in the following courses:

ARS 160 - DRAWING: FOUNDATIONS

Semester Hours: 3

Introduction to principles, materials, and techniques of drawing. Observational drawing and exercises teach students visual skills and introduce aesthetics and artistic expression. Class covers visual and manual skills, problem solving, critical thinking, and the tools and materials artists use.

BYS 119L - LABORATORY

Semester Hours: 0

Laboratory exercised to introduce students to accurate measurement techniques, observation, and the development of relevant hypotheses. Several formal lab reports are required as an introduction to scientific writing.

BYS 120L - ORGANISMAL BIOLOGY LAB

Semester Hours: 0

Introduction to the basic concepts of natural selection, population biology, and the biodiversity of animals and plants. Several formal lab reports are required as a further introduction to scientific writing, along with a lab practical on the biodiversity of animals and plants.

BYS 499 - UNGRAD HONORS RES & THESIS

Semester Hours: 2-4

Individual investigations into biological problems under direct supervision of instructor. For honors students majoring in the biological sciences. Prerequisites: Approval of instructor, chair, and director of honors program; Senior Standing.

CH 125 - GENERAL CHEMISTRY LAB I

Semester Hour: 1

Complements the lecture material for CH 121. Includes the determination of chemical and physical properties of materials, synthesis and characterization, and introduction to spectroscopy. Prerequisite with concurrency: CH 121.

CM 113 - Intro to Rhetorical Communication

Semester Hours: 3

Develops public speaking skills through an examination of rhetorical theory, training, and practice. Includes informative, persuasive, and other forms of speeches to prepare students for oral presentations in college and post-college ('real world') settings.

ECN 142 - PRINC OF MACROECONOMICS

Semester Hours: 3

How does our economy function? Why do we have periods of unemployment and inflation and what can we do about it? Economics is a way of thinking about the world, how to identify and focus on fundamental issues so we can understand our economy and how monetary and fiscal policy affects our lives. Prerequisite: any 100 level or 200 level MA course.

ECN 143 - PRINC OF MICROECONOMICS

Semester Hours: 3

How do markets coordinate our unlimited wants with our limited capacity to produce? We study producer and consumer choice in a variety of market structures, the social welfare implications inherent in market systems and policies designed to correct those market failures. Prerequisite: Any 100 level or 200 level MA course.

EE 213 - ELECTRICAL CIRCUIT ANALYSIS I

Semester Hours: 3

Basic concepts of DC and AC circuit theory and analysis. Includes both DC and AC power. Prerequisites: MA 201 and PH 112 both w/concurrency.

EH 105 - HONORS ENGLISH SEMINAR

Semester Hours: 3

Interpretive and comparative readings in texts of enduring intellectual, esthetic, and ethical importance; critical and analytic writing and research projects. Grading Scale: A, B, C, D, F. Minimum grade of C- required to advance to 200-level English classes. Prerequisites: Formal admission to the University Honors Program.

EH 209 - HONORS SEM READINGS LIT/CUL I

Semester Hours: 3

Critical analysis of texts from ancient times through the Age of Discovery. The course offers an in-depth examination of important works and their cultural contexts in a seminar format. Prerequisite: EH 102 or EH 103 or EH 105, and Honor's College Student.

EH 210 - HONORS SEM READINGS LIT/CUL 2

Semester Hours: 3

Critical analysis of texts from the Age of Discovery through the present. The course offers an in-depth examination of important works and their cultural contexts in a seminar format. Prerequisite: EH 102 or EH 103 or EH 105, and Honor's College Student.

EH 301 - TECHNICAL WRITING

Semester Hours: 3

Practical writing, especially technical or scientific reports and proposals, with emphasis on organization, research, and presentation. Qualifies as elective in English major. Does not count toward English minor except Cognate Studies in Technical Writing. Junior Standing. Prerequisite: EH 102 or EH 103 or EH 105.

ENG 101 - INTRO COMPUTING ENGINEERS

Semester Hours: 3

Introduces students to the fundamental principles of programming for solving engineering problems. It familiarizes students with the process of computational thinking and the translation of real-life engineering to computational problems. Languages may include Matlab, Python, and others as appropriate. Prerequisites: MA 113 w/concurrency or Math placement level 2000.

ESS 103L - LABORATORY

Semester Hours: 0

HY 103 - WORLD HISTORY TO 1500

Semester Hours: 3

Explore the historical development of peoples and cultures from their beginnings to 1500. Trace cross-cultural interactions among societies, states, and economies of Asia, Europe, Africa, the Americas and Oceania.

HY 104 - WORLD HISTORY SINCE 1500

Semester Hours: 3

Explore global interdependence from the period of transoceanic exploration to the present. Trace cross-cultural interactions among societies, states, and economies of Asia, Europe, Africa, the Americas, and Oceania.

MA 171 - CALCULUS A

Semester Hours: 4

Limits, derivatives, applications of the derivative, definite and indefinite integrals, exponential and logarithmic functions, and inverse functions.

Prerequisites: MA 113 or MA 115 with a grade of C or better, or Level 3 placement.

MA 172 - CALCULUS B

Semester Hours: 4

Techniques of integration, applications of the integral, polar coordinates, sequences, series, and conic sections. Prerequisites: MA 171 with a grade of C or better.

MA 201 - CALCULUS C

Semester Hours: 4

Vectors, vector-valued functions, partial derivatives, multiple integrals, vector fields, line and surface integrals. Prerequisites: MA 172 with a grade of C or better.

MA 238 - APPL DIFFERENTIAL EQUATIONS

Semester Hours: 3

This course provides an elementary introduction to the techniques and necessary theory for solving the basic differential equations usually encountered by beginning science and engineering students. General topics include analytical and graphical methods for solving and analyzing first order differential equations; Euler's numerical method; the basic theory of higher-order, linear differential equations, with major emphasis on equations with constant coefficients; variation of parameters; the Laplace transform as a tool for solving differential equations. MA 238 is an AGSC core course. Prerequisites: MA 172 & MA 201 with concurrency.

MAE 271 - STATICS

Semester Hours: 3

Topics include: forces, resultant forces, moments, couples equivalent force systems, equilibrium, distributed loads, two force members, trusses, centroids, moments of inertia, shear and bending moment diagrams, static and kinematic friction. (Same as CE 271) Prerequisites: PH 111, MA 201 and ENG 101.

MAE 345 - HONORS THERMODYNAMICS COLQ

Semester Hour: 1

Students in this course will be expected to participate in assigned readings and discussions to develop an understanding of the context behind the fundamental concepts and principles of thermodynamics. Through reflections students will be encouraged to apply this knowledge to develop their own creative ideas. Prerequisites with concurrency: MAE 341 or CHE 344.

MU 100 - INTRO TO MUSIC LITERATURE

Semester Hours: 3

Basic music appreciation. Exploration of ideas and issues in various types of western music through reading, listening, and discussion. Offered every semester.

NUR 307 - INQRY TO EVIDNC BASED NURS PRC

Semester Hours: 3

This course identifies various modes of inquiry and critical analysis used in the development of nursing science. Explore evidence based models to examine the evidence from a variety of research designs used to formulate nursing decisions. Emphasis is on identifying and synthesizing the best evidence to solve complex health problems in order to deliver safe, competent nursing care to diverse populations. Prerequisites: NUR 310 and NUR 312 and NUR 321.

NUR 415 - HONORS DIRECTED RESEARCH

Semester Hours: 2

This course allows for implementation of the student's research proposal as developed in the Honors section of NUR 307. The focus is on data collection and preliminary data analysis. The seminar format will provide students access to expert researchers.

PHL 101 - INTRODUCTION TO PHILOSOPHY

Semester Hours: 3

Introduction to philosophical reflection focusing upon central problems in the major branches of the western tradition: metaphysics, epistemology and value theory.

PHL 102 - INTRO TO ETHICS

Semester Hours: 3

Major ethical positions in both classical and modern thought. The course may include a consideration of case studies drawn from practical contexts in engineering, medicine and other areas.

PH 111 - GEN PHYSICS W/CALCULUS I

Semester Hours: 3

For science and engineering students. Basic laws of physics and their application to specific problems: vectors, Newtonian mechanics, energy, conservation laws, simple harmonic motion, statics, fluids. Offered all terms. Prerequisite: MA 171 Corequisite: PH 114.

PH 114 - GENERAL PHYSICS LAB I

Semester Hour: 1

Laboratory instruction in support of material covered in PH 111. Offered all terms. Corequisite: PH 111.

PH 112 - GEN PHYSICS W/CALC II

Semester Hours: 3

Continuation of PH 111. Heat and thermodynamics, basic electricity, electric and magnetic fields. Offered all terms. Prerequisite: MA 172, PH 111, PH 114. Corequisite: PH 115.

PH 115 - GENERAL PHYSICS LAB II

Semester Hour: 1

Laboratory instruction in support of material covered in PH 112. Offered all terms. Corequisite: PH 112.

SOC 100 - INTRO TO SOCIOLOGY

Semester Hours: 3

An introduction to the critical and scientific study of society, culture, social institutions and social change. Illuminates the social and cultural context of our lives and is useful for exploring contemporary social issues, problems and change in society.

College of Nursing

1610 Ben Graves Drive

Telephone: 256.824.6345

Email: nursing@uah.edu

Dean:

Marsha Howell Adams, PhD, RN, CNE, ANEF, FAAN, Professor

Mission

Educate and inspire individuals to become nurse leaders who act with integrity, discover through scientific methods, and advocate for the best health care experiences of people and communities in a complex and evolving health care environment. In collaboration with our university colleagues and community partners, we are committed to excellence through our teaching, scholarship, practice, and service.

Vision

To have a global reputation for transforming health care through innovative nursing practice, education, and research.

Core Values

- Integrity - Resolutely adhering to moral, ethical, and professional standards.
- Inspiration - Encouraging, role-modeling, and mentoring others to pursue their professional dreams.

- Caring - Acting with compassion and respecting all persons by embracing cultural humility, diversity, and person-centered care.
- Excellence - Pursuing and achieving goals of the highest caliber.
- Wellness - Maximizing well-being in different states of health.

Degrees and Certificates Offered

The College of Nursing offers the Bachelor of Science in Nursing (BSN), Master of Science in Nursing (MSN), Doctor of Nursing Practice (DNP), and Joint Nursing Science Ph.D. (UAH and UA) degrees. The College of Nursing also offers a Post-Master's Family Nurse Practitioner Certificate Program, and a Graduate Certificate in Nursing Education. The bachelor's program includes a track for students who are completing their initial nursing education (pre-licensure), a track for students currently licensed as registered nurses (RN-BSN), and a dual associates/bachelors track for students pursuing an Associates Degree in Nursing (ADN) while simultaneously pursuing a Bachelors of Science in Nursing degree.

Accreditation

The Baccalaureate Degree Program in Nursing at the University of Alabama in Huntsville (UAH) College of Nursing is accredited by the Commission on Collegiate Nursing Education (<http://ccneaccreditation.org/>). The undergraduate program is also approved by the Alabama Board of Nursing.

Bachelor of Science in Nursing

The College of Nursing offers the Bachelor of Science in Nursing (BSN) degree. The BSN degree includes a track for students who are completing their initial nursing education (pre-licensure), a track for students currently licensed as registered nurses (RN-BSN), and a dual associates/bachelors track for students pursuing an Associates Degree in Nursing (ADN) while simultaneously pursuing a Bachelors of Science in Nursing degree.

The undergraduate pre-licensure program prepares graduates to assume entry-level positions in a variety of health care settings. The program is divided into two components: the lower and upper divisions. Lower division general studies (prerequisite) courses provide a broad background in general education and form the foundation for the professional nursing component of the program. Upper division courses provide the theoretical and practical basis for nursing practice in the complex U.S. health care system. In addition to focusing on essentials of nursing in the hospital including the critical care area, the curriculum also emphasizes community and primary care. Opportunities to provide care to diverse clients are provided. Use of technology, including simulation and telehealth, is integrated throughout the program. The program prepares graduates for professional positions immediately after graduation and provides a firm foundation for graduate study. Students who earn the BSN degree are eligible to sit for the National Council Licensure Examination for Registered Nurses (NCLEX-RN). The guiding framework for the BSN Program is the *The Essentials of Baccalaureate Education for Professional Nursing Practice*.

The RN-BSN program is specifically designed for Registered Nurses with a diploma or associate degree and is offered online. Students who enroll in the full-time option may complete the nursing component of the program in one year. Part-time options are available as well. The college awards up to 42 semester hours of validated nursing credit to each registered nurse upon successful completion of the first semester.

The dual associates/bachelors nursing track is specifically designed for the ADN student and is offered online. Students are enrolled simultaneously in an ADN program and our online BSN program.

Program Objectives

1. Practice nursing as a generalist using scientific, ethical, legal, and professional standards as a basis for clinical judgment.
2. Translate research and utilize evidence-based practice to promote quality healthcare across diverse, vulnerable populations and cultures.
3. Examine healthcare policy, care delivery models, and organizational systems for current and future healthcare needs within the clinical setting.
4. Demonstrate characteristics of leadership and accountability to promote effective intra- and inter-professional communication and collaboration in healthcare systems.
5. Display proficiency in the use of patient care technologies, healthcare information systems, and communication devices to support safe and competent nursing practice.
6. Engage in lifelong learning and participate in professional activities that enhance the nursing profession.
7. Appraise health determinants to include personal, social, economic, and environmental factors that influence the health of individuals, families, groups, communities, and populations.

Advising and Assistance

The focus of advising in the College of Nursing (CON) is to assist students to successfully progress toward their educational objectives. All students taking classes at UAH in the lower division (100 and 200 level classes), those seeking admission to the upper division nursing courses (UAH or transfer students), and Registered Nurses (RNs) are advised in the CON Office of Undergraduate Programs. Advisors in the CON Office of Undergraduate Programs assist students to define and develop realistic educational and career plans. In addition, they monitor progress toward educational and career goals, approve all designated educational transactions such as schedules, drop/adds, withdrawals, and maintain advising records for each student. Advisors also refer students to other campus resources when needed.

All students use DegreeWorks in Banner Self Service to track their progress toward meeting the requirements of the program of study (POS).

Majors in Nursing

- Nursing, BSN (p. 388)
- Nursing, RN-BSN (p. 397)
- Nursing, Dual ADN/BSN (p. 396)

NUR 000 - NURSING-CREDIT BY VALIDATION

Semester Hours: 3-42

NUR 001 - NURSING TESTING BLOCK

Semester Hours: 0

Nursing Testing Block is a common block of time for students in different cohorts to take their examinations.

NUR 102 - MULTIDIMENSIONS OF NURSING

Semester Hours: 3

This course is designed for the student who has declared nursing as a major. Emphasis will be placed on the role of professional nurses working with clients and other health care professionals. The evolution of nursing as a profession will be examined and the student introduced to the health care delivery system.

NUR 201 - MULTIDIM ASPECTS HL CAREER OPT

Semester Hours: 3

This course is designed for the student who wishes to explore a career in the health care professions as a potential career path. Particular emphasis will be placed on the role of health care providers working in partnership with clients to promote health states and prevent disease.

NUR 202 - HEALTHY LIVING LIFESPAN

Semester Hours: 3

This class will focus on health and wellness across the lifespan, with an emphasis on promoting healthy living and preventing illness. It is designed to develop health literacy and to identify ways to put healthy ideas into practice. Diverse perceptions and beliefs related to health are explored and strategies to optimize health are presented.

NUR 220 - HEALTH PROMOTION NUR MAJORS

Semester Hours: 3

The focus of this class is on health and high-level wellness across the lifespan, with an emphasis on promoting healthy living and preventing illness. Diverse perceptions and beliefs related to health and wellness are explored, and ways to put healthy ideas into practice are applied. Medical terminology to improve healthcare communication is incorporated into the course.

NUR 301 - Professional Concepts in Nursing

Semester Hours: 2

This course will focus on development using concepts and theories basic to the art and science of nursing. Students are introduced to the concepts of communication, teaching/learning, clinical decision making, ethical, legal, nursing history, and philosophy for knowledge development of the discipline. Prerequisites with concurrency: NUR 303, 304, 309, and 311.

NUR 302 - NURSING & HEALTH PROMOTION

Semester Hours: 3

Focus on nursing, health, and wellness across the life span. Emphasis on health promotion and prevention of illness. Strategies to optimize health are presented. Perceptions and beliefs related to health, illness, disease, and cultural diversity are explored as are mechanisms for promoting health through politics and the health care delivery system.

NUR 303 - HEALTH ASSESSMENT

Semester Hours: 4

Focus on holistic assessment of culturally diverse clients across the life span. Communication & psychomotor skills are developed in clinical laboratory settings with an emphasis on normal findings and health promotion.

NUR 303L - CLINICAL

Semester Hours: 0

NUR 304 - APP PATHOPHYSIOLOGY LIFESPAN

Semester Hours: 3

The course is designed to help the student build on previous knowledge of anatomy and physiology and microbiology. Adaptations and alterations in health status throughout the lifespan are emphasized. Students explore the implications of lifestyle to pathology within a nursing framework, and learn to relate normal body functioning to the pathophysiological changes that occur in, and as a result of disease.

NUR 305 - NUR PROC MENTAL HLTH/ILLNESS

Semester Hours: 4

Nursing process in the promotion of psychosocial integrity. Emphasis is on the therapeutic use of self through providing interventions for individuals and groups in a variety of settings. Prerequisites: NUR 310 and NUR 312 and NUR 321.

NUR 305L - CLINICAL

Semester Hours: 0

NUR 307 - INQRY TO EVIDNC BASED NURS PRC

Semester Hours: 3

This course identifies various modes of inquiry and critical analysis used in the development of nursing science. Explore evidence based models to examine the evidence from a variety of research designs used to formulate nursing decisions. Emphasis is on identifying and synthesizing the best evidence to solve complex health problems in order to deliver safe, competent nursing care to diverse populations. Prerequisites: NUR 310 and NUR 312 and NUR 321.

NUR 308 - NURS CARE ADULTS ALTER HLTH

Semester Hours: 8

This course focuses on the application of the nursing process in the collaborative nursing management of adult clients experiencing simple to complex physiological health alterations. Clinical experiences provide opportunities for beginning to intermediate clinical reasoning in the acute care environment. The embodiment of professionalism and professional values are emphasized. Prerequisites: NUR 310 and NUR 312 and NUR 321.

NUR 308L - CLINICAL

Semester Hours: 0

NUR 309 - CLINICAL INFORMATICS

Semester Hours: 2

This course is designed to introduce clinical informatics as a tool to improve healthcare systems through safe, ethical, and evidence-based practice. Advances in technology, data management, and decision support software are explored. Competencies in basic computer skills are also included in the course to improve information literacy. Prerequisites with concurrency: NUR 301, 303, 304, and 311.

NUR 310 - PROFESSIONAL PRACTICE NURS I

Semester Hours: 6

This course will begin the process of learning foundational nursing skills to be used in nursing practice. Psychomotor nursing skills needed to assist individuals meet basic human needs will be taught with expectation the student will demonstrate competency in performing skills. Laboratory and clinical experiences are included. Prerequisites: NUR 301, NUR 303, NUR 304, NUR 309, NUR 311.

NUR 310L - CLINICAL

Semester Hours: 0

NUR 311 - CLINICAL CALCULATIONS

Semester Hour: 1

In this course, students will learn to accurately calculate medication dosages. Testing in this course will establish minimal medication calculation proficiency required to progress to the second semester of the nursing program. Prerequisites with concurrency: NUR 301, 304, 303, and 309.

NUR 312 - GERO NURSING CARE

Semester Hours: 3

This course is designed to focus on current health care issues affecting the older adult. Physical, psychological, sociocultural, and spiritual aspects of aging are examined within the context of the family and society. The course applies the nursing process with emphasis on optimal health for the older adult. Prerequisites: NUR 301, 303, 304, 309, and 311. Prerequisite with concurrency: NUR 310 and 321.

NUR 312L - CLINICAL

Semester Hours: 0

This is the clinical component of the Gerontological Nursing Care course. The course will focus on current health care issues affecting the older adult. Physical, psychological, sociocultural, and spiritual aspects of aging are examined within the context of the family and society. The course applies the nursing process with emphasis on optimal health for the older adult.

NUR 321 - PHARMACOLOGY IN NURS

Semester Hours: 3

This course comprises pharmacological concepts incorporating an overview of historical and current issues in drug therapy. Pharmacotherapeutics, pharmacodynamics, pharmacokinetics, contraindications and precautions for prototype drugs for multiple body systems are presented. Major emphasis is placed on nursing management practices using nursing process as well as the nurses' role in optimizing reliable medication administration.

Prerequisites: NUR 301, 303, 304, 309, 311.

NUR 336 - SPIRITUALITY IN NURSING

Semester Hours: 3

Spirituality aspects of client, family and community care are the focus of this course. The course reviews the history of spirituality in nursing care. The nurses' role in meeting the spiritual needs of clients throughout the lifespan is explored.

NUR 339 - INFO MGMT IN HEALTHCARE

Semester Hours: 3

This course is designed to introduce information management, including decision support systems. The use of information management nomenclature is integrated into the learning activities. The role of the nurse as an advocate in improving patient outcomes using data management is explored. Safety, ethical, and legal concerns are addressed. Prerequisite: NUR 410.

NUR 390 - INDEPENDENT STUDY

Semester Hours: 1-4

Individualized independent study of specific nursing problem under sponsorship of a nursing faculty member with special preparation in the field. Elective.

NUR 391 - GLOBAL HEALTH

Semester Hour: 1

NUR 400 - SPECIAL TOPICS

Semester Hours: 3

NUR 401 - NURS CARE CRITICALLY ILL ADULT

Semester Hours: 5

This course explores the evidence-based collaborative nursing management of clients experiencing complex physiological health alterations. Clinical experiences will provide opportunities for advanced clinical reasoning in the acute and critical care environments. Prerequisites: NUR 305 and NUR 307 and NUR 308.

NUR 401L - CLINICAL

Semester Hours: 0

NUR 402 - POPULATION BASED HLTH CARE

Semester Hours: 3

Promotion of health, prevention of disease in at-risk aggregate populations. Examines complex problems and health care policy. Open to all university students.

NUR 402L - CLINICAL EXPERIENCE

Semester Hours: 0

NUR 403 - MATERNAL INFANT NURSING

Semester Hours: 4

This course explores internal and external factors, which impact the health of the family during the antepartal, intrapartal, postpartal and neonatal periods of childbearing. Emphasis is placed on nursing care of these clients, normal physiology, pathophysiology, psychological and sociocultural needs, and risk identification and reduction. Prerequisites: NUR 305 and NUR 307 and NUR 308 and NUR 321.

NUR 403L - CLINICAL

Semester Hours: 0

NUR 404 - FAMILY-CENTER NUR CARE CHILDRE

Semester Hours: 4

This course is designed to introduce the concept of family centered pediatric care that is developmentally appropriate for a culturally diverse population. Clinical experiences in selected agencies. Prerequisites: NUR 301 and NUR 307 and NUR 308 and NUR 321.

NUR 404L - CLINICAL

Semester Hours: 0

NUR 405 - COMMUNITY HEALTH NURS

Semester Hours: 4

The course explores the community as client and teaches concepts and knowledge necessary to promote the health of the public and communities. Emphasis is on community health theory, individual, family, and community assessment, aspects of epidemiology, program planning and evaluation, trends and issues, legislation, ethics, research, health care economics and disaster management. Prerequisites: NUR 401 and NUR 403 and NUR 404.

NUR 405L - CLINICAL EXPERIENCE

Semester Hours: 0

NUR 406 - LEADERSHIP & MGMT IN NURSING

Semester Hours: 3

Describes and analyzes selected theories of management and leadership in health care systems with focus on broadening students' knowledge base and skills as they relate to entry-level nursing management. Organization structures and dynamics as well as pertinent issues and trends are addressed.

NUR 407 - PROF PRACTICE IN NURSING II

Semester Hours: 8

The focus of this course is the leadership and management functions of professional nursing. Essential skills are communication, interprofessional collaboration, delegation, coordination, and the application of evidence-based practice models. Clinical experiences will focus on performance of the professional nurse role in a concentrated practicum. Prerequisites: NUR 401 and NUR 403 and NUR 404.

NUR 407L - CLINICAL EXPERIENCE

Semester Hours: 0

NUR 408 - PROF PRAC IN NURS III SEMINAR

Semester Hours: 2

The purpose of this class is to facilitate the synthesis of knowledge, the application of critical thinking to decisions about patient care, and to ensure safe and competent nursing practice. Test-taking skills and time management concepts will be applied in preparation of the NCLEX-RN licensure exam. Prerequisites: NUR 407.

NUR 410 - TRANSITION INTO PROFESSIONAL ROLES

Semester Hours: 3

The course examines the multi-dimensional role of the professional nurse in health systems. Through the analysis of a paradigm case and development of a personal philosophy of nursing, the student evaluates professional practice and develops goals designed to guide learning and professional development. Philosophical, social, political, legal, and ethical issues inherent in the practice of professional nursing in health systems are discussed.

NUR 411 - THEORETICAL APPL IN PROF NURS

Semester Hours: 3

Designed for registered nurse students to synthesize knowledge gained from previous nursing experience when analyzing theories, issues and concepts that influence professional nursing practice. Theoretical concepts, which influence critical thinking, are applied to the nursing process. Analysis of normal processes and professional nursing responses to alterations in life processes across the lifespan are examined. Caring for diverse clients is emphasized. Ethical and legal issues which impact the care for client systems are examined when synthesizing theoretical and nursing practice issues.

NUR 412 - CARE FOR AGGREGATES, FAM & POP

Semester Hours: 7

Designed for registered nurse students to apply theoretical concepts related to primary, secondary, and tertiary care of aggregates. Emphasis is on application of the nursing process in promoting community health for at-risk aggregate populations and is delivered in an on-line format. Course objectives are designed to meet the individual learning needs of the student in delivering and managing care of selected families with emphasis on the aggregate. Prerequisites: NUR 339 and NUR 410.

NUR 412L - CLINICAL EXPERIENCE

Semester Hours: 0

NUR 413 - LEADERSHIP PROF NURS PRACT

Semester Hours: 5

4 course / 1 clinical Designed to improve leadership in professional nursing practice, this course provides the basis for advancing health through leading and managing the care giver and care coordinator roles in a variety of culturally diverse healthcare systems. The exploration of the health care environment takes place within the context of organizational climate and culture, leading change and innovation and promoting excellence in professionalism. Students apply leadership principles through case study and the development of a clinical change project within indirect practice experiences. Prerequisite with concurrency: NUR 410.

NUR 415 - HONORS DIRECTED RESEARCH

Semester Hours: 2

This course allows for implementation of the student's research proposal as developed in the Honors section of NUR 307. The focus is on data collection and preliminary data analysis. The seminar format will provide students access to expert researchers.

NUR 416 - HONORS RESEARCH SEMINAR

Semester Hour: 1

The focus of this seminar is completion of final research report, as begun in NUR 307 and NUR 415.

NUR 417 - NURS CARE VUL POP

Semester Hours: 4

This course examines health determinants and health disparities within the US as well as in the global community. The student will examine health disparities and the burden of disease within social, cultural, political, economic, and environmental contexts. Students will examine strategies aimed at risk reduction and improvement through outcomes. Prerequisite with concurrency: NUR 410.

NUR 419 - SCHOLRY INQUIRY IN NURSING PRA

Semester Hours: 3

Focuses on the various modes of inquiry used in the development of nursing science. Emphasis on the critical examination of nursing research including methodologies, utilization, and theoretical bases.

NUR 420 - EVIDENCE BASED NURS PRACTICE

Semester Hours: 3

This course focuses on developing the nurse to be an 'evidence user' for the purpose of improving healthcare outcomes. Emphasis is on the critical analysis of evidence to be used in formulating nursing decisions and the design of client care guidelines. Structured for the registered nurse student.

NUR 421 - AC CARE FOR PROFESSIONAL NURSE

Semester Hours: 3

2 Course / 1 Clinical The nursing process is applied to clients experiencing physiological health alterations requiring complex and collaborative nursing strategies and appropriate resource management. Direct practice experiences are focused on conducting comprehensive assessments and care planning with the interprofessional team. Prerequisite with concurrency: NUR 410.

NUR 422 - COMMUNITY HEALTH FOR PROF NURS

Semester Hours: 5

4 course/1 clinical. This course is designed to provide the application of theoretical concepts related to primary, secondary, and tertiary care of families and aggregates in professional nursing practice. Emphasis is on application of the nursing process in assessing social determinants of health and promoting community health for diverse communities. Application of direct practice experience activities are designed to meet individual learning needs of the student in delivering and managing care of selected aggregate populations. Prerequisite with concurrency: NUR 410.

NUR 423 - EVID BASED PRACTICE PROFESS NU

Semester Hours: 3

This course fosters the application of the best clinical evidence into practice in order to promote improvement in healthcare experiences and patient outcomes. Various modes of scientific inquiry used in the development of nursing science are incorporated into a survey of research techniques, methodologies, and ethical concerns. This will enable students to select and evaluate appropriate information relevant to evidence based practice. Students will develop skills in the use of electronic databases to facilitate acquisition of current information. Emphasis is placed on the critical analysis of evidence to be used in formulating nursing decisions and the design of client care guidelines. Prerequisite: NUR 410.

NUR 426 - SPACE LIFE SCIENCES

Semester Hours: 3

Theories and concepts of contemporary issues in health and nursing related to space life sciences.

NUR 427 - INTRODUCTION TO FORENSICS

Semester Hours: 3

This course provides an overview of the field of forensic nursing. Concepts of care for victims and family members of violence, abuse, traumatic accidents, and criminal activity are discussed. Current healthcare practices and medical/legal/ethical issues are reviewed. Elective, open to all university students.

NUR 428 - GERONTOLOGICAL NURSING

Semester Hours: 3

Nursing care of older adults in multiple settings. Issues and trends are incorporated.

NUR 430 - HLTH CARE WKFR:ISS/LDRSH STRAT

Semester Hours: 3

Description and analysis of contemporary issues regarding the health care workforce. Particular focus will be placed on the multifaceted nature of health care workforce shortages. Various models for analysis of workforce issues will be used and strategies being used will be examined. An evaluation of the nurse leader role in creating positive work environments and implementing solutions concludes the student experience.

NUR 434 - PALLIATIVE CARE

Semester Hours: 3

Palliative care is when there is no longer a medical treatment or cure for a physical problem. This palliative care course includes meeting the physical, emotional, social cultural and spiritual needs of individuals and their families. A course focus will be coping, grief, bereavement pain relief and managing living implications for individuals with life-threatening illnesses. There will be recognition of the importance of individuality, vulnerability, and resilience in the quality of living during the dying process.

NUR 437 - NURSING AS A POLITICAL FORCE

Semester Hours: 3

Overview of the legislative process and legislation relative to health care issues. The role of the professional nurse in the political climate is explored. Elective, open to all university students.

NUR 439 - NURSING MEDICAL MISSIONS

Semester Hours: 2

This course will examine concepts and issues associated with humanitarian and medical missions. Commonly occurring healthcare needs relevant to specific vulnerable populations will be analyzed in preparation for delivery of healthcare. The culmination of this course is a trip abroad to deliver healthcare to a population in need within the structure of a medical mission. This course is an accepted elective in the Nursing program. Prerequisite: NUR 303.

Nursing, BSN

Program of Study for Lower Division Courses

Students completing the lower division general studies (prerequisite courses) of the program at UAH should follow the program of study outlined below. Specific UAH courses that satisfy admission requirements are listed under the degree description. Students transferring from Alabama two-year colleges should follow the general studies curriculum approved by the Articulation and General Studies Committee (AGSC & STARS (<http://stars.troy.edu/>)). Students transferring from other institutions are encouraged to complete courses equivalent to those listed below:

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	

Humanities and Fine Arts

3-6

CM 113	Intro to Rhetorical Communication
WLC 101S	INTRO FOREIGN LANG I: SPANISH
or WLC 101A	INTRO FOREIGN LANG I: ARABIC
or WLC 101F	INTRO FOREIGN LANG I:FRENCH
or WLC 101G	INTRO FOREIGN LANG I:GERMAN
or WLC 101J	INTRO FOREIGN LANG I:JAPANESE
or WLC 101R	INTRO FOREIGN LANG I:RUSSIAN
WLC 102S	INTRO FOREIGN LANG II:SPANISH
or WLC 102A	INTRO FOREIGN LANG II: ARABIC
or WLC 102F	INTRO FOREIGN LANG II:FRENCH
or WLC 102G	INTRO FOREIGN LANG II:GERMAN
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN
WLC 201S	INTERM FOREIGN LANG:SPANISH
or WLC 201A	INTERM FOREIGN LANG I: ARABIC
or WLC 201F	INTERM FOREIGN LANG:FRENCH
or WLC 201G	INTERM FOREIGN LANG:GERMAN
or WLC 201J	INTERM FOREIGN LANG: JAPANESE
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN
WLC 202S	INTERM FOREIGN LANG II:SPANISH
or WLC 202A	INTERM FOREIGN LANG II: ARABIC
or WLC 202F	INTERM FOREIGN LANG II:FRENCH
or WLC 202G	INTERM FOREIGN LANG II:GERMAN
or WLC 202J	INTERM FORGN LANG II:JAPANESE
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN
WLC 204	INTERNATIONAL CINEMA
PHL 101	INTRODUCTION TO PHILOSOPHY
PHL 102	INTRO TO ETHICS
PHL 103	INTRODUCTION TO LOGIC
PHL 150	TECH, SCIENCE & HUMAN VALUES
WGS 200	INTRO WOMEN'S & GENDER STUDIES
AMS 229	ANCIENT & MEDIEVAL WORLDS
ARH 100	ARH SURV:ANCIENT-MEDIEVAL
ARH 101	ARH SURV:RENAISSANCE-MODERN
ARH 103	ARH SUR:NON-WESTERN TRADITIONS
ARS 160	DRAWING: FOUNDATIONS
TH 122	THEATRE APPRECIATION
TH 123	INTRO TO FILM STUDIES
MU 100	INTRO TO MUSIC LITERATURE

Area III: Mathematics and Sciences**11-12**

Mathematics

3-4

MA 105	NATURE OF MATHEMATICS
MA 107	ALGEBRA WITH APPLICATIONS
MA 110	FINITE MATHEMATICS
MA 112	PRECALCULUS ALGEBRA
MA 113	PRECALCULUS TRIGONOMETRY
MA 115	PRECALCULUS ALGEBRA & TRIG
MA 120	MATH PROFESSIONAL APPLICATIONS
MA 171	CALCULUS A

Natural Sciences (Lab)

8

AST 100	SURVEY OF ASTRONOMY
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AST 106	EXPLORING THE COSMOS I
AST 107	EXPLORING THE COSMOS II
BYS 109	FUNDAMENTALS OF BIOLOGY
BYS 119	PRINCIPLES OF BIOLOGY
BYS 120	ORGANISMAL BIOLOGY
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB
ESS 103	ENVIRONMENTAL EARTH SCIENCE
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG
PH 100	CONCEPTUAL PHYSICS
PH 101	GENERAL PHYSICS I
PH 102	GENERAL PHYSICS II
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III

Area IV: History and Social and Behavioral Sciences* **12**

History **3-6**

HY 103	WORLD HISTORY TO 1500
HY 104	WORLD HISTORY SINCE 1500
HY 221	UNITED STATES TO 1877
HY 222	UNITED STATES SINCE 1877

Social and Behavioral Sciences **6-9**

ECN 142	PRINC OF MACROECONOMICS
ECN 143	PRINC OF MICROECONOMICS
GS 200	GLOBAL SYSTEMS AND CULTURES
ESS 105	WORLD REGIONAL GEOGRAPHY
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY
PSC 101	INTRO TO AMERICAN GOVERNMENT
PSC 102	INTRO TO COMPARATIVE POLITICS
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS
PY 101	GENERAL PSYCHOLOGY I
PY 201	LIFE-SPAN DEVELOPMENT
SOC 100	INTRO TO SOCIOLOGY
SOC 102	ANALYSIS OF SOCIAL PROBLEMS
SOC 103	INTRO TO CRIMINOLOGY
SOC 105	INTRO CULTURAL ANTHROPOLOGY

Code	Title	Semester Hours
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Pre Professional **18**

Additional lower division BSN requirements		
BYS 214	INFECTION & IMMUNITY	
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I	

BYS 216	HUMAN ANATOMY & PHYSIOLOGY II	
NUR 220	HEALTH PROMOTION NUR MAJORS	
Choose one:		
PY 300	PSYCHOLOGICAL STATISTICS	
SOC 303	STATISTICS/SOCIAL SCIENCES	
MSC 287	BUSINESS STATISTICS I	
Total Lower Division Semester Hours		60

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Take no more than six hours in a single discipline in Area II or Area IV.

Upper Division Courses

The following upper Division courses are required for a baccalaureate degree in nursing. Contact the College of Nursing Office of Undergraduate Programs for the most current information.

For Pre-Licensure Students:

Code	Title	Semester Hours
NUR 001	NURSING TESTING BLOCK	0
NUR 301	Professional Concepts in Nursing	2
NUR 303	HEALTH ASSESSMENT	4
NUR 303L	CLINICAL	0
NUR 304	APP PATHOPHYSIOLOGY LIFESPAN	3
NUR 305	NUR PROC MENTAL HLTH/ILLNESS	4
NUR 305L	CLINICAL	0
NUR 307	INQRY TO EVIDNC BASED NURS PRC	3
NUR 308	NURS CARE ADULTS ALTER HLTH	9
NUR 308L	CLINICAL	0
NUR 309	CLINICAL INFORMATICS	2
NUR 310	PROFESSIONAL PRACTICE NURS I	6
NUR 310L	CLINICAL	0
NUR 311	CLINICAL CALCULATIONS	1
NUR 312	GERO NURSING CARE	3
NUR 312L	CLINICAL	0
NUR 321	PHARMACOLOGY IN NURS	3
NUR 401	NURS CARE CRITICALLY ILL ADULT	4
NUR 401L	CLINICAL	0
NUR 403	MATERNAL INFANT NURSING	4
NUR 403L	CLINICAL	0
NUR 404	FAMILY-CENTER NUR CARE CHILDRE	4
NUR 404L	CLINICAL	0
NUR 405	COMMUNITY HEALTH NURS	4
NUR 405L	CLINICAL EXPERIENCE	0
NUR 407	PROF PRACTICE IN NURSING II	8
NUR 407L	CLINICAL EXPERIENCE	0
NUR 408	PROF PRAC IN NURS III SEMINAR	2
Total BSN Semester Hours		126

Admission Policies

Students interested in pursuing a baccalaureate degree in nursing must meet the general entrance requirements of the University. Students should schedule advising as early as possible to ensure that the correct prerequisite courses for the upper division major are completed as required. Students are also encouraged to meet with a nursing advisor each semester to monitor their progress. All lower division general studies (prerequisites)

courses must be completed to be eligible to enroll in upper division courses. For information and assistance, contact the College of Nursing Office of Undergraduate Programs (256.824.6742).

Admission to the Upper Division BSN Program

Students must apply and be admitted to the upper division nursing program to be eligible to enroll in level 300 and 400 courses with clinical labs. Admission into the upper division nursing major is competitive, and spaces are limited. A separate nursing application (found on the UAH CON website (<https://www.uah.edu/nursing/degree-programs/bsn/bsn-admission/>)) for the upper division must be submitted by published dates. When the number of students applying to the upper division exceeds the number of spaces available, the most qualified applicants will be admitted. Those applicants who present the strongest academic records and who show the most promise for success in the upper division will be admitted. Enrollment at UAH as a nursing major in the lower division component does not assure admission to the upper division/professional component. Students admitted into the Early Promotion into Nursing Program (EPNP) as freshman are exempt from these criteria unless they do not maintain their eligibility for EPNP. Students will be notified within four weeks of the application deadlines of admission status.

Enrollment in the upper division nursing component is limited and competitive. Students are admitted without regard to race, color, creed, national origin, sex, or qualified disability.

Admission Criteria

1. Students must meet the following criteria to be considered eligible for admission:
 - a. Admission to the University prior to the application deadline.
 - b. Submission of a completed nursing application and application fee by posted deadlines.
 - c. A minimum cumulative calculated nursing GPA of 3.0 on all nursing prerequisite courses.
 - d. A minimum cumulative GPA of 2.75 in all required science courses.
 - e. A minimum grade of 'C' in all nursing prerequisite courses.
 - f. A minimum ACT/SAT score of 18/960. Second degree seeking students who are unable to obtain their ACT/SAT scores or who scored below the minimum may either take the Residual ACT (to earn a score of 18 or higher) or achieve an 80% or higher on the HESI Admission Assessment (A2) exam.
 - g. A minimum cumulative score of 70% on the HESI Admission Assessment (A2) Exam.
An 80% or higher is required on the HESI A2 for EPNP students and second degree seeking students with no or below minimum ACT/SAT score.
2. Once students have been selected for promotion to the upper division, grades on prerequisite courses are checked just prior to the start of the semester for which they were accepted. Promotion to the upper division will be forfeited if any prerequisite course is found lacking or less than a 'C' is earned.
3. Students seeking transfer from the upper division of another nursing education program must submit a letter of good standing indicating that the student is in good standing and eligible for continued enrollment in that program. Students who were dismissed (failed out) of another nursing program are not eligible for admission to the UAH College of Nursing undergraduate program. Nursing courses requested for transfer will be reviewed individually for equivalency by the College of Nursing. Transfer requests are to be submitted to the College of Nursing Office of Undergraduate Programs.

Early Promotion into UAH Nursing Program (EPNP)

Highly qualified students who enter UAH as freshmen, declare Nursing as their major, complete all lower division nursing coursework on the UAH campus, and meet the requirements listed below will be enrolled in the EPNP and guaranteed a slot in the upper division Nursing courses. Since students will also be eligible to enroll in the UAH Honors College, students enrolling in the EPNP should consider applying for the UAH Honor's College <http://www.uah.edu/honors/application-forms> (<http://www.uah.edu/honors/application-forms/>).

High school students who meet the following criteria automatically qualify for the EPNP:

- A high school GPA of 3.5.*
- A minimum composite ACT score of 28.*

Students who do not meet these criteria and are still interested in applying for the EPNP, may request an individual assessment of their application.

In order to maintain good standing status for promotion into the upper division of nursing, EPNP students must:

- Maintain a minimum cumulative GPA of 3.25 on all required lower division (prerequisite) courses.
- Complete all identified required courses at UAH.
- Achieve an overall cumulative score of at least 80% on the HESI Admissions Assessment (A2) exam.

Students who do not maintain these criteria may be eligible for admission, but they are placed in the competitive pool of applications.

* Requirements and conditions are subject to change.

Progression Standards

I. Grading Scale (implemented fall 2019):

The faculty of the College of Nursing adopted a grading scale for the upper division nursing courses in the traditional BSN program, which is consistent with major universities across the United States. The scale is listed below:

A = 90 - 100

B = 80 - 89

C = 75 - 79

D = 60 - 74

F <60

II. Students must follow the program of study (POS) under which they were admitted (see A below). Students who withdraw or fail courses must follow the policies outlined in sections B-D below.

A. Progression according to the Program of Study (POS):

1. A grade of 'C' or above must be earned in all required nursing courses.
2. Students must meet standards of professional conduct as described in the American Nurses Association Code of Ethics for Nurses, the Alabama Board of Nursing Practice Act, and standards of student behavior as described in the *UAH Undergraduate Student Handbook*.
3. Throughout the program, student must meet health and other requirements as identified in the *Health and Other Requirements*, as well as requirements specified in clinical agency contracts.

B. Failure of One Course:

1. A student who receives a grade below 'C' in a required nursing course may repeat the course only once and must meet with the Associate Dean of Undergraduate Programs to develop a revised program of study based on space-availability and progression constraints. Before considering placement of any students who have not succeeded in a course, preference for spaces will be given to those applicants who meet all progression criteria. Any alteration of the initial program of study will lengthen the student's program. A progression agreement may be required.

C. Dismissal from Nursing Program:

1. A student who receives two or more grades below 'C' in required nursing courses, in either the same course or in separate courses, at any time during the program will be dismissed from the College of Nursing (except NUR 311 and NUR 408). Students may petition for readmission to the College of Nursing by following the policy and completing the form found in the *College of Nursing Undergraduate Student Handbook* and submitting it to the Director of Undergraduate Admissions and Advisement in the College of Nursing. Readmission into the upper division nursing program is not guaranteed and is based on the availability of space in a cohort and on the information submitted in the application. Students who are readmitted and subsequently earn another grade below 'C' in any nursing course will be permanently dismissed from the program.
2. Academic dismissal from the College of Nursing precludes progression in the nursing curriculum. Retroactive withdrawal or other related progression decisions from courses after academic dismissal from the nursing program does not result in a reversal of the dismissal.

D. Withdrawal from Nursing Program:

1. Any student who withdraws from a course must meet with the Associate Dean of Undergraduate Programs to develop a revised program of study based on space-availability and progression constraints. Before considering placement of any students who have not succeeded in a course, preference for spaces will be given to those applicants who meet all progression criteria. Any alteration of the initial program of study will lengthen the student's program. A progression agreement may be required.

E. Graduation from the Nursing Program:

1. Students are required to take national standardized examinations in selected courses. These examinations are counted as a portion of the overall course grade for each course. Remediation will be required if scores fall below UAH Nursing passing standard.
2. An overall 'C' (2.0) grade point average (GPA) on all courses taken at UAH is required for graduation.

Health and Other Requirements for Students in Upper Division Nursing Courses

Clinical agencies require students to meet various health related requirements. Students must complete and maintain currency of all health documentation requirements prior to enrollment in upper division level courses and throughout the program for progression. Students are responsible for

maintaining original health records. Some of these records will be managed by the Office of Undergraduate Programs, an external clearing house, or by the UAH Student Health Center. **Students who fail to complete their health requirements by the designated deadline will not be allowed to begin classes until all health requirements are completed.**

Standards of Conduct and Accountability

The nursing student shall comply with legal, moral, and legislative standards that determine unacceptable behavior of the nurse and that may be cause for denial of a license to practice as a registered nurse, in accordance with the Alabama law regulating practice of registered and nursing as provided below.

The Alabama Board of Nursing may deny a license and/or temporary permit by examination or endorsement based on Alabama rule 610-x-8-.02 and rule 610-x-8-.03. Examples of grounds for denial and discipline of a license may include:

1. Engaging in fraud, misrepresentation, deception, or concealment of a material fact in applying for or securing licensure or taking any examination required for licensure.
2. Having engaged in conduct that is inconsistent with good moral character such as having a criminal history or pattern of illegal conduct or disregard for the law.
3. Having disciplinary action pending or having had a license, registration, or certification for any health-related profession denied, conditionally issued, fined, reprimanded, censured, restricted, limited, placed on probation, suspended, revoked, voluntarily surrendered, or otherwise encumbered in any state, territory or country.
4. Having been court-martialed or administratively discharged by a branch of the United States Armed Forces for any act or conduct that would constitute grounds for discipline Alabama under Rule 610-X-8-.03.
5. Any other reasons authorized by law.

Failure to comply with any of the Alabama Board of Nursing rules while in the nursing program constitutes grounds for dismissal from the program.

Completion of the nursing program does not guarantee licensure based on the Alabama Board of Nursing's regulations governing review of candidates for eligibility for initial and continuing licensure.

Core Performance Standards

Core Performance Standards may also be referred to as essential functions define selected attributes and behaviors necessary for students to demonstrate in order to successfully complete their education and subsequently enter nursing practice. These essential functions are determined to be required for initial and continued enrollment in the College of Nursing. Students must be able to perform each of the following essential functions with or without reasonable accommodations.

1. Critical thinking ability for effective clinical reasoning and clinical judgment consistent with level of education preparation. Examples (not all inclusive) of necessary activities include identifying cause-effect relationships in clinical and classroom situation, use of scientific method in developing patient care plans; evaluation of effectiveness of nursing interventions.
2. Professional relationships, Interpersonal skills sufficient for professional interactions with a diverse population of individuals, families, and groups. Examples (not all inclusive) include the ability to establish rapport with patients/clients and colleagues; capacity to engage in successful conflict resolution; peer accountability.
3. Communication adeptness sufficient for verbal and written professional interaction. Examples (not all inclusive) include explaining treatment procedures, initiating health teaching, and documenting and interpreting nursing actions and patient/client responses.
4. Mobility as physical abilities sufficient to move from room to room and maneuver in small spaces. Examples (not inclusive) include moving around in clients' rooms, work spaces and treatment areas; and administering cardiopulmonary procedures.
5. Gross and fine motor abilities sufficient for providing safe, effective nursing care. Examples (not all inclusive) include completing examinations/evaluations by writing, typing or demonstration; calibrating and using equipment, and therapeutic positioning of clients.
6. Auditory ability sufficient to monitor and assess health needs. Examples (not all inclusive) include hearing basic conversation; monitoring alarms, emergency signals and auscultatory sounds; and hearing cries for help.
7. Visual abilities sufficient for observation and assessment necessary in patient care. Examples (not all inclusive) include reading documents such as patient charts and laboratory reports, reading calibrations on syringes, sphygmomanometers, and thermometers, and equipment outputs such as waves, printouts, and digital readings; and accurately observing client behaviors such as color changes and nonverbal communication and responses to treatments.
8. Tactile abilities sufficient for physical assessment. Examples (not all inclusive) include performing palpation, percussion, temperature changes, complete physical examinations and other activities related to therapeutic interventions.
9. Behavioral/Social abilities sufficient to demonstrate emotional stability, maintenance or composure under stress, development of mature, empathetic and effective nurse-patient relationships and use of sound and unimpaired judgment in classroom and clinical activities.

These core performance standards are not intended to be complete listing of all nursing behaviors, but they are a sampling of the types of abilities needed by nursing students to meet program objectives and requirements. The College or its affiliated agencies may identify additional critical behaviors

or abilities. The identified core performance standards are revised and adopted from the Americans with Disabilities Act implications for Nursing Education (revised 2008).

Responsibility Compliance with Clinical Agencies

Students are responsible for complying with policies and procedures required by clinical agencies. The College of Nursing may not be able to provide alternative placements for students. Failure to meet clinical agency requirements may lead to exclusion from required clinical educational experiences and prevent completion of the program.

Upper Division Program of Study:

Semester 1		Semester Hours
NUR 001	NURSING TESTING BLOCK	0
NUR 301	Professional Concepts in Nursing	2
NUR 303	HEALTH ASSESSMENT	4
NUR 303L	CLINICAL	0
NUR 304	APP PATHOPHYSIOLOGY LIFESPAN	3
NUR 309	CLINICAL INFORMATICS	2
NUR 311	CLINICAL CALCULATIONS	1
Term Semester Hours:		12
Semester 2		
NUR 001	NURSING TESTING BLOCK	0
NUR 310	PROFESSIONAL PRACTICE NURS I	6
NUR 310L	CLINICAL	0
NUR 312	GERO NURSING CARE	3
NUR 321	PHARMACOLOGY IN NURS	3
Term Semester Hours:		12
Semester 3		
NUR 001	NURSING TESTING BLOCK	0
NUR 305	NUR PROC MENTAL HLTH/ILLNESS	4
NUR 305L	CLINICAL	0
NUR 307	INQRY TO EVIDNC BASED NURS PRC	3
NUR 308	NURS CARE ADULTS ALTER HLTH	9
NUR 308L	CLINICAL	0
Term Semester Hours:		16
Semester 4		
NUR 001	NURSING TESTING BLOCK	0
NUR 401	NURS CARE CRITICALLY ILL ADULT	4
NUR 401L	CLINICAL	0
NUR 403	MATERNAL INFANT NURSING	4
NUR 403L	CLINICAL	0
NUR 404	FAMILY-CENTER NUR CARE CHILDRE	4
NUR 404L	CLINICAL	0
Term Semester Hours:		12
Semester 5		
NUR 405	COMMUNITY HEALTH NURS	4
NUR 405L	CLINICAL EXPERIENCE	0
NUR 407	PROF PRACTICE IN NURSING II	8
NUR 407L	CLINICAL EXPERIENCE	0
NUR 408	PROF PRAC IN NURS III SEMINAR	2
Term Semester Hours:		14
Total Semester Hours:		66

Nursing, Dual ADN/BSN

Required Prerequisite Courses

Prerequisite course requirements will be completed at the community college according to their program of study.

Dual ADN/BSN Nursing Courses

Code	Title	Semester Hours
Community College courses:		
NUR 112 (CC)	Fundamental Concepts of Nursing	7
NUR 113 (CC)	Nursing Concepts I	8
NUR 114 (CC)	Nursing Concepts II	8
NUR 115 (CC)	Evidence Based Clinical Reasoning	2
NUR 211 (CC)	Advanced Nursing Concepts	7
NUR 221 (CC)	Advanced Evidence Based Clinical Reasoning	7
UAH courses (all online):		
NUR 339	INFO MGMT IN HEALTHCARE	3
NUR 410	TRANSITION INTO PROFESS ROLES	3
NUR 413	LEADERSHIP PROF NURS PRACT	5
NUR 417	NURS CARE VUL POP	4
NUR 421	AC CARE FOR PROFESSIONAL NURSE	3
NUR 422	COMMUNITY HEALTH FOR PROF NURS	5
NUR 423	EVID BASED PRACTICE PROFESS NU	3
Total Semester Hours		65

Dual ADN/BSN Admission Requirements

***Note: Initial enrollment of this program will begin Spring 2021**

Minimum Admission Requirements:

1. Unconditional admission to UAH and the partner community college.
2. Must be in good standing with UAH and the partner community college.
3. Receipt of completed nursing application at both institutions by posted deadlines.
4. Meet eligibility criteria for admission.

Additional requirements:

1. All general academic courses must be completed prior to application deadlines.
2. A minimum 2.5 cumulative GPA on all college work.
3. A minimum 2.5 GPA for nursing required academic core courses at the partner community college (ENG 101, MTH 100 or higher, BIO 201 and BIO 202).
4. Minimum of 18 ACT composite score National or Residual.
5. Full time enrollment status in semesters 5-9 between UAH and the partner community college.

Progression and Graduation Standards

1. A minimum grade of 'C' or above must be earned in all required nursing courses and any outstanding co-requisite courses.
2. An overall 'C' (2.0) grade point average (GPA) is required for graduation.

Dual ADN/BSN Curriculum (beginning 5th semester)

Sophomore

Spring

NUR 112 (CC)	Fundamental Concepts of Nursing	7
NUR 339	INFO MGMT IN HEALTHCARE	3
NUR 410	TRANSITION INTO PROFESS ROLES	3
Term Semester Hours:		13

Junior

Fall

NUR 113 (CC) Nursing Concepts I		8
NUR 413	LEADERSHIP PROF NURS PRACT	5
Term Semester Hours:		13

Spring

NUR 114 (CC) Nursing Concepts I		8
NUR 115 (CC) Evidence Based Clinical Reasoning		2
NUR 417	NURS CARE VUL POP	4
Term Semester Hours:		14

Summer

NUR 211 (CC) Advanced Nursing Concepts		7
NUR 423	EVID BASED PRACTICE PROFESS NU	3
NUR 421	AC CARE FOR PROFESSIONAL NURSE	3
Term Semester Hours:		13

Senior

Fall

NUR 221 (CC) Advanced Evidence Based Clinical Reasoning		7
NUR 422	COMMUNITY HEALTH FOR PROF NURS	5
Term Semester Hours:		12

Total Semester Hours: 65

Nursing, RN-BSN

Lower Division Courses

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	

EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S	INTRO FOREIGN LANG I: SPANISH	
or WLC 101A	INTRO FOREIGN LANG I: ARABIC	
or WLC 101F	INTRO FOREIGN LANG I:FRENCH	
or WLC 101G	INTRO FOREIGN LANG I:GERMAN	
or WLC 101J	INTRO FOREIGN LANG I:JAPANESE	
or WLC 101R	INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S	INTRO FOREIGN LANG II:SPANISH	
or WLC 102A	INTRO FOREIGN LANG II: ARABIC	
or WLC 102F	INTRO FOREIGN LANG II:FRENCH	
or WLC 102G	INTRO FOREIGN LANG II:GERMAN	
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE	
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN	
WLC 201S	INTERM FOREIGN LANG:SPANISH	
or WLC 201A	INTERM FOREIGN LANG I: ARABIC	
or WLC 201F	INTERM FOREIGN LANG:FRENCH	
or WLC 201G	INTERM FOREIGN LANG:GERMAN	
or WLC 201J	INTERM FOREIGN LANG: JAPANESE	
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN	
WLC 202S	INTERM FOREIGN LANG II:SPANISH	
or WLC 202A	INTERM FOREIGN LANG II: ARABIC	
or WLC 202F	INTERM FOREIGN LANG II:FRENCH	
or WLC 202G	INTERM FOREIGN LANG II:GERMAN	
or WLC 202J	INTERM FORGN LANG II:JAPANESE	
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN	
WLC 204	INTERNATIONAL CINEMA	
PHL 101	INTRODUCTION TO PHILOSOPHY	
PHL 102	INTRO TO ETHICS	
PHL 103	INTRODUCTION TO LOGIC	
PHL 150	TECH, SCIENCE & HUMAN VALUES	
WGS 200	INTRO WOMEN'S & GENDER STUDIES	
AMS 229	ANCIENT & MEDIEVAL WORLDS	
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Area III: Mathematics and Sciences		11-12
Mathematics		3-4
MA 105	NATURE OF MATHEMATICS	
MA 107	ALGEBRA WITH APPLICATIONS	
MA 110	FINITE MATHEMATICS	
MA 112	PRECALCULUS ALGEBRA	
MA 113	PRECALCULUS TRIGONOMETRY	
MA 115	PRECALCULUS ALGEBRA & TRIG	
MA 120	MATH PROFESSIONAL APPLICATIONS	
MA 171	CALCULUS A	

Natural Sciences (Lab)

8

AST 100	SURVEY OF ASTRONOMY
AST 106	EXPLORING THE COSMOS I
AST 107	EXPLORING THE COSMOS II
BYS 109	FUNDAMENTALS OF BIOLOGY
BYS 119	PRINCIPLES OF BIOLOGY
BYS 120	ORGANISMAL BIOLOGY
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB
ESS 103	ENVIRONMENTAL EARTH SCIENCE
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG
PH 100	CONCEPTUAL PHYSICS
PH 101	GENERAL PHYSICS I
PH 102	GENERAL PHYSICS II
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III

Area IV: History and Social and Behavioral Sciences***12**

History

3-6

HY 103	WORLD HISTORY TO 1500
HY 104	WORLD HISTORY SINCE 1500
HY 221	UNITED STATES TO 1877
HY 222	UNITED STATES SINCE 1877

Social and Behavioral Sciences

6-9

ECN 142	PRINC OF MACROECONOMICS
ECN 143	PRINC OF MICROECONOMICS
GS 200	GLOBAL SYSTEMS AND CULTURES
ESS 105	WORLD REGIONAL GEOGRAPHY
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY
PSC 101	INTRO TO AMERICAN GOVERNMENT
PSC 102	INTRO TO COMPARATIVE POLITICS
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS
PY 101	GENERAL PSYCHOLOGY I
PY 201	LIFE-SPAN DEVELOPMENT
SOC 100	INTRO TO SOCIOLOGY
SOC 102	ANALYSIS OF SOCIAL PROBLEMS
SOC 103	INTRO TO CRIMINOLOGY
SOC 105	INTRO CULTURAL ANTHROPOLOGY

Code	Title	Semester Hours
Pre Professional		18
Additional lower division BSN requirements		
BYS 214	INFECTION & IMMUNITY	

BYS 215	HUMAN ANATOMY & PHYSIOLOGY I
BYS 216	HUMAN ANATOMY & PHYSIOLOGY II
GENL 101	GENERAL TRANSFER CREDIT

Choose one:

PY 300	PSYCHOLOGICAL STATISTICS
SOC 303	STATISTICS/SOCIAL SCIENCES
MSC 287	BUSINESS STATISTICS I

Total Lower Division Semester Hours**59-60**

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Take no more than six hours in a single discipline in Area II or Area IV.

RN-BSN Upper Division Courses (all online)

In order to be considered to the upper division nursing major, students must be accepted to the University and currently possess an unencumbered RN license.

Code	Title	Semester Hours
NUR 339	INFO MGMT IN HEALTHCARE	3
NUR 410	TRANSITION INTO PROFESS ROLES	3
NUR 413	LEADERSHIP PROF NURS PRACT	5
NUR 417	NURS CARE VUL POP	4
NUR 421	AC CARE FOR PROFESSIONAL NURSE	3
NUR 422	COMMUNITY HEALTH FOR PROF NURS	5
NUR 423	EVID BASED PRACTICE PROFESS NU	3
NUR 000	NURSING-CREDIT BY VALIDATION	42

Credit received for completion of Registered Nursing degree up to 42 validation hours.

Total Semester Hours**26**

Admission of RN-BSN Students

- Prospective students should refer to the program website at <https://online.uah.edu/programs/rn-to-bsn.aspx> to determine eligibility for the online program based on state residency and work location.
- Admission to the RN-BSN program requires admission to the University as well as the following minimum requirements:
 - Minimum cumulative grade point average (GPA) of 2.0.
 - Graduation from an accredited associate degree nursing program or a diploma program.
 - Licensure must be from an approved state. Verification of your states eligibility is provided by the College of Nursing.
- Registered nurse students must possess an unencumbered current license and maintain this status throughout the program. A registered nurse student will not be allowed to continue in the program if the nursing license is placed on probation, suspended, or revoked status.

Progression and Graduation Standards

- Outstanding co-requisite courses may be completed while taking nursing courses. However, it is advised that outstanding co-requisite courses be completed prior to beginning the curriculum.
- A minimum grade of 'C' or above must be earned in all required nursing courses and any outstanding co-requisite courses.
- An overall 'C' (2.0) grade point average (GPA) is required for graduation.

RN-BSN (All Classes Online)

Fall		Semester Hours
NUR 410	TRANSITION INTO PROFESS ROLES (Must be first course) ^{*Offered every semester}	3
NUR 413	LEADERSHIP PROF NURS PRACT	5
NUR 417	NURS CARE VUL POP	4
NUR 000	NURSING-CREDIT BY VALIDATION (42 hours applied at no cost)	0
Term Semester Hours:		12
Spring		
NUR 422	COMMUNITY HEALTH FOR PROF NURS	5

NUR 423	EVID BASED PRACTICE PROFESS NU	3
	Term Semester Hours:	8
Summer		
NUR 339	INFO MGMT IN HEALTHCARE	3
NUR 421	AC CARE FOR PROFESSIONAL NURSE	3
	Term Semester Hours:	6
	Total Semester Hours:	26

College of Professional Studies

148 Wilson Hall

Telephone: 256.824.6013

Email: CPSDeansOffice@uah.edu (cpsdeansoffice@uah.edu)

Dean: Karen M. Clanton, Ed.D.

Mission

The mission of the College of Professional Studies is to increase student access, external partnerships, community outreach, and extended learning that leverage the University's areas of expertise for the mutual benefit of the community and the institution.

Degrees

Bachelor of Arts in Professional Studies

Bachelor of Science in Professional Studies

The Bachelor of Arts or Bachelor of Science in Professional Studies (BPS) is designed for adults who have prior college and/or work experience, but have yet to obtain a four-year degree. The program offers a well-rounded education through an interdisciplinary curriculum with established concentration areas that provide a flexible pathway for adults to complete a bachelor's degree. Concentration areas include Leadership Strategies and Dynamics; Organizational Studies; Technology, Science and Society; and Engineering Technology.

The program is structured to meet the needs of working professionals; balancing academic rigor with flexibility and value. The degree provides students the option of participating fully online, in the classroom or a combination. Students may transfer up to 75% of previously completed coursework, including up to 34 hours of technical credits, to this degree. The program also accepts ACE recommended credits for military training. An Academic Success Specialist will work with students to provide them with a clear pathway to success, starting with the admission process and on through graduation.

The College of Professional Studies provides adult learners the opportunity to expand their knowledge base across an array of academic disciplines to meet professional and personal goals. Graduates will learn how to communicate effectively, make informed decisions, and use analytical and critical thinking. For more details visit UAHComplete.uah.edu (<https://www.uah.edu/pcs/uah-complete/>).

Accreditation

The University of Alabama in Huntsville has institutional accreditation from the Southern Association of Colleges and Schools Commission on Colleges (SACSCOC) to award baccalaureate, masters, and doctoral degrees.

The College of Professional Studies offers the following degree programs:

Bachelor of Arts in Professional Studies (p. 407)

Bachelor of Science in Professional Studies (p. 407)

Bachelor of Science in Professional Studies - Engineering Technology Concentration (p. 411)

Engineering Technology

Prepare to establish yourself as a successful, practicing Engineering Technologist. Graduates will use their math, science, and engineering skills to design products and systems, install and maintain products, and provide a wide range of services, such as implementation of the design, testing, calibration, and supervision of its operations.

Organizational Studies

Prepare for careers that involve finding solutions to human problems in organizations and communities. Coursework will focus on business (emphasis on management and information systems) and humanities/social sciences (emphasis on communications, philosophy, political science, psychology, education, and/or sociology). The curriculum will include organizational theory and behavior, professional ethics, management, information systems,

individual and group dynamics, and communication skills. Students will acquire an understanding of human behavior in groups, organizations, and larger systems.

Leadership Strategies and Dynamics

Develop an understanding of foundational leadership theory in your chosen context. Focus on the nature of leadership in a variety of settings and prepare for leadership responsibility in the community and in your selected profession. Coursework will focus on business (emphasis on leadership and management) and social sciences/humanities (emphasis on communications, history, philosophy, political science, psychology, and/or sociology). Courses will provide an educational experience in theories of motivation, leadership styles, organizational and group behavior, professional ethics, communication, theories of cultural difference and multicultural communication, human resources, and/or budgeting.

Technology, Science and Society

Integrate the study of science, engineering, and/or technology with its social and cultural impact on humanity. Focus on developing a broad understanding of the technical, historical and social dimensions of science and technology. Curriculum options include engineering, the natural sciences, computer science, information sciences, business, the social sciences, and/or humanities. The curriculum provides an interdisciplinary approach to explore the significance, challenges, and effects that science and technology present to society. Courses allow students to incorporate technical scientific knowledge with analytical thinking from a social perspective.

B.A. or B.S. in Professional Studies Courses

PRO 280 - PRIVATE PILOT GROUND SCHOOL

Semester Hours: 3

Prepares student for FAA Private Pilot written examination. Provides student with necessary knowledge to progress into primary pilot flight training. A kit for approximately \$150 must be purchased.

PRO 301 - THRY & PRAC ADULT LEARNING

Semester Hours: 3

This course presents an overview of five foundational learning theories and related research in adult education and development. The conceptual framework is centered on discovering what motivates the adult learner and the impact social perspectives have on adult learning through analysis and discussion. Students will define competencies needed for success in academic study and professional leadership, in setting educational goals, and in planning a learning experience to achieve them. Emphasis is placed on issues unique to adult re-entry students and the university services available to support nontraditional students.

PRO 310 - ACADEMIC WRITING PROFESS STUDI

Semester Hours: 3

Students will learn academic writing skills by engaging in the process of academic inquiry and argument. The course will cover a broad perspective of writing by exploring various writing and research styles used through different academic professions. Prerequisites: EH 102 or EH 105.

PRO 315 - ENGINEERING COMMUNICATION

Semester Hours: 3

Students will learn to communicate professionally in an engineering/technical environment. Students will develop written communications such as letters, memos, reports and proposals, create clear process descriptions and instructions, and deliver persuasive and effective oral presentations. Prerequisite: EH 102 or EH 103 or EH 105.

PRO 320 - INDS PERSPECT & CRITICAL THNKG

Semester Hours: 3

Interdisciplinary studies fosters foundational knowledge acquisition by which individuals draw on multiple disciplinary perspectives and integrate their insights and modes of thinking to advance the studies and the fundamental development of critical and analytical thinking skills. Complex issues are addressed from multi-faceted perspectives that stimulate problem solving, problem defining and problem posing. Emphasis is placed on how to synthesize evidence drawn from multiple sources as a basis for informed decision-making.

PRO 321 - MEDIA LITERACY

Semester Hours: 3

Investigate the interdisciplinary nature of 21st-century media. Students analyze the combined influence of production methods, semiotics, politics, ethics, and psychology on our critical understanding of advertising, propaganda, conspiracy theories, social media, and the Internet of Things. Prerequisite: EH 102.

PRO 325 - INDS RESEARCH & APPLICATIONS

Semester Hours: 3

Interdisciplinary research is a contemporary decision-making process for transcending the scope of a single discipline or program to develop insights that offer bold advances in knowledge, solutions to urgent societal problems, an edge in technological innovations, and a more integrative knowledge of multidisciplinary theories and concepts. This course introduces the primary drivers for interdisciplinary research and examines the interdisciplinary research process. Students will apply an integrated model for conducting research that draws on multiple disciplines. Prerequisites: PRO 310 and PRO 320.

PRO 331 - ENGINEERING TECH FNDNS I

Semester Hours: 3

An introduction to the Engineering Technology profession, resources and skills. Students will learn about engineering design, communication, professional ethics, and basic principles and physical laws used to understand and solve engineering related problems. Prerequisites: MA 113 or higher, EH 102 or EH 105 and PH 102 or higher.

PRO 332 - ENGINEERING TECH FNDNS II

Semester Hours: 3

A follow-on to PRO 331, the course introduces the Engineering Technology profession, resources and skills. Students will learn about computational engineering tools, graphical communication, characteristics of materials, in addition to the mathematical and statistical methods used to understand and solve engineering-related problems. Co-requisite: PRO 331 (Grade of C- or better).

PRO 333 - COMPUTER-AIDED DESIGN

Semester Hours: 3

An introduction to Computer-Aided Design (CAD) using Creo Parametric. Covers basic concepts of 3D modeling techniques and frequently used commands required to advance from a novice to an intermediate user level of Creo Parametric. Prerequisite: PRO 332 (grade of C- or better), or special permission. MAE 211 accepted as a substitute. PRO 333 does not substitute for MAE 211.

PRO 334 - PRINCIPLES OF STATICS

Semester Hours: 3

Develop an undertaking of the principles of statics. Topics include resultant and equilibrium of noncurrent and concurrent forces, force analysis of structures and machines, force systems in space, friction, centers of gravity, centroids, and movement of inertia of areas. Prerequisites: PRO 332, MA 171 and PH 102 PRO 334 can not be used as a substitute for MAE/CE 271.

PRO 335 - STRENGTH OF MATERIALS

Semester Hours: 3

Comprehend and compare the behavior of solid objects subjected to various stresses and strains. Topics include stress and strain for axial loads, shear stresses and strains in torsion members, bending and deflection of beams, combined stress using Mohr's circle columns, and structural connections. Prerequisite: PRO 334 or MAE 271 or CE 271 (all with grades of C- or better).

PRO 336 - PRINCIPLES OF DYNAMICS

Semester Hours: 3

Learn the principles of Dynamics based on two broad areas of study, Kinematics and Kinetics. Kinematics is the study of the geometry of motion. Kinetics is the study of the relation between the forces acting on a body, the mass of the body, and the motion of the body. Prerequisite: PRO 334 or MAE 271 or CE 271 (all with grades of C- or better).

PRO 341 - ELECTRICAL CIRCUITS & SYSTEMS

Semester Hours: 3

This course introduces the major topics related to electrical circuits and systems and demonstrates how electrical engineering concepts are applied in other fields and everyday products. Topics include basic circuit analysis, digital systems, electronic devices and circuits, and electromechanics. Prerequisites: PRO 332 (grade of C- or better), MA 171, PH 102.

PRO 398 - SPEC TOPICS: INTERDISC STUDIES

Semester Hours: 3

Course uses an interdisciplinary approach to draw on intersecting and divergent knowledge from a variety of scholarly disciplines in order to create an in-depth and multi-faceted understanding of a particular instructor chosen issue, topic or problem. Prerequisite: EH 102.

PRO 399 - INDEP STUDY: INTERDISC STUDIES

Semester Hours: 3

Course allows individual students to pursue an interdisciplinary topic of interest which is not otherwise available and may involve any combination of readings assignments, tutorials, lectures, papers, presentations, or field/laboratory study (determined in consultation with instructor). Prerequisite: PRO 325.

PRO 431 - FUNDAMENTALS OF MANUFACTURING

Semester Hours: 3

This course introduces the fundamentals of manufacturing, examining the selection and use of various materials, processes, and systems. Prerequisites: (PRO 333 or MAE 201) and (PRO 335 or MAE 370 or CE 370).

PRO 433 - INSTRUMENTATION & MEASUREMENT

Semester Hours: 3

This course introduces valuable topics that an engineering technologist needs to master in order to design measurement and instrumentation systems. Topic areas include the essential general characteristics of instruments, electrical measurement systems, and computerized data acquisition systems. Prerequisites: (PRO 335 or CE 270 or MAE 370) and (PRO 336 or CE 272 or MAE 272) and (PRO 341 or EE 213).

PRO 498 - INQUIRY AND LEARNING

Semester Hours: 3

Inquiry-based learning accelerates understanding, fosters critical thinking skills, and facilitates self-direction and discovery. Using this method, students will identify an interdisciplinary problem related to their approved concentration area, perform the foundational research, and formulate a research proposal. This is the first of a two-semester progression to complete a Capstone research thesis/project in PRO 499. Prerequisite: PRO 325.

PRO 499 - CAPSTONE EXP: RSCH THESIS/PROJ

Semester Hours: 3

Students majoring in Professional Studies are required to complete a senior research thesis in their approved interdisciplinary concentration. This Capstone course requires the student to demonstrate his/her ability to integrate the core knowledge and skills gained in their interdisciplinary areas of study using inquiry-based learning methods. Research is conducted and a thesis-style paper is written and orally presented. Prerequisite: PRO 498 with minimum grade of C-.

Specialized Credit Courses

UAH offers specialized credit courses that support various educational partnerships. The following courses have distinct admission and registration requirements. For details, email CPSprograms@uah.edu, phone 256.824.2808, or visit CPS.uah.edu/USSRC (<https://www.uah.edu/pcs/conferences-special-programs/ussrc-partnership/>).

ESS 100 - INTRODUCTION TO SPACE SCIENCE

Semester Hour: 1

Covers physiology in space, computer systems, and materials in space, robotics, thermodynamics, astrophysics, and solar physics. Laboratory experiments and simulated missions. Offered in cooperation with the U.S. Space & Rocket Center. Prerequisite: Available only to high school students with U.S. citizenship enrolled in Advanced Space Academy@.

ENG 105 - INTRODUCTION TO AERONAUTICS

Semester Hour: 1

Introduction to a variety of aviation subjects, including flight physiology, computer systems, aerodynamics, aeronautics, jet propulsion, thermodynamics, navigation, and survival skills. Lectures and simulated missions. Offered in cooperation with U.S. Space & Rocket Center. Prerequisite: Available only to high-school students with U.S. citizenship enrolled in Aviation Challenge@ Mach III.

Registration (p. 404) | Professional Development (p. 405) | Outreach & Events (p. 406) | Osher Lifelong Learning (p. 406)

Non-Credit Programs

UAH College of Professional Studies (CPS) provides access to quality education and training for individuals; partners with businesses and government for workforce development; enhances public awareness of the instructional and research strengths of the University; promotes lifelong learning fostering continued growth, human fulfillment, and positive social change; and supports economic development throughout North Alabama. These objectives are carried out through the following programming departments: Professional Development Solutions, Conferences and Special Programs, Osher Lifelong Learning Institute, and Testing and Certification Services. For more information about CPS programs, visit CPS.uah.edu (<https://www.uah.edu/pcs/>).

CPS Registration Services

103 Wilson Hall

Telephone: 256.824.6010 or 800.448.4031

FAX: 256.824.6760

Email: CPSreg@uah.edu

Kathy Hosch, Senior Associate Director

UAH College of Professional Studies (CPS) Registration Office provides registration services for non-credit programs and select credit courses. Registration options include online, phone, fax, or in person. There is no formal application process for non-credit courses and enrollments are taken

throughout the year. Transcripts for continuing education units (CEUs) are available upon written request for a \$5 fee per transcript. Visit [CPS.uah.edu \(https://www.uah.edu/pcs/\)](https://www.uah.edu/pcs/) for registration information and related policies.

Professional Development Solutions

140 Wilson Hall

Telephone: 256.824.4430

Email: pdsolutions@uah.edu

Mission

Professional Development Solutions develops and presents professional training and educational activities in areas including leadership, management, engineering, cybersecurity, information technology, and certification exam preps. Programs are designed to allow a participant the choice of attending individual courses of interest or completing a more structured certificate program leading to a Certificate of Professional Achievement. Programs are offered in an atmosphere conducive for meeting professional training needs, and available in various classroom and online formats. CPS maintains state-of-the-art computer labs and classrooms, and its instructors are known and respected industry practitioners and researchers in their respective fields.

Visit [CPS.uah.edu/PDSolutions \(https://uah.edu/pcs/professional-development/\)](https://uah.edu/pcs/professional-development/) for the current schedule of course offerings.

EXAM PREPS

A+

Certified Associate in Project Management (CAPM®)

Certified Authorization Professional (CAP®)

Certified Ethical Hacker (CEH™)

Certified Information Systems Security Professional (CISSP®)

Certified Network Defender (CND)

Certified Systems Engineering Professional (CSEP)

Cisco CCNA Certification

CompTIA® Advanced Security Practitioner (CASP+)

Drone Pilot License Test Prep

Linux+

Network+

PMP® Certification

Private Pilot Ground School

Security+

CERTIFICATE PROGRAMS

MANAGEMENT

Communication Skills

Earned Value Management

Federal Contract Management

Federal Costing

Federal Proposal Management

Interior Design Professional

Leadership Skills and Strategies

Life Cycle Logistics

Project Management/Agile

Supervisory Skills for Managers

Supply Chain Management

Team Building

Technical and Business Writing

ENGINEERING

Computer-Aided Design

DOORS® - Requirements Management Application

Geospatial

MATLAB for Engineers and Analysts

Missile Systems and Capabilities

Model-Based Systems Engineering with SysML

Modeling and Simulation

Rocket Propulsion

Rotorcraft Systems and Capabilities

Systems Engineering
 Systems Thinking
 Test and Evaluation
 Unmanned Aerial Vehicles (UAVs)

INFORMATION TECHNOLOGY

C++ Developer
 CAD
 Data Analytics
 Data Visualization
 DevOps
 G Suite
 Java Developer
 Linux
 Master Programmer
 Microsoft Office Suite
 Object-Oriented Programming
 Oracle Applications Developer
 PowerShell
 Python Developer
 QuickBooks
 R Programming
 SQL
 VMWare
 Web Developer

Customized Training & Facilitation

UAH's customized training solutions offer organizations ways to seize new opportunities and systematically address key problems. Professional Development specialists work directly with corporate, government, and professional organizations to develop high quality certificate programs and short courses that meet specific training goals. These programs can be offered on site, on campus, or via online learning. Through targeted learning experiences, the individual or team can bring new tools and competencies back into the organization, providing an immediate on-the-job impact.

Outreach and Events

149 Wilson Hall
 Telephone: 256.824.2808
 Email: CPSprograms@uah.edu (p. 12)
 Fathia Hardy, Associate Director

The Outreach and Event Management unit embodies collaborative projects and mutually beneficial partnerships among The University of Alabama in Huntsville and external groups that enrich both our academic and research missions and the communities we serve. Our management team hosts and co-hosts various conferences, training sessions, symposiums, continuing education, special events, meetings, and workshops. Visit CPS.uah.edu/Conferences (<https://uah.edu/pcs/conferences-special-programs/>) for current information.

Osher Lifelong Learning Institute (OLLI)

113 Wilson Hall
 Telephone: 256.824.6183
 Email: OLLI.info@uah.edu
 Ale Pacheco, OLLI Program Manager

Mission

The Osher Lifelong Learning Institute (OLLI) and the College of Professional Studies partner to provide lifelong learning courses and enrichment activities designed to fulfill the educational needs of adults 50 and above. OLLI at UAH is a member-led, non-profit, volunteer-based organization that advances the educational, cultural, and social interests of its members by sponsoring courses, socials, bonus presentations, industrial tours, and travel opportunities designed to fit the interests and needs of its members. CPS supports OLLI's efforts by providing support services and a safe, comfortable, and intellectually stimulating on-campus environment that supports adult lifelong learning and enhances community outreach.

Curriculum

Courses offered in a wide range of subject areas:

Arts and Music
Finance and Economics
Foreign Languages
Health and Fitness
History and Government
Information Technology
Leisure, Games, and Nature
Literature and Writing
Psychology and Philosophy
Science and Mathematics
Skills and Hobbies

We offer three terms a year with a mini-term in the summer. Most courses meet 1.5 hours per class, once a week, for six to eight weeks. We also offer courses in our popular 'OLLI After Five' format. OLLI courses are taught by qualified volunteer instructors. Courses are not graded, and no tests are administered. Visit [Osher.uah.edu \(https://uah.edu/pcs/olli/\)](https://uah.edu/pcs/olli/) for current information.

Testing and Certification Services

214 Wilson Hall
Telephone: 256.824.6373
Email: TaCS@uah.edu
Maria Bricker, Assistant Director

Mission

The University of Alabama in Huntsville Testing and Certification Services (TaCS) unit is committed to providing exceptional, accessible, and comprehensive testing services for students, graduates, professionals, and individuals from our surrounding communities. As a certified center of the National College Testing Association (NCTA), we are dedicated to upholding high standards of security and academic integrity by maintaining and adhering to their Standards and Guidelines.

Tests

The TaCS office offers numerous testing opportunities to include:

ACT
Alabama State Dept of Insurance Exam
BASF/DDI
CLEP/DANTES
GRE
HESI
Kryterion
MAT
National Center for Competency Testing
Pearson VUE Testing
Proctored Exams
PROV
Residual ACT
SAT
Scantron
SSAT

Visit [CPS.uah.edu/TaCS \(https://uah.edu/pcs/testing-certification-services/\)](https://uah.edu/pcs/testing-certification-services/) for a full list of available tests, test schedule, policy and guidelines, and ways to register.

Bachelor of Professional Studies

Bachelor of Professional Studies degree requires 120 hours:

- A minimum of 36 of 120 credit hours must be taken at the 300 level or higher; 6 credit hours must be taken at the 400 level.
- A minimum of 25% of the total requirements and 12 of the last 18 hours must be completed at UAH.
- No more than 60 credit hours from a 2-year or community college can be applied toward the BPS degree.
- A minimum GPA of 2.0 is required for all courses taken at UAH and is the minimum requirement for graduation.
- Students will work with the BPS Academic Success Specialist to learn how their transfer credits can apply toward this program of study.

Charger Foundations (General Education Requirements)

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S or WLC 101A or WLC 101F or WLC 101G or WLC 101J or WLC 101R	INTRO FOREIGN LANG I: SPANISH INTRO FOREIGN LANG I: ARABIC INTRO FOREIGN LANG I:FRENCH INTRO FOREIGN LANG I:GERMAN INTRO FOREIGN LANG I:JAPANESE INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S or WLC 102A or WLC 102F or WLC 102G or WLC 102J or WLC 102R	INTRO FOREIGN LANG II:SPANISH INTRO FOREIGN LANG II: ARABIC INTRO FOREIGN LANG II:FRENCH INTRO FOREIGN LANG II:GERMAN INTRO FOREIGN LANG II:JAPANESE INTRO FOREIGN LANG II:RUSSIAN	
WLC 201S or WLC 201A or WLC 201F or WLC 201G or WLC 201J or WLC 201R	INTERM FOREIGN LANG:SPANISH INTERM FOREIGN LANG I: ARABIC INTERM FOREIGN LANG:FRENCH INTERM FOREIGN LANG:GERMAN INTERM FOREIGN LANG: JAPANESE INTERM FOREIGN LANG:RUSSIAN	
WLC 202S or WLC 202A or WLC 202F or WLC 202G or WLC 202J or WLC 202R	INTERM FOREIGN LANG II:SPANISH INTERM FOREIGN LANG II: ARABIC INTERM FOREIGN LANG II:FRENCH INTERM FOREIGN LANG II:GERMAN INTERM FORGN LANG II:JAPANESE INTERM FOREIGN LANG II:RUSSIAN	
WLC 204	INTERNATIONAL CINEMA	
PHL 101	INTRODUCTION TO PHILOSOPHY	

PHL 102	INTRO TO ETHICS	
PHL 103	INTRODUCTION TO LOGIC	
PHL 150	TECH, SCIENCE & HUMAN VALUES	
WGS 200	INTRO WOMEN'S & GENDER STUDIES	
AMS 229	ANCIENT & MEDIEVAL WORLDS	
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
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MA 107	ALGEBRA WITH APPLICATIONS	
MA 110	FINITE MATHEMATICS	
MA 112	PRECALCULUS ALGEBRA	
MA 113	PRECALCULUS TRIGONOMETRY	
MA 115	PRECALCULUS ALGEBRA & TRIG	
MA 120	MATH PROFESSIONAL APPLICATIONS	
MA 171	CALCULUS A	
Natural Sciences (Lab)		8
AST 100	SURVEY OF ASTRONOMY	
AST 106	EXPLORING THE COSMOS I	
AST 107	EXPLORING THE COSMOS II	
BYS 109	FUNDAMENTALS OF BIOLOGY	
BYS 119	PRINCIPLES OF BIOLOGY	
BYS 120	ORGANISMAL BIOLOGY	
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I	
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB	
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB	
ESS 103	ENVIRONMENTAL EARTH SCIENCE	
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG	
PH 100	CONCEPTUAL PHYSICS	
PH 101	GENERAL PHYSICS I	
PH 102	GENERAL PHYSICS II	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	
Area IV: History and Social and Behavioral Sciences*		12
History		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	

HY 221	UNITED STATES TO 1877
HY 222	UNITED STATES SINCE 1877
Social and Behavioral Sciences	
ECN 142	PRINC OF MACROECONOMICS
ECN 143	PRINC OF MICROECONOMICS
GS 200	GLOBAL SYSTEMS AND CULTURES
ESS 105	WORLD REGIONAL GEOGRAPHY
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY
PSC 101	INTRO TO AMERICAN GOVERNMENT
PSC 102	INTRO TO COMPARATIVE POLITICS
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS
PY 101	GENERAL PSYCHOLOGY I
PY 201	LIFE-SPAN DEVELOPMENT
SOC 100	INTRO TO SOCIOLOGY
SOC 102	ANALYSIS OF SOCIAL PROBLEMS
SOC 103	INTRO TO CRIMINOLOGY
SOC 105	INTRO CULTURAL ANTHROPOLOGY

6-9

*Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Take no more than six hours in a single discipline in Area II or Area IV.

Professional Studies Interdisciplinary Core

Code	Title	Semester Hours
PRO 301	THRY & PRAC ADULT LEARNING ¹	3
PRO 310	ACADEMIC WRITING PROFESS STUDI	3
PRO 320	INDS PERSPECT & CRITICAL THNKG	3
PRO 325	INDS RESEARCH & APPLICATIONS	3
PRO 498	INQUIRY AND LEARNING	3
PRO 499	CAPSTONE EXP: RSCH THESIS/PROJ	3

¹ PRO 301 is required for students with less than 60 hours credit and/or those who have not been enrolled in higher education for an extended period. MUST enroll during the first semester.

Interdisciplinary Concentrations (Students must select one of the following concentrations)

Code	Title	Semester Hours
Leadership Strategies and Dynamics (Total of 30 hours)		
MGT 301	MANAGING ORGANIZATIONS	
MGT 410	LEADERSHIP, PERSONAL DEV & ORG	
Leadership and Business Related Courses (Students must select 12 hours in this area)		
Arts, Humanities and Social & Behavioral Science Related Courses (Students must select 12-15 hours in this area)		
Organizational Studies Concentration (Total of 30 hours)		
MGT 301	MANAGING ORGANIZATIONS	
MGT 361	ORGANIZATIONAL BEHAVIOR	
Business Related Courses (Students must select 12 hours in this area)		
Arts, Humanities and Social & Behavioral Science Related Courses (Students must select 12-15 hours in this area)		
Technology, Science and Society Concentration (Total of 30 hours)		
Science, Engineering, and/or Technology Related Courses (Students must select 15-24 hours in this area)		
Arts, Humanities and Social & Behavioral Science and Business Related Courses (Students must select 9-18 hours in this area)		

Bachelor of Science - Engineering Technology Concentration

Bachelor of Professional Studies degree requires 120 hours:

- A minimum of 36 of 120 credit hours must be taken at the 300 level or higher; 6 credit hours must be taken at the 400 level.
- A minimum of 25% of the total requirements and 12 of the last 18 hours must be completed at UAH.
- No more than 60 credit hours from a 2-year or community college can be applied toward the BPS degree.
- A minimum GPA of 2.0 is required for all courses taken at UAH and is the minimum requirement for graduation.
- Students will work with the BPS Academic Success Specialist to learn how their transfer credits can apply toward this program of study.

Charger Foundations (General Education Requirements)

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S or WLC 101A or WLC 101F or WLC 101G or WLC 101J or WLC 101R	INTRO FOREIGN LANG I: SPANISH INTRO FOREIGN LANG I: ARABIC INTRO FOREIGN LANG I:FRENCH INTRO FOREIGN LANG I:GERMAN INTRO FOREIGN LANG I:JAPANESE INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S or WLC 102A or WLC 102F or WLC 102G or WLC 102J or WLC 102R	INTRO FOREIGN LANG II:SPANISH INTRO FOREIGN LANG II: ARABIC INTRO FOREIGN LANG II:FRENCH INTRO FOREIGN LANG II:GERMAN INTRO FOREIGN LANG II:JAPANESE INTRO FOREIGN LANG II:RUSSIAN	
WLC 201S or WLC 201A or WLC 201F or WLC 201G or WLC 201J	INTERM FOREIGN LANG:SPANISH INTERM FOREIGN LANG I: ARABIC INTERM FOREIGN LANG:FRENCH INTERM FOREIGN LANG:GERMAN INTERM FOREIGN LANG: JAPANESE	

or WLC 201R	INTERM FOREIGN LANG:RUSSIAN	
WLC 202S	INTERM FOREIGN LANG II:SPANISH	
or WLC 202A	INTERM FOREIGN LANG II: ARABIC	
or WLC 202F	INTERM FOREIGN LANG II:FRENCH	
or WLC 202G	INTERM FOREIGN LANG II:GERMAN	
or WLC 202J	INTERM FORGN LANG II:JAPANESE	
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN	
WLC 204	INTERNATIONAL CINEMA	
PHL 101	INTRODUCTION TO PHILOSOPHY	
PHL 102	INTRO TO ETHICS	
PHL 103	INTRODUCTION TO LOGIC	
PHL 150	TECH, SCIENCE & HUMAN VALUES	
WGS 200	INTRO WOMEN'S & GENDER STUDIES	
AMS 229	ANCIENT & MEDIEVAL WORLDS	
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Area III: Mathematics and Sciences		11-12
Mathematics		3-4
MA 105	NATURE OF MATHEMATICS	
MA 107	ALGEBRA WITH APPLICATIONS	
MA 110	FINITE MATHEMATICS	
MA 112	PRECALCULUS ALGEBRA	
MA 113	PRECALCULUS TRIGONOMETRY	
MA 115	PRECALCULUS ALGEBRA & TRIG	
MA 120	MATH PROFESSIONAL APPLICATIONS	
MA 171	CALCULUS A	
Natural Sciences (Lab)		8
AST 100	SURVEY OF ASTRONOMY	
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BYS 109	FUNDAMENTALS OF BIOLOGY	
BYS 119	PRINCIPLES OF BIOLOGY	
BYS 120	ORGANISMAL BIOLOGY	
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I	
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PY 101	GENERAL PSYCHOLOGY I	
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SOC 102	ANALYSIS OF SOCIAL PROBLEMS	
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SOC 105	INTRO CULTURAL ANTHROPOLOGY	

*Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Take no more than six hours in a single discipline in Area II or Area IV.

Pre Professional Requirements

Code	Title	Semester Hours
MA 171	CALCULUS A	4
ENG 101	INTRO COMPUTING ENGINEERS	3
MSC 287	BUSINESS STATISTICS I	3

Professional Studies Interdisciplinary Core

Code	Title	Semester Hours
PRO 301	THRY & PRAC ADULT LEARNING	3
PRO 310	ACADEMIC WRITING PROFESS STUDI	3
PRO 320	INDS PERSPECT & CRITICAL THNKG	3

PRO 301 is required for students with less than 60 hours credit and/or those who have not been enrolled in higher education for an extended period. MUST enroll during the first semester.

Engineering Technology

Code	Title	Semester Hours
PRO 315	ENGINEERING COMMUNICATION	3
PRO 331	ENGINEERING TECH FNDNS I	3
PRO 332	ENGINEERING TECH FNDNS II	3

PRO 333	COMPUTER-AIDED DESIGN	3
PRO 341	ELECTRICAL CIRCUITS & SYSTEMS	3
PRO 334	PRINCIPLES OF STATICS	3
PRO 335	STRENGTH OF MATERIALS	3
PRO 336	PRINCIPLES OF DYNAMICS	3
PRO 431	FUNDAMENTALS OF MANUFACTURING	3
PRO 433	INSTRUMENTATION & MEASUREMENT	3

Elective Courses (Total of 29-32 hours)

Additional Elective courses 100+ level to reach 120 credit hours. Electives can be taken from any department and do not have to be taken in your concentration.

Overall Requirements

All Professional Studies degrees must have at least 120 credits.

At least 36 credits of the 120 must be at the 300+ level and 6 credits must be at the 400 level.

¹Based on Math placement, a prerequisite of MA 113 may be required.

²A two course sequence of General Physics (PH 101 and PH 102) is required.

College of Science

C 207 and C 206 Materials Science Building

Telephone: 256.824.6605

Mission

The College of Science provides quality education with leading-edge research opportunities through interdisciplinary programs administered by seven departments and vibrant collaborations across campus and community. Faculty bring their innovative research into the classroom, equipping students with advanced knowledge, skills and abilities, and preparing leaders for this generation and beyond.

College of Science offers undergraduate degrees in the following disciplines:

- Atmospheric and Earth Science (<http://catalog.uah.edu/undergrad/colleges-departments/science/atmospheric-science/#majorstext>)
- Biology (p. 415)
- Chemistry (p. 470)
- Computer Science (p. 539)
- Mathematics (p. 579)
- Physics (p. 604)

College of Science Academic Advising

To schedule an appointment with a College of Science academic advisor, click here (<http://www.uah.edu/academic-advising/>).

Morgan Lewis, B.S., M.S.

C 206 Materials Science Building

256.824.2505

Email: scienceadvising@uah.edu (lewism@uah.edu)

Jennifer Bradley, B.S., M.S.

C 206 Materials Science Building

256.824.2505

Email: scienceadvising@uah.edu (jennifer.bradley@uah.edu)

Matthew Wilson, B.A., M.S.

C 206 Materials Science Building

256.824.2505

Email: scienceadvising@uah.edu (jennifer.bradley@uah.edu)

Biological Sciences

369A Shelby Center

Telephone: 256.824.6260

Email: biology.admin@uah.edu

Chair: Dr. Paul Wolf, Professor (<https://www.uah.edu/science/departments/biology/faculty-staff/paul-wolf/>)

The Biological Sciences department offers the following undergraduate degrees:

- Biological Sciences, BS (p. 422)
- Biological Sciences, BS - Biochemistry Concentration (p. 428)
- Biological Sciences, BS - Pre-Professional Health Careers Concentration (p. 455)
- Biological Sciences, BS - Ecology and Evolution Concentration (p. 434)
- Biological Sciences, BS - Microbiology Concentration (p. 448)
- Biological Sciences, BS - Secondary Education Concentration (p. 463)

Program Objectives

The UAH Department of Biological Sciences prepares students for jobs in an evolving marketplace. Our graduates comprise the next generation of highly skilled environmental, clinical, data scientists, and other fields related to biological sciences. Our comprehensive curricula include instruction through lecture, field, and laboratory experience for our undergraduates, and meet the highest national standards.

Learning Outcomes

The UAH Department of Biology program fosters an advanced understanding of biology through phenomenon-based learning and research. Throughout the biology program, students engage in the scientific process, allowing them to understand the applications of biology to real-life scenarios.

Majors in Biological Sciences

- Biological Sciences, BS (p. 422)
- Biological Sciences, BS - Biochemistry Concentration (p. 428)
- Biological Sciences, BS - Pre-Professional Health Careers Concentration (p. 455)
- Biological Sciences, BS - Ecology and Evolution Concentration (p. 434)
- Biological Sciences, BS - Microbiology Concentration (p. 448)
- Biological Sciences, BS - Secondary Education Concentration (p. 463)

For more information about the department of biology, visit [uah.edu/biology](http://www.uah.edu/science/departments/biology/) (<http://www.uah.edu/science/departments/biology/>).

Minor in Biological Sciences

- Biological Sciences (p. 470)

UAH's Joint Undergraduate Master's Program (JUMP) allows undergraduate students to study at the graduate level. By completing graduate courses in your senior year you may reduce the time taken to earn a graduate (MS) degree. Please visit the JUMP (p. 18) page for general information.

Requirements For Admissions

1. Cumulative Overall GPA of 3.3 +
2. Major GPA of 3.5 +
3. Student shall complete BYS 120, BYS 219, BYS 300, BYS 361 + BYS 362, CH 121 + CH 125, CH 123 + CH 126, CH 331 + CH 335, CH 332 + CH 336 by Junior year

Additional Information

- Maximum of 12 credit hours count toward both degrees

Designated Faculty Contact/Advisor

Dr. Matthew Niemiller
matthew.niemiller@uah.edu
256.824.3077

BYS 100 - INTRO HEALTH PROFESSIONS

Semester Hour: 1

Career options for undergraduate students interested in health professions. Basics of health-care delivery systems and terminology of health care. No BYS major or minor credit. Primarily for freshman and sophomores.

BYS 109 - FUNDAMENTALS OF BIOLOGY

Semester Hours: 4

This course emphasizes an understanding of the living world through discussion of biological concepts and how they relate to social sciences and humanities. Biological concepts covered include the nature of science, cellular biology, biochemistry, heredity, evolution, biological diversity, ecology, anatomy, and physiology. Not intended for biology majors. Co-requisite: BYS 109L.

BYS 109L - LABORATORY

Semester Hours: 0

Laboratory Online Students will experience laboratory activities via interactive online software. Topics include experimental design, biology of a cell, genetics, diversity, evolution, and ecology. Co-requisite: BYS 109.

BYS 119 - PRINCIPLES OF BIOLOGY

Semester Hours: 4

Lecture/Lab/Recitation. Introduction to biological principles of cell structure, function, metabolism and reproduction. One two hour lab and a one hour recitation per week.

BYS 119L - LABORATORY

Semester Hours: 0

Laboratory exercised to introduce students to accurate measurement techniques, observation, and the development of relevant hypotheses. Several formal lab reports are required as an introduction to scientific writing.

BYS 119R - RECITATION

Semester Hours: 0

Homework turned in and discussed; exams discussed and further assistance with course material available.

BYS 120 - ORGANISMAL BIOLOGY

Semester Hours: 4

Lecture/Lab/Recitation. Discussion of biological function with special emphasis on contrasting strategies employed by organisms in meeting similar biological needs. One two-hour lab and a one hour recitation per week.

BYS 120L - ORGANISMAL BIOLOGY LAB

Semester Hours: 0

Introduction to the basic concepts of natural selection, population biology, and the biodiversity of animals and plants. Several formal lab reports are required as a further introduction to scientific writing, along with a lab practical on the biodiversity of animals and plants.

BYS 120R - RECITATION

Semester Hours: 0

Homework turned in and discussed; exams discussed and further assistance with course material available.

BYS 200 - DINOSAUR BIOLOGY

Semester Hours: 2

Introduction to the major areas of scientific interest in dinosaur biology; origin of the dinosaurs, their size, thermal biology, behavior and functional anatomy, relationships, and extinction. Lecture, discussion, and laboratory. Field trips may be required.

BYS 202 - HUMAN ANAT & PHYS II/CALHOUN

Semester Hours: 4

BYS 205 - CODING ALGORITHMS FOR BIOLOGY

Semester Hours: 3

Prerequisites: BYS 119, BYS 120, MA 112.

BYS 214 - INFECTION & IMMUNITY

Semester Hours: 4

Lecture/Lab. Two 2-hour labs a week. Principles of microbiology with emphasis on infectious disease of humans; epidemiological and immunological aspects. No credit for students who have credit for BYS 321 or advanced microbiology courses. Recommended for students in the College of Nursing. Prerequisites: BYS 119 and either CH 101 or CH 121 or CH 151.

BYS 214L - LABORATORY

Semester Hours: 0

BYS 215 - HUMAN ANATOMY & PHYSIOLOGY I

Semester Hours: 4

BYS 215 (I) and laboratory (one 3-hour lab per week), is designed primarily for the Nursing and Kinesiology majors. Course and laboratory material focus on the use of anatomical terminology, major tissues of the body and in-depth study of skeletal, muscular and nervous system physiology. Basic pathology is also presented to prepare students for clinicals. Laboratory material reinforces the lecture content with detailed identification of bones, joints, surface markings and human musculature. Prerequisites: BYS 119, CH 101 and CH 105.

BYS 215L - HA&P I LABORATORY

Semester Hours: 0

An introduction to anatomical terminology; basic histology of normal tissues versus common pathologies. Focus on the human skeletal and muscular systems. Students are engaged in recognition of individual bones, surface markings and major muscles through dissection and use of muscular models.

BYS 216 - HUMAN ANATOMY & PHYSIOLOGY II

Semester Hours: 4

BYS 216 (II) and laboratory (one 3-hour lab per week) is designed as a continuum for the Nursing and Kinesiology majors. Course and laboratory material focus on the structures and organization of the central and peripheral nervous system, neurotransmitters, cardiovascular, renal, respiratory, digestive and detailed study of the endocrine systems. Basic pathology is also presented to prepare students for clinicals. Laboratory material reinforces the lecture content with dissections of key organs, study of blood flow, identification of major blood vessels and nerves and explanations of various diagnostic tests (EKG/ECG). Prerequisite: BYS 215.

BYS 216L - HA&P II LABORATORY

Semester Hours: 0

Study of the anatomy of the nervous, cardiovascular, respiratory, renal and digestive systems. Dissections of eye, brain, heart, lung and kidney. Basic EKG/ECG reading and a study of factors affecting blood pressure. Enzymatic action of the digestive system; basic urinalysis determinations.

BYS 219 - GENETICS AND EVOLUTION

Semester Hours: 4

Lecture/Lab/Recitation. Two labs and one recitation per week. Hereditary basis of organisms; genes as the discrete units of inheritance and genes in organisms and populations. Mendelian principles and evolutionary processes. Replication, transcription and translation of DNA, RNA, and proteins. Prerequisites: BYS 120 and (CH 101 or CH 121) and (MA 107 or 112).

BYS 219L - LABORATORY

Semester Hours: 0

Laboratory activities include experiments to further students understanding in Mendelian genetics, molecular biology and Human genetic diseases. Counted as part of the overall grade for BYS 219.

BYS 219R - RECITATION

Semester Hours: 0

Homework turned in and discussed; exams discussed and further assistance with course material available.

BYS 292 - INTRO TO BIOLOGICAL RESEARCH

Semester Hours: 3

Introduction to the principles and practices of biological research. Covers experimental design, statistical analysis, critical review of journal articles, responsible conduct of research, and writing for the biological sciences. Recommended for students planning to do undergraduate research. Prerequisites: BYS 119, MA 112, EH 101.

BYS 300 - CELL & DEVELOPMENTAL BIOLOGY

Semester Hours: 4

Lecture/Lab. One lab per week. Introduces the student to topics in cell and developmental biology. Subjects include cell structure, organelles, cytoskeleton, secretory pathway, cell division, cell cycle, cell interaction and control of differentiation. Prerequisites: BYS 219 (C- or better) and either CH 123 or 201.

BYS 300L - CELL & DEVELOPMENT BIO LAB

Semester Hours: 0

BYS 301 - ELEMENTARY BIOCHEMISTRY

Semester Hours: 3

Biochemistry and energetics of living cells, metabolism, structure and function of carbohydrates, lipids, proteins and nucleic acid. Enzymes, coenzymes, vitamins, blood, endocrine glands, DNA synthesis and gene expression. Same as CH 301. Prerequisites: BYS 119, BYS 120 and (CH 121 or CH 331).

BYS 302 - PEOPLE, PLANTS & ENVIRONMENT

Semester Hours: 3

This course is designed to introduce students from multiple departments to the vital roles that plants have in our ecosystems through the study of basic plant and soil science. Special attention is placed on the impact that plants have on our technology-based society.

BYS 311 - INTRO MOLECULAR UNDSST BIO SYST

Semester Hours: 3

Introduction to a molecular understanding of genes, gene expression and genetic engineering in selected procaryotic and eucaryotic systems. Includes examples of biotechnology applications. Prerequisite: CH 331.

BYS 312 - PRINCIPLES OF ECOLOGY

Semester Hours: 4

Lecture/Lab. One lab a week. Population structure and growth, competition, predation, symbiosis, biogeochemical cycling and energy flow, disturbance and community dynamics, biodiversity and conservation. Field trips required. Prerequisites: BYS 120, and BYS 219.

BYS 313 - ANATOMY & PHYSIOLOGY I

Semester Hours: 4

Lecture/Lab. One lab a week. Structure and function of the human body. Anatomy of the skeletal and muscular systems, physiology of membranes, cellular and epithelial transport and nervous system function. Appropriate preparation for professional schools/graduate study in biological sciences. Prerequisite: BYS 119. Prerequisites with concurrency: BYS 300, and either CH 201 or 331.

BYS 313L - LABORATORY

Semester Hours: 0

Laboratory activities on the basic concept of system physiology including a rat dissection. Focuses on membrane transport and histology, and include gross anatomy and a study of the muscles and bones of the human body. Capstone student research project on electromyography of muscles.

BYS 314 - ANATOMY & PHYSIOLOGY II

Semester Hours: 4

Lecture and one lab a week. Continuation of BYS 313 stressing structural and functional relationships of major organ systems, focusing on heart, brain, lungs, kidney and the gastrointestinal tract. Appropriate for students preparing for professional schools or graduate study in biological sciences. Prerequisite: BYS 313 (C- or better).

BYS 314L - ANATOMY/PHYSIOLOGY II LAB

Semester Hours: 0

Research-intensive system based laboratory course. Includes brain dissection and student EEG project and a heart dissection and a cardiovascular physiology project. This is followed by a pulmonary function lab and a renal function lab where students calculate their own glomerular filtration rate.

BYS 315 - ICHTHYOLOGY

Semester Hours: 4

Classification, anatomy, physiology, and ecology of freshwater and marine fishes. Emphasis fishes of north Alabama. Laboratory and field trips required. Prerequisites: BYS 120 and BYS 219. Prerequisite with concurrency: BYS 300.

BYS 317 - VERTEBRATE ZOOLOGY

Semester Hours: 5

Lecture/Lab. Two three-hour labs a week. Morphology of vertebrate animals. Relationship of organs and systems and their phylogenetic significance. Prerequisites: BYS 120 and BYS 219. Prerequisite with concurrency: BYS 300.

BYS 318 - VERTEBRATE REPRODUCTION

Semester Hours: 3

General treatment of the major concepts and controversial areas of comparative vertebrate reproduction: ecological and evolutionary aspects, development of reproductive functions and sexual behavior, seasonal breeding and other topics of current interest. Prerequisites: BYS 120 and BYS 219. Prerequisite with concurrency: BYS 300.

BYS 320 - MEDICAL TERMINOLOGY

Semester Hours: 3

The meaning, spelling, etymology and pronunciation of major medical terms related to anatomy, pathology, medical professions, procedures and pharmaceuticals; body systems, their associated diseases and disorders. Correct usage of terms and interpretation of documents containing these terms. Hybrid course with online and in-class portions. Prerequisites: BYS 300 or BYS 215 and BYS 216.

BYS 321 - GENERAL MICROBIOLOGY I

Semester Hours: 4

Structure, biochemistry, and genetics of microorganisms, control of microbial growth, and microorganisms as pathogens. Lab covers basic and diagnostic methods in microbiology, environmental factors controlling microbial growth and survival, and characteristics of medically important microorganisms. Prerequisites: BYS 120, BYS 219. Prerequisite with concurrency: BYS 300.

BYS 321L - LABORATORY

Semester Hours: 0

BYS 322 - GENERAL MICROBIOLOGY II

Semester Hours: 4

Emphasizes diversity of microorganisms with respect to ecology, physiology, and phylogeny. Prerequisite: BYS 321.

BYS 322L - GENERAL MICROBIOLOGY II LAB

Semester Hours: 0

BYS 347 - BIOPHYSICAL CHEMISTRY I

Semester Hours: 3

First and second laws of thermodynamics. Free energy and equilibrium. Colligative properties of solutions. Ionic equilibria. Electrochemistry. Reaction kinetics. Enzyme catalysis. Adsorption and surface tension. Same as CH 347. Prerequisites: CH 332, PH 112, PH 115 and MA 172.

BYS 348 - BIOPHYSICAL CHEMISTRY II

Semester Hours: 3

Viscosity, diffusion, sedimentation, electrophoresis, determination of molecular weight by osmotic pressure. Light scattering and photochemistry. Elementary IR, UV-VIS, ESR, NMR spectroscopy. Fluorescence. Optical rotation. Same as CH 348. Prerequisites: BYS 347 or CH 347.

BYS 361 - GENERAL BIOCHEMISTRY

Semester Hours: 3

Biochemical structure and function of amino acids, proteins, carbohydrates, lipids, and nucleic acids; Enzyme catalysis and kinetics; major catabolic pathways, their integration and control mechanisms: Glycolysis, Citric Acid Cycle, Fatty Acid Oxidation and Oxidative Phosphorylation. Same as CH 361. Prerequisites: (BYS 119, BYS 120, CH 332 and CH 335) or (BYS 311, CH 332 and CH 335).

BYS 362 - GENERAL BIOCHEMISTRY LAB

Semester Hour: 1

One 3-hour lab a week. Practical experience in isolation, qualitative identification, and quantitative estimation of biomolecules. Same as CH 362. Prerequisites: CH 335 and CH 336. Prerequisite with concurrency: CH 361.

BYS 363 - GEN BIOCHEMISTRY II

Semester Hours: 3

A continuation of BYS 361 to include amino acid oxidation, biosynthesis of biomolecules, integration of metabolism, DNA and RNA metabolism, protein biosynthesis, and gene structure. Same as CH 363. Prerequisites: BYS 361 (C- or better).

BYS 364 - BIOGEOGRAPHY

Semester Hours: 3

Why plants and animals live where they do. Principles governing plant and animal distribution and dispersal, using the communities of North America as prime examples. Strongly recommended: BYS 312. Prerequisites: BYS 120, BYS 219. Prerequisite with concurrency: BYS 300.

BYS 365 - GEN BIOCHEMISTRY LAB II

Semester Hour: 1

Experimental course illustrating the topics in BYS 363. Prerequisites: BYS 361 and BYS 362. Prerequisite with concurrency: BYS 363.

BYS 403 - ADV EXERCISE PHYSIOLOGY

Semester Hours: 4

Lecture/Lab. One lab per week. Human physiology, addressing the effects of environmental variables such as altitude, thermal stress and terrain on the major physiological systems of the body; in-depth analysis of resistance training, aerobic and anaerobic training; integration of multiple systems. Prerequisites: BYS 401, and (BYS 301 or CH 301) or (BYS 361 or CH 361).

BYS 405 - PSYCHOPHARMACOLOGY

Semester Hours: 3

Introduction to drug classification and action with emphasis on physiological and psychological interactions.

BYS 417 - PRINCIPLES OF PLANT PHYSIOLOGY

Semester Hours: 4

The objectives in the development of this course is to provide students with an opportunity to: (1) study the principles of plant physiology (2) to gain an understanding of the complexity of plant genetics and stress response pathways (hormones) as well as (3) to appreciate how dependent we are on plants from those in our forests and environment to those in agricultural production and beyond. Laboratory experiments will provide an additional opportunity for students to take the lecture material and gain actual experience in the growth, nutritional requirements and maintenance of a wide variety of plants through the semester via work on campus as well as in the UAH Greenhouse. Prerequisites: BYS 120 and BYS 219.

BYS 419 - MICROBIAL GENETICS

Semester Hours: 3

Transmission, expression, and evolution of genes in microorganisms. Studies of chromosomes, plasmids, transposons, bacteriophages, and other genetic elements. Prerequisites: BYS 219, BYS 300 and BYS 321.

BYS 430 - IMMUNOLOGY

Semester Hours: 4

Lecture/Lab. One 3-hour lab per week. Innate, humoral and cell-mediated immunity. Immune deficiencies and hypersensitivities. Autoimmunity, transplantation, and tumor immunology. Prerequisites: BYS 219, BYS 300 and BYS 321. Prerequisite with concurrency: CH 361.

BYS 431 - BIOLOGICAL DATA SKILLS

Semester Hours: 3

This course covers a range of computational skills needed specifically for biologists who do not have any training in computer science. The course focuses on command line tools, basic programming in Python, and various aspects of data handling including, data curation, organization, storage, querying, and archiving. The course will include a project that ties together skills that are useful for individual students.

BYS 433 - RESEARCH SEMINAR ATTENDANCE

Semester Hour: 1

This course gives upper level biology majors a chance to gain exposure to research in biology. Students will attend seminars and learn about how research projects are planned, and interpreted. Additionally they will learn how scientists present their research. Prerequisite: BYS 300.

BYS 436 - BIOLOGICAL PSYCHOLOGY

Semester Hours: 3

Functional analysis of neural and endocrine systems underlying behavior. Same as PY 436. Prerequisites: (either a or b): (a) 15 hours of PY or approval of instructor; (b) BYS 120 or BYS 313, and 6 hours of PY.

BYS 437 - PSYCHOBIOLOGY STRESS & ILLNESS

Semester Hours: 3

Overview of psychological stress responses and their influence on health, behavior and illness. Same as PY 437. Prerequisites: approval of instructor.

BYS 461 - HERPETOLOGY

Semester Hours: 4

Classification, diversity, anatomy function, ecology, behavior, and evolution of amphibians and reptiles. Laboratory and field trips devoted to anatomy and identification, with an emphasis on Alabama and southeastern U.S. species. Prerequisites: BYS 120 and BYS 219.

BYS 464 - EVOLUTION

Semester Hours: 3

Principles of evolution and speciation. Nature of species, selection and adaptation, divergence and cladogenesis, isolation, hybridization, and phylogeny. Prerequisites: BYS 120, 219. Prerequisites with concurrency: BYS 300.

BYS 465 - MOLECULAR MTHDS ECLGY & EVOLU

Semester Hours: 4

This lecture and laboratory course is intended as an intense introduction to modern molecular methods in biological research. Topics include: genetic variation, evolutionary genetics, ecological genetics, genomics, gene expression, phylogenetics, and bioinformatics. Prerequisites: BYS 464.

BYS 490 - SENIOR CAPSTONE

Semester Hours: 2

Discussions, readings, and presentations of topical biological subjects using scientific literature. Capstone course emphasizing refinement of oral and written communication skills and critical thinking. All students will take ETS Major Field Test in Biology as part of the course grade. Prerequisites: BYS 119, 120, 219, and 300. Senior standing.

BYS 491 - SP TOPICS BIOLOGICAL SCI

Semester Hours: 1-4

Directed readings and/or written reports on topics of interest to individual students carried out under supervision of an instructor. Prerequisites: Permission of instructor required before registration.

BYS 492 - UNDERGRADUATE RESEARCH

Semester Hours: 2-4

For advanced-level biological sciences students with biological sciences GPA of 3.5 or above. Individual investigations into biological problems under direct supervision of instructor. May also be taken at the Marine Environmental Sciences Consortium, Dauphin Island, Alabama. Prerequisites: Permission of instructor required before registration.

BYS 499 - UNGRAD HONORS RES & THESIS

Semester Hours: 2-4

Individual investigations into biological problems under direct supervision of instructor. For honors students majoring in the biological sciences. Prerequisites: Approval of instructor, chair, and director of honors program; Senior Standing.

Marine Sciences

Select courses in marine sciences, available through the Marine Sciences Consortium at The Dauphin Island Sea Lab (<http://www.disl.org/>), may be taken for credit at UAH toward a biological sciences major or minor, a minor in marine sciences, or a Master of Science degree in biological sciences. Marine sciences coursework must be approved by the Marine Sciences Consortium UAH liaison officer in the Biological Sciences Department prior to enrollment in the courses.

MS 202 - MARINE BIOLOGY

Semester Hours: 4

Survey of invertebrates, vertebrates, and marine plants as communities with local examples. Examination of marshland, estuarine, beach, dune, inlet and neritic habitats, and niches. Lecture/Lab/field work. Offered only at the Marine Environmental Sciences Consortium Sea Lab at Dauphin Island, AL. Prerequisites: BYS 119 and BYS 120.

MS 204 - COM MARINE FISHERIES/ALA

Semester Hours: 2

Biology, harvesting technology, and processing of commercially valuable fish and shellfish species of Alabama. Offered only at the Marine Environmental Sciences Consortium Sea Lab at Dauphin Island, Alabama. No credit for biological sciences major or minor; can be used for marine science minor.

MS 301 - MARINE TECH METHODS I

Semester Hours: 2

Marine science research equipment, methods, and techniques. Operation and field maintenance of major sampling gear. Only at the Marine Environmental Sciences Consortium Sea Lab at Dauphin Island, Alabama. No credit for biological sciences major or minor; can be used for a marine science minor. Prerequisites: BYS 119 and BYS 120.

MS 303 - COASTAL CLIMATOLOGY

Semester Hours: 2

Physical factors resulting in climatic conditions in and near coastal region. Emphasis on northern Gulf of Mexico. Only at the Marine Environmental Sciences Consortium Sea Lab at Dauphin Island, Alabama. No credit toward a biological sciences major or minor; can be used for a marine science minor.

MS 304 - COASTAL ZONE MANAGEMENT
Semester Hours: 2

Examination of ecological features and physical management policies design for coastal communities and a review of the federal and state programs that impinge upon coastal ecological communities. Only at the Marine Environmental Sciences Consortium Sea Lab at Dauphin Island, Alabama.

MS 491 - SPECIAL TOPICS IN MARINE SCIEN
Semester Hours: 1-4

Biological Sciences, BS

Biological Sciences, BS Requirements:

- All students are encouraged to see an advisor after completion of 24 credits.
- Biological Sciences, BS degree requires 128 credit hours.
- 39 of 128 credit hours must be taken at 300 level or higher (39 credits includes courses taken at the 300+ level in major, minor (if chosen), Pre professional area and electives).
- 12 credit hours of 300 level and above must be taken in the major or 6 credit hours in the major and 6 credit hours in the minor (if chosen).
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- Unless otherwise noted a C- or better is required for all College of Science prerequisite courses.
- No more than 64 credit hours from a two-year college can be applied toward a UAH degree.
- For graduation application instructions, see here (p. 812).

Degree Requirements

Charger Foundations Requirements

*Please see Area V for CoS requirements that can also be used to fulfill Charger Foundations Requirements.

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S	INTRO FOREIGN LANG I: SPANISH	
or WLC 101A	INTRO FOREIGN LANG I: ARABIC	
or WLC 101F	INTRO FOREIGN LANG I:FRENCH	
or WLC 101G	INTRO FOREIGN LANG I:GERMAN	
or WLC 101J	INTRO FOREIGN LANG I:JAPANESE	

or WLC 101R	INTRO FOREIGN LANG I:RUSSIAN
WLC 102S	INTRO FOREIGN LANG II:SPANISH
or WLC 102A	INTRO FOREIGN LANG II: ARABIC
or WLC 102F	INTRO FOREIGN LANG II:FRENCH
or WLC 102G	INTRO FOREIGN LANG II:GERMAN
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN
WLC 201S	INTERM FOREIGN LANG:SPANISH
or WLC 201A	INTERM FOREIGN LANG I: ARABIC
or WLC 201F	INTERM FOREIGN LANG:FRENCH
or WLC 201G	INTERM FOREIGN LANG:GERMAN
or WLC 201J	INTERM FOREIGN LANG: JAPANESE
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN
WLC 202S	INTERM FOREIGN LANG II:SPANISH
or WLC 202A	INTERM FOREIGN LANG II: ARABIC
or WLC 202F	INTERM FOREIGN LANG II:FRENCH
or WLC 202G	INTERM FOREIGN LANG II:GERMAN
or WLC 202J	INTERM FORGN LANG II:JAPANESE
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN
WLC 204	INTERNATIONAL CINEMA
PHL 101	INTRODUCTION TO PHILOSOPHY
PHL 102	INTRO TO ETHICS
PHL 103	INTRODUCTION TO LOGIC
PHL 150	TECH, SCIENCE & HUMAN VALUES
WGS 200	INTRO WOMEN'S & GENDER STUDIES
AMS 229	ANCIENT & MEDIEVAL WORLDS
ARH 100	ARH SURV:ANCIENT-MEDIEVAL
ARH 101	ARH SURV:RENAISSANCE-MODERN
ARH 103	ARH SUR:NON-WESTERN TRADITIONS
ARS 160	DRAWING: FOUNDATIONS
TH 122	THEATRE APPRECIATION
TH 123	INTRO TO FILM STUDIES
MU 100	INTRO TO MUSIC LITERATURE
Area III: Mathematics and Sciences	
Mathematics	
MA 105	NATURE OF MATHEMATICS
MA 107	ALGEBRA WITH APPLICATIONS
MA 110	FINITE MATHEMATICS
MA 112	PRECALCULUS ALGEBRA
MA 113	PRECALCULUS TRIGONOMETRY
MA 115	PRECALCULUS ALGEBRA & TRIG
MA 120	MATH PROFESSIONAL APPLICATIONS
MA 171	CALCULUS A
Natural Sciences (Lab)	
AST 100	SURVEY OF ASTRONOMY
AST 106	EXPLORING THE COSMOS I
AST 107	EXPLORING THE COSMOS II
BYS 109	FUNDAMENTALS OF BIOLOGY
BYS 119	PRINCIPLES OF BIOLOGY
BYS 120	ORGANISMAL BIOLOGY
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I

11-12

3-4

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CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB
ESS 103	ENVIRONMENTAL EARTH SCIENCE
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG
PH 100	CONCEPTUAL PHYSICS
PH 101	GENERAL PHYSICS I
PH 102	GENERAL PHYSICS II
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III

Area IV: History and Social and Behavioral Sciences* **12**

History 3-6

HY 103	WORLD HISTORY TO 1500
HY 104	WORLD HISTORY SINCE 1500
HY 221	UNITED STATES TO 1877
HY 222	UNITED STATES SINCE 1877

Social and Behavioral Sciences 6-9

ECN 142	PRINC OF MACROECONOMICS
ECN 143	PRINC OF MICROECONOMICS
GS 200	GLOBAL SYSTEMS AND CULTURES
ESS 105	WORLD REGIONAL GEOGRAPHY
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY
PSC 101	INTRO TO AMERICAN GOVERNMENT
PSC 102	INTRO TO COMPARATIVE POLITICS
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS
PY 101	GENERAL PSYCHOLOGY I
PY 201	LIFE-SPAN DEVELOPMENT
SOC 100	INTRO TO SOCIOLOGY
SOC 102	ANALYSIS OF SOCIAL PROBLEMS
SOC 103	INTRO TO CRIMINOLOGY
SOC 105	INTRO CULTURAL ANTHROPOLOGY

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Take no more than six hours in a single discipline in Area II or Area IV.

Area V: Pre Professional Requirements

Code	Title	Semester Hours
Courses in this area may also fulfill Charger Foundations requirements		
Communications:		3
CM 113	Intro to Rhetorical Communication	
Calculus - choose one:		3-4
MA 120	MATH PROFESSIONAL APPLICATIONS	
or MA 171	CALCULUS A	
MA 171	CALCULUS A	

Physics Sequence Choose one:**8**

PH 101 & 101L	GENERAL PHYSICS I and GENERAL PHYSICS I LAB
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&

PH 102 & 102L	GENERAL PHYSICS II and GENERAL PHYSICS LAB II
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OR

PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I
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&

PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II
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General Chemistry and lab**4**

CH 101 or CH 121	INTRO TO CHEMISTRY GENERAL CHEMISTRY I
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CH 105 or CH 125	INTRO CHEMISTRY LAB GENERAL CHEMISTRY LAB I
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Organic Chemistry and lab**4**

CH 201 or CH 331	ELEM ORGANIC CHEMISTRY ORGANIC CHEMISTRY I
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CH 205 or CH 335	ELEM ORGANIC CHEMISTRY LAB ORGANIC CHEMISTRY LAB I
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Computer Programming - choose one:**3**

CS 100 or CS 102 or CS 103 or CS 104	INTRO COMPUTERS & PROGRAM INTRO TO C PROGRAMMING INTRO PROGRAMMING USING JAVA INTRO TO CS USING PYTHON
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Technical Writing**3**

EH 301	TECHNICAL WRITING
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Major Requirements

Code	Title	Semester Hours
Biology Core ⁵		18
BYS 119 & 119L & 119R	PRINCIPLES OF BIOLOGY and LABORATORY and RECITATION	
BYS 120 & 120L & 120R	ORGANISMAL BIOLOGY and ORGANISMAL BIOLOGY LAB and RECITATION	
BYS 219 & 219L & 219R	GENETICS AND EVOLUTION and LABORATORY and RECITATION	
BYS 300 & 300L	CELL & DEVELOPMENTAL BIOLOGY and CELL & DEVELOPMENT BIO LAB	
BYS 490	SENIOR CAPSTONE	

Biology Elective Course Requirements**18**

Choose BYS classes, Ex: BYS 321, BYS 312, etc. Enough credits to reach 18 credit hours.

Elective Requirements

Code	Title	Semester Hours
Elective Courses		36-37

Additional Elective courses 100+ level to reach 128 credit hours. Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credits of 100 level HPE courses can count toward degree requirements.

Overall Requirements

Code	Title	Semester Hours
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All College of Science degrees must have at least 128 credits.

At least 39 of the 128 credits must be at the 300+ level. These may be taken in any area including electives.

Total Semester Hours	128
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- 1 Students must take one literature and one history course. Students must also take either a second literature or history course to complete a sequence. Acceptable Literature sequences must include one early literature (EH 207 or EH 242 or EH 209) and one later literature (EH 208 or EH 210). Acceptable history sequences are (HY 103 + HY 104), or (HY 221 + HY 222)
- 2 Based on Math placement, (<http://www.uah.edu/science/departments/math/undergraduate-students/placement/>) prerequisite MA 112 and/or MA 113 Mathematics courses may be required. If the student intends to pursue a course of study requiring more advanced mathematics background, they should take MA 171 . Otherwise, MA 120 may be used to meet this requirement.
- 3 No more than 6 credit hours can be taken in a single discipline.
- 4 For choices see the World Languages and Cultures (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/foreign-languages-literatures/>) department.
- 5 Biology pre requisites require a minimum grade of D- or higher. BYS 301 and BYS 314 pre requisites require a minimum grade of C- or higher.

Sample four year plan for Biological Sciences, BS degree:

Note: This is only an example and variations are possible.

Year 1

Fall		Semester Hours
FYE 101S	CHARGER SUCCESS - SCIENCE	1
EH 101	COLLEGE WRITING I	3
BYS 119 & 119L & 119R	PRINCIPLES OF BIOLOGY and LABORATORY and RECITATION	4
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	4
MA 171 or MA 120	CALCULUS A or MATH PROFESSIONAL APPLICATIONS	4
Term Semester Hours:		16
Spring		
EH 102	COLLEGE WRITING II	3
BYS 120 & 120L & 120R	ORGANISMAL BIOLOGY and ORGANISMAL BIOLOGY LAB and RECITATION	4
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	4
Fine Art		3
See Requirements tab for approved list.		
Elective		1
Elective		1
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		16

Year 2

Fall

BYS 219 & 219L & 219R	GENETICS AND EVOLUTION and LABORATORY and RECITATION	4
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CH 201 & CH 205	ELEM ORGANIC CHEMISTRY and ELEM ORGANIC CHEMISTRY LAB	4
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Literature		3
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See Requirements tab for approved list.

Social and Behavioral Science		3
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See Requirements tab for approved list.

Term Semester Hours:	14
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Spring

BYS 300 & 300L	CELL & DEVELOPMENTAL BIOLOGY and CELL & DEVELOPMENT BIO LAB	4
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CM 113	Intro to Rhetorical Communication	3
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Humanities, 2nd Fine Art or 2nd Literature		3
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See Requirements tab for approved list.

Social and Behavioral Science		3
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See Requirements tab for approved list.

Elective		3
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Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.

Term Semester Hours:	16
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Year 3**Fall**

BYS 300+ level or higher course		4
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PH 101 & 101L	GENERAL PHYSICS I and GENERAL PHYSICS I LAB	4
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History		3
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See Requirements tab for approved list.

Elective		3
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Elective		3
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Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.

Term Semester Hours:	17
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Spring

BYS 300+ level or higher course		4
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PH 102 & 102L	GENERAL PHYSICS II and GENERAL PHYSICS LAB II	4
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2nd History or 3rd Social and Behavioral Science		3
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See Requirements tab for approved list.

CS 100 or CS 102 or CS 103	INTRO COMPUTERS PROGRAM or INTRO TO C PROGRAMMING or INTRO PROGRAMMING USING JAVA	3
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or CS 104	or INTRO TO CS USING PYTHON	
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Elective		2
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Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.

Term Semester Hours:		16
Year 4		
Fall		
BYS 300+ level or higher course		3
BYS 300+ level or higher course		4
EH 301	TECHNICAL WRITING	3
Elective 300+ level or higher course		3
Elective		3
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		16
Spring		
BYS 490	SENIOR CAPSTONE	2
BYS 300+ level or higher course		3
Elective 300+ level or higher course		3
Elective 300+ level or higher course		3
Elective 300+ level or higher course		3
Elective		3
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		17
Total Semester Hours:		128

Biological Sciences, BS - Biochemistry Concentration

Biological Sciences, Biochemistry Concentration, BS Requirements:

- All students are encouraged to see an advisor after completion of 24 credits.
- Biological Sciences, Biochemistry concentration BS degree requires 128 credit hours.
- 39 of 128 credit hours must be taken at 300 level or higher (39 credits includes courses taken at the 300+ level in major, minor (if chosen), Pre professional area and electives).
- 12 credit hours of 300 level and above must be taken in the major or 6 credit hours in the major and 6 credit hours in the minor (if chosen).
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- Unless otherwise noted a C- or better is required for all College of Science prerequisite courses.
- No more than 64 credit hours from a two-year college can be applied toward a UAH degree.
- For graduation application instructions, see here (p. 812).

Degree Requirements

Charger Foundations Requirements

*Please see Area V for CoS requirements that can also be used to fulfill Charger Foundations Requirements.

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3

ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S	INTRO FOREIGN LANG I: SPANISH	
or WLC 101A	INTRO FOREIGN LANG I: ARABIC	
or WLC 101F	INTRO FOREIGN LANG I:FRENCH	
or WLC 101G	INTRO FOREIGN LANG I:GERMAN	
or WLC 101J	INTRO FOREIGN LANG I:JAPANESE	
or WLC 101R	INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S	INTRO FOREIGN LANG II:SPANISH	
or WLC 102A	INTRO FOREIGN LANG II: ARABIC	
or WLC 102F	INTRO FOREIGN LANG II:FRENCH	
or WLC 102G	INTRO FOREIGN LANG II:GERMAN	
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE	
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN	
WLC 201S	INTERM FOREIGN LANG:SPANISH	
or WLC 201A	INTERM FOREIGN LANG I: ARABIC	
or WLC 201F	INTERM FOREIGN LANG:FRENCH	
or WLC 201G	INTERM FOREIGN LANG:GERMAN	
or WLC 201J	INTERM FOREIGN LANG: JAPANESE	
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN	
WLC 202S	INTERM FOREIGN LANG II:SPANISH	
or WLC 202A	INTERM FOREIGN LANG II: ARABIC	
or WLC 202F	INTERM FOREIGN LANG II:FRENCH	
or WLC 202G	INTERM FOREIGN LANG II:GERMAN	
or WLC 202J	INTERM FORGN LANG II:JAPANESE	
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN	
WLC 204	INTERNATIONAL CINEMA	
PHL 101	INTRODUCTION TO PHILOSOPHY	
PHL 102	INTRO TO ETHICS	
PHL 103	INTRODUCTION TO LOGIC	
PHL 150	TECH, SCIENCE & HUMAN VALUES	
WGS 200	INTRO WOMEN'S & GENDER STUDIES	
AMS 229	ANCIENT & MEDIEVAL WORLDS	
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	

MU 100	INTRO TO MUSIC LITERATURE	
Area III: Mathematics and Sciences		11-12
Mathematics		3-4
MA 105	NATURE OF MATHEMATICS	
MA 107	ALGEBRA WITH APPLICATIONS	
MA 110	FINITE MATHEMATICS	
MA 112	PRECALCULUS ALGEBRA	
MA 113	PRECALCULUS TRIGONOMETRY	
MA 115	PRECALCULUS ALGEBRA & TRIG	
MA 120	MATH PROFESSIONAL APPLICATIONS	
MA 171	CALCULUS A	
Natural Sciences (Lab)		8
AST 100	SURVEY OF ASTRONOMY	
AST 106	EXPLORING THE COSMOS I	
AST 107	EXPLORING THE COSMOS II	
BYS 109	FUNDAMENTALS OF BIOLOGY	
BYS 119	PRINCIPLES OF BIOLOGY	
BYS 120	ORGANISMAL BIOLOGY	
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I	
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB	
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB	
ESS 103	ENVIRONMENTAL EARTH SCIENCE	
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG	
PH 100	CONCEPTUAL PHYSICS	
PH 101	GENERAL PHYSICS I	
PH 102	GENERAL PHYSICS II	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	
Area IV: History and Social and Behavioral Sciences*		12
History		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Sciences		6-9
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
ESS 105	WORLD REGIONAL GEOGRAPHY	
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS	

PY 101	GENERAL PSYCHOLOGY I
PY 201	LIFE-SPAN DEVELOPMENT
SOC 100	INTRO TO SOCIOLOGY
SOC 102	ANALYSIS OF SOCIAL PROBLEMS
SOC 103	INTRO TO CRIMINOLOGY
SOC 105	INTRO CULTURAL ANTHROPOLOGY

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Take no more than six hours in a single discipline in Area II or Area IV.

Area V: Pre Professional Requirements

Code	Title	Semester Hours
Courses in this area may also fulfill Charger Foundations requirements		
Communications:		3
CM 113	Intro to Rhetorical Communication	
Calculus		8
MA 171	CALCULUS A	
MA 172	CALCULUS B	
Physics Sequence		8
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
Computer Programming - choose one:		3
CS 100	INTRO COMPUTERS & PROGRAM	
or CS 102	INTRO TO C PROGRAMMING	
or CS 103	INTRO PROGRAMMING USING JAVA	
or CS 104	INTRO TO CS USING PYTHON	
Technical Writing		3
EH 301	TECHNICAL WRITING	

Major Requirements

Code	Title	Semester Hours
Biology Core ⁵		18
BYS 119 & 119L & 119R	PRINCIPLES OF BIOLOGY and LABORATORY and RECITATION	
BYS 120 & 120L & 120R	ORGANISMAL BIOLOGY and ORGANISMAL BIOLOGY LAB and RECITATION	
BYS 219 & 219L & 219R	GENETICS AND EVOLUTION and LABORATORY and RECITATION	
BYS 300 & 300L	CELL & DEVELOPMENTAL BIOLOGY and CELL & DEVELOPMENT BIO LAB	
BYS 490	SENIOR CAPSTONE	
Biochemistry Concentration Requirements		18
BYS 321 & 321L	GENERAL MICROBIOLOGY I and LABORATORY	
BYS 361	GENERAL BIOCHEMISTRY	

BYS 363
& BYS 365 GEN BIOCHEMISTRY II
and GEN BIOCHEMISTRY LAB II
Biology Elective courses 300+ level (7 credits)

Chemistry Minor Requirements (this minor is required for this concentration)

Code	Title	Semester Hours
Chemistry Minor		21
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	
CH 223 & CH 224	QUANTITATIVE ANALYSIS and QUANTITATIVE ANALYSIS LAB	
CH 331 & CH 335	ORGANIC CHEMISTRY I and ORGANIC CHEMISTRY LAB I	
CH 332 & CH 336	ORGANIC CHEMISTRY II and ORGANIC CHEMISTRY LAB II	
CH 362	GENERAL BIOCHEMISTRY LAB	

Elective Requirements

Code	Title	Semester Hours
Elective Courses		15-19
Additional elective courses, 100+ level, to reach 128 credits. Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credits of 100 level HPE courses can count toward degree requirements.		

Overall Requirements

Code	Title	Semester Hours
All College of Science degrees must have at least 128 credits.		
At least 39 of the 128 credits must be at the 300+ level. These may be taken in any area including electives.		
Total Semester Hours		128

- Students must take one literature and one history course. Students must also take either a second literature or history course to complete a sequence. Acceptable Literature sequences must include one early literature (EH 207 or EH 242 or EH 209) and one later literature (EH 208 or EH 210). Acceptable history sequences are (HY 103 + HY 104), or (HY 221 + HY 222)
- Based on Math placement, (<http://www.uah.edu/science/departments/math/undergraduate-students/placement/>) prerequisite MA 112 and/or MA 113 Mathematics courses may be required.
- No more than 6 credit hours can be taken in a single discipline.
- For choices see the World Languages and Cultures (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/foreign-languages-literatures/>) department.
- Biology pre requisites require a minimum grade of D- or higher. BYS 301 and BYS 314 pre requisites require a minimum grade of C- or higher.

Sample four year plan for Biological Sciences, Biochemistry Concentration BS degree:

Note: This is only an example and variations are possible.

Year 1

Fall		Semester Hours
FYE 101S	CHARGER SUCCESS - SCIENCE	1
EH 101	COLLEGE WRITING I	3
BYS 119 & 119L & 119R	PRINCIPLES OF BIOLOGY and LABORATORY and RECITATION	4
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	4

MA 171	CALCULUS A	4
Term Semester Hours:		16
Spring		
EH 102	COLLEGE WRITING II	3
BYS 120 & 120L & 120R	ORGANISMAL BIOLOGY and ORGANISMAL BIOLOGY LAB and RECITATION	4
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	4
MA 172	CALCULUS B	4
Elective		1
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		16
Year 2		
Fall		
BYS 219 & 219L & 219R	GENETICS AND EVOLUTION and LABORATORY and RECITATION	4
CH 223 & CH 224	QUANTITATIVE ANALYSIS and QUANTITATIVE ANALYSIS LAB	4
Literature		3
See Requirements tab for approved list.		
Fine Art		3
See Requirements tab for approved list.		
Social/Behavioral Science		3
See Requirements tab for approved list.		
Term Semester Hours:		17
Spring		
BYS 300 & 300L	CELL & DEVELOPMENTAL BIOLOGY and CELL & DEVELOPMENT BIO LAB	4
CH 331 & CH 335	ORGANIC CHEMISTRY I and ORGANIC CHEMISTRY LAB I	4
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	4
Humanities, 2nd Fine Art or 2nd Literature		3
See Requirements tab for approved list.		
Term Semester Hours:		15
Year 3		
Fall		
BYS 300+ level or higher course		3
CH 332 & CH 336	ORGANIC CHEMISTRY II and ORGANIC CHEMISTRY LAB II	4
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	4
Social/Behavioral Science		3
See Requirements tab for approved list.		
History		3
See Requirements tab for approved list.		
Term Semester Hours:		17

Spring

BYS 300+ level or higher course		3
BYS 321 & 321L	GENERAL MICROBIOLOGY I and LABORATORY	4
CS 100 or CS 102 or CS 103 or CS 104	INTRO COMPUTERS PROGRAM or INTRO TO C PROGRAMMING or INTRO PROGRAMMING USING JAVA or INTRO TO CS USING PYTHON	3
CM 113	Intro to Rhetorical Communication	3
2nd History or 3rd Social/Behavioral Science		3
See Requirements tab for approved list.		
Term Semester Hours:		16

Year 4**Fall**

BYS 361 & CH 362	GENERAL BIOCHEMISTRY and GENERAL BIOCHEMISTRY LAB	4
EH 301	TECHNICAL WRITING	3
Elective 300+ level or higher course		3
Elective		3
Elective		3
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		16

Spring

BYS 363 & BYS 365	GEN BIOCHEMISTRY II and GEN BIOCHEMISTRY LAB II	4
BYS 490	SENIOR CAPSTONE	2
Elective 300+ level or higher course		3
Elective		3
Elective		3
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		

Term Semester Hours:	15
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Total Semester Hours:	128
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Biological Sciences, BS - Ecology and Evolution Concentration

Biological Sciences, Ecology and Evolution Concentration, BS Requirements:

- All students are encouraged to see an advisor after completion of 24 credits.
- Biological Sciences, Ecology and Evolution concentration BS degree requires 128 credit hours.
- 39 of 128 credit hours must be taken at 300 level or higher (39 credits includes courses taken at the 300+ level in major, minor (if chosen), Pre professional area and electives).
- 12 credit hours of 300 level and above must be taken in the major or 6 credit hours in the major and 6 credit hours in the minor (if chosen).
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- Unless otherwise noted a C- or better is required for all College of Science prerequisite courses.
- No more than 64 credit hours from a two-year college can be applied toward a UAH degree.
- For graduation application instructions, see here (p. 812).

Degree Requirements

Charger Foundations Requirements

*Please see Area V for CoS requirements that can also be used to fulfill Charger Foundations Requirements.

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101	COLLEGE WRITING I	
or EH 101S	COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S	INTRO FOREIGN LANG I: SPANISH	
or WLC 101A	INTRO FOREIGN LANG I: ARABIC	
or WLC 101F	INTRO FOREIGN LANG I:FRENCH	
or WLC 101G	INTRO FOREIGN LANG I:GERMAN	
or WLC 101J	INTRO FOREIGN LANG I:JAPANESE	
or WLC 101R	INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S	INTRO FOREIGN LANG II:SPANISH	
or WLC 102A	INTRO FOREIGN LANG II: ARABIC	
or WLC 102F	INTRO FOREIGN LANG II:FRENCH	
or WLC 102G	INTRO FOREIGN LANG II:GERMAN	
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE	
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN	
WLC 201S	INTERM FOREIGN LANG:SPANISH	
or WLC 201A	INTERM FOREIGN LANG I: ARABIC	
or WLC 201F	INTERM FOREIGN LANG:FRENCH	
or WLC 201G	INTERM FOREIGN LANG:GERMAN	
or WLC 201J	INTERM FOREIGN LANG: JAPANESE	
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN	
WLC 202S	INTERM FOREIGN LANG II:SPANISH	
or WLC 202A	INTERM FOREIGN LANG II: ARABIC	
or WLC 202F	INTERM FOREIGN LANG II:FRENCH	
or WLC 202G	INTERM FOREIGN LANG II:GERMAN	
or WLC 202J	INTERM FORGN LANG II:JAPANESE	
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN	

WLC 204	INTERNATIONAL CINEMA	
PHL 101	INTRODUCTION TO PHILOSOPHY	
PHL 102	INTRO TO ETHICS	
PHL 103	INTRODUCTION TO LOGIC	
PHL 150	TECH, SCIENCE & HUMAN VALUES	
WGS 200	INTRO WOMEN'S & GENDER STUDIES	
AMS 229	ANCIENT & MEDIEVAL WORLDS	
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Area III: Mathematics and Sciences		11-12
Mathematics		3-4
MA 105	NATURE OF MATHEMATICS	
MA 107	ALGEBRA WITH APPLICATIONS	
MA 110	FINITE MATHEMATICS	
MA 112	PRECALCULUS ALGEBRA	
MA 113	PRECALCULUS TRIGONOMETRY	
MA 115	PRECALCULUS ALGEBRA & TRIG	
MA 120	MATH PROFESSIONAL APPLICATIONS	
MA 171	CALCULUS A	
Natural Sciences (Lab)		8
AST 100	SURVEY OF ASTRONOMY	
AST 106	EXPLORING THE COSMOS I	
AST 107	EXPLORING THE COSMOS II	
BYS 109	FUNDAMENTALS OF BIOLOGY	
BYS 119	PRINCIPLES OF BIOLOGY	
BYS 120	ORGANISMAL BIOLOGY	
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I	
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB	
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB	
ESS 103	ENVIRONMENTAL EARTH SCIENCE	
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG	
PH 100	CONCEPTUAL PHYSICS	
PH 101	GENERAL PHYSICS I	
PH 102	GENERAL PHYSICS II	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	
Area IV: History and Social and Behavioral Sciences*		12
History		3-6

HY 103	WORLD HISTORY TO 1500
HY 104	WORLD HISTORY SINCE 1500
HY 221	UNITED STATES TO 1877
HY 222	UNITED STATES SINCE 1877

Social and Behavioral Sciences 6-9

ECN 142	PRINC OF MACROECONOMICS
ECN 143	PRINC OF MICROECONOMICS
GS 200	GLOBAL SYSTEMS AND CULTURES
ESS 105	WORLD REGIONAL GEOGRAPHY
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY
PSC 101	INTRO TO AMERICAN GOVERNMENT
PSC 102	INTRO TO COMPARATIVE POLITICS
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS
PY 101	GENERAL PSYCHOLOGY I
PY 201	LIFE-SPAN DEVELOPMENT
SOC 100	INTRO TO SOCIOLOGY
SOC 102	ANALYSIS OF SOCIAL PROBLEMS
SOC 103	INTRO TO CRIMINOLOGY
SOC 105	INTRO CULTURAL ANTHROPOLOGY

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Take no more than six hours in a single discipline in Area II or Area IV.

Area V: Pre Professional Requirements

Code	Title	Semester Hours
Courses in this area may also fulfill Charger Foundations requirements		
Communications		3
CM 113	Intro to Rhetorical Communication	
Calculus - Choose one:		3-4
MA 120	MATH PROFESSIONAL APPLICATIONS	
MA 171	CALCULUS A	
Statistics		3
MA 281	ELEMENTS OF STATISTICAL ANALYS	
Physics sequence Choose one:		8
PH 101 & 101L and	GENERAL PHYSICS I and GENERAL PHYSICS I LAB	
PH 102 & 102L	GENERAL PHYSICS II and GENERAL PHYSICS LAB II	
OR		
PH 111 & PH 114 and	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
General Chemistry and lab:		4
CH 101 or CH 121 and	INTRO TO CHEMISTRY GENERAL CHEMISTRY I	
CH 105 or CH 125	INTRO CHEMISTRY LAB GENERAL CHEMISTRY LAB I	
Organic Chemistry and lab		4
CH 201	ELEM ORGANIC CHEMISTRY	

or CH 331	ORGANIC CHEMISTRY I	
and		
CH 205	ELEM ORGANIC CHEMISTRY LAB	
or CH 335	ORGANIC CHEMISTRY LAB I	
Computer Science: Choose one		3
CS 100	INTRO COMPUTERS & PROGRAM	
or CS 102	INTRO TO C PROGRAMMING	
or CS 103	INTRO PROGRAMMING USING JAVA	
or CS 104	INTRO TO CS USING PYTHON	
Technical Writing		3
EH 301	TECHNICAL WRITING	

Major Requirements

Code	Title	Semester Hours
Biology Core ⁵		18
BYS 119 & 119L & 119R	PRINCIPLES OF BIOLOGY and LABORATORY and RECITATION	
BYS 120 & 120L & 120R	ORGANISMAL BIOLOGY and ORGANISMAL BIOLOGY LAB and RECITATION	
BYS 219 & 219L & 219R	GENETICS AND EVOLUTION and LABORATORY and RECITATION	
BYS 300 & 300L	CELL & DEVELOPMENTAL BIOLOGY and CELL & DEVELOPMENT BIO LAB	
BYS 490	SENIOR CAPSTONE	
Ecology and Evolution Concentration Requirements		18
BYS 312	PRINCIPLES OF ECOLOGY	
BYS 321 & 321L	GENERAL MICROBIOLOGY I and LABORATORY	
BYS 364	BIOGEOGRAPHY	
BYS 464	EVOLUTION	
BYS 465	MOLECULAR MTHDS ECLGY & EVOLU	

Elective Requirements

Code	Title	Semester Hours
Elective Courses		29-34
Additional Elective courses 100+ level to reach 128 credit hours. Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credits of 100 level HPE courses can count toward degree requirements.		

Overall Requirements

Code	Title	Semester Hours
All College of Science degrees must have at least 128 credits.		
At least 39 of the 128 credits must be at the 300+ level. These may be taken in any area including electives.		
Total Semester Hours		128

¹ Students must take one literature and one history course. Students must also take either a second literature or history course to complete a sequence. Acceptable Literature sequences must include one early literature (EH 207 or EH 242 or EH 209) and one later literature (EH 208 or EH 210). Acceptable history sequences are (HY 103 + HY 104), or (HY 221 + HY 222)

- ² Based on Math placement, (<http://www.uah.edu/science/departments/math/undergraduate-students/placement/>) prerequisite MA 112 and/or MA 113 Mathematics courses may be required. If the student intends to pursue a course of study requiring more advanced mathematics background, they should take MA 171 . Otherwise, MA 120 may be used to meet this requirement.
- ³ No more than 6 credit hours can be taken in a single discipline.
- ⁴ For choices see the World Languages and Cultures (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/foreign-languages-literatures/>) department.
- ⁵ Biology pre requisites require a minimum grade of D- or higher. BYS 301 and BYS 314 pre requisites require a minimum grade of C- or higher.

Sample four year plan for Biological Sciences, Ecology and Evolution Concentration, BS degree:

Note: This is only an example and variations are possible.

Year 1

		Semester Hours
Fall		
FYE 101S	CHARGER SUCCESS - SCIENCE	1
BYS 119 & 119L & 119R	PRINCIPLES OF BIOLOGY and LABORATORY and RECITATION	4
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	4
MA 171 or MA 120	CALCULUS A or MATH PROFESSIONAL APPLICATIONS	4
EH 101	COLLEGE WRITING I	3
Term Semester Hours:		16
Spring		
EH 102	COLLEGE WRITING II	3
BYS 120 & 120L & 120R	ORGANISMAL BIOLOGY and ORGANISMAL BIOLOGY LAB and RECITATION	4
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	4
Fine Art		3
See Requirements tab for approved list.		
Elective		2
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		16

Year 2

Fall		
BYS 219 & 219L & 219R	GENETICS AND EVOLUTION and LABORATORY and RECITATION	4
ST 281 or MA 281	ELEMENTS OF STAT ANALYSIS or ELEMENTS OF STATISTICAL ANALYS	3
CM 113	Intro to Rhetorical Communication	3
Literature		3
See Requirements tab for approved list.		
Social/Behavioral Science		3
See Requirements tab for approved list.		
Term Semester Hours:		16

Spring

BYS 300 & 300L	CELL & DEVELOPMENTAL BIOLOGY and CELL & DEVELOPMENT BIO LAB	4
CH 331 & CH 335	ORGANIC CHEMISTRY I and ORGANIC CHEMISTRY LAB I	4
History		3
See Requirements tab for approved list.		
Social/Behavioral Science		3
See Requirements tab for approved list.		
Elective		3
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		17
Year 3		
Fall		
BYS 312	PRINCIPLES OF ECOLOGY	4
PH 101 & 101L	GENERAL PHYSICS I and GENERAL PHYSICS I LAB	4
2nd History or 3rd Social/Behavioral science		3
See Requirements tab for approved list.		
Elective		3
Elective		2
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		16
Spring		
BYS 364	BIOGEOGRAPHY	3
PH 102 & 102L	GENERAL PHYSICS II and GENERAL PHYSICS LAB II	4
CS 100	INTRO COMPUTERS PROGRAM	3
or CS 102	or INTRO TO C PROGRAMMING	
or CS 103	or INTRO PROGRAMMING USING JAVA	
or CS 104	or INTRO TO CS USING PYTHON	
Humanities, 2nd Fine art or 2nd Literature		3
Elective		3
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		16
Year 4		
Fall		
BYS 464	EVOLUTION	3
BYS 321 & 321L	GENERAL MICROBIOLOGY I and LABORATORY	4
EH 301	TECHNICAL WRITING	3
Elective 300+ level or higher course		3
Elective		3

Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.

	Term Semester Hours:	16
Spring		
BYS 465	MOLECULAR MTHDS ECLGY EVOLU	4
BYS 490	SENIOR CAPSTONE	2
Elective 300+ level or higher course		4
Elective 300+ level or higher course		3
Elective		2
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
	Term Semester Hours:	15
	Total Semester Hours:	128

Biological Sciences, BS - Exercise Physiology Concentration

The concentration emphasizes sports health to prepare for Professional schools such as Athletic training or Physical therapy. Additional coursework may be required for entry into such programs. See the Pre Professional Advising office (<http://www.uah.edu/ppa/>) for additional information.

Biological Sciences, Exercise Physiology Concentration, BS Requirements:

- All students are encouraged to see an advisor after completion of 24 credits.
- Biological Sciences, Exercise Physiology concentration BS degree requires 128 credit hours.
- 39 of 128 credit hours must be taken at 300 level or higher (39 credits includes courses taken at the 300+ level in major, minor (if chosen), Pre professional area and electives).
- 12 credit hours of 300 level and above must be taken in the major or 6 credit hours in the major and 6 credit hours in the minor (if chosen).
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- Unless otherwise noted a C- or better is required for all College of Science prerequisite courses.
- No more than 64 credit hours from a two-year college can be applied toward a UAH degree.
- For graduation application instructions, see here (p. 812).

Degree Requirements

Charger Foundations Requirements

*Please see Area V for CoS requirements that can also be used to fulfill Charger Foundations Requirements.

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6

EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S	INTRO FOREIGN LANG I: SPANISH	
or WLC 101A	INTRO FOREIGN LANG I: ARABIC	
or WLC 101F	INTRO FOREIGN LANG I:FRENCH	
or WLC 101G	INTRO FOREIGN LANG I:GERMAN	
or WLC 101J	INTRO FOREIGN LANG I:JAPANESE	
or WLC 101R	INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S	INTRO FOREIGN LANG II:SPANISH	
or WLC 102A	INTRO FOREIGN LANG II: ARABIC	
or WLC 102F	INTRO FOREIGN LANG II:FRENCH	
or WLC 102G	INTRO FOREIGN LANG II:GERMAN	
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE	
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN	
WLC 201S	INTERM FOREIGN LANG:SPANISH	
or WLC 201A	INTERM FOREIGN LANG I: ARABIC	
or WLC 201F	INTERM FOREIGN LANG:FRENCH	
or WLC 201G	INTERM FOREIGN LANG:GERMAN	
or WLC 201J	INTERM FOREIGN LANG: JAPANESE	
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN	
WLC 202S	INTERM FOREIGN LANG II:SPANISH	
or WLC 202A	INTERM FOREIGN LANG II: ARABIC	
or WLC 202F	INTERM FOREIGN LANG II:FRENCH	
or WLC 202G	INTERM FOREIGN LANG II:GERMAN	
or WLC 202J	INTERM FORGN LANG II:JAPANESE	
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN	
WLC 204	INTERNATIONAL CINEMA	
PHL 101	INTRODUCTION TO PHILOSOPHY	
PHL 102	INTRO TO ETHICS	
PHL 103	INTRODUCTION TO LOGIC	
PHL 150	TECH, SCIENCE & HUMAN VALUES	
WGS 200	INTRO WOMEN'S & GENDER STUDIES	
AMS 229	ANCIENT & MEDIEVAL WORLDS	
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Area III: Mathematics and Sciences		11-12
Mathematics		3-4
MA 105	NATURE OF MATHEMATICS	
MA 107	ALGEBRA WITH APPLICATIONS	
MA 110	FINITE MATHEMATICS	
MA 112	PRECALCULUS ALGEBRA	
MA 113	PRECALCULUS TRIGONOMETRY	

MA 115	PRECALCULUS ALGEBRA & TRIG	
MA 120	MATH PROFESSIONAL APPLICATIONS	
MA 171	CALCULUS A	
Natural Sciences (Lab)		8
AST 100	SURVEY OF ASTRONOMY	
AST 106	EXPLORING THE COSMOS I	
AST 107	EXPLORING THE COSMOS II	
BYS 109	FUNDAMENTALS OF BIOLOGY	
BYS 119	PRINCIPLES OF BIOLOGY	
BYS 120	ORGANISMAL BIOLOGY	
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I	
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB	
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB	
ESS 103	ENVIRONMENTAL EARTH SCIENCE	
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG	
PH 100	CONCEPTUAL PHYSICS	
PH 101	GENERAL PHYSICS I	
PH 102	GENERAL PHYSICS II	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	
Area IV: History and Social and Behavioral Sciences*		12
History		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Sciences		6-9
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
ESS 105	WORLD REGIONAL GEOGRAPHY	
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS	
PY 101	GENERAL PSYCHOLOGY I	
PY 201	LIFE-SPAN DEVELOPMENT	
SOC 100	INTRO TO SOCIOLOGY	
SOC 102	ANALYSIS OF SOCIAL PROBLEMS	
SOC 103	INTRO TO CRIMINOLOGY	
SOC 105	INTRO CULTURAL ANTHROPOLOGY	

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Take no more than six hours in a single discipline in Area II or Area IV.

Area V: Pre Professional Requirements

Code	Title	Semester Hours
Courses in this area may also fulfill Charger Foundations requirements		
Communications:		3
CM 113	Intro to Rhetorical Communication	
Calculus - choose one:		3-4
MA 120 or MA 171	MATH PROFESSIONAL APPLICATIONS CALCULUS A	
MA 171	CALCULUS A	
Physics Sequence Choose one:		8
PH 101 & 101L &	GENERAL PHYSICS I and GENERAL PHYSICS I LAB	
PH 102 & 102L	GENERAL PHYSICS II and GENERAL PHYSICS LAB II	
OR		
PH 111 & PH 114 &	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
Computer Programming - choose one:		3
CS 100 or CS 102 or CS 103 or CS 104	INTRO COMPUTERS & PROGRAM INTRO TO C PROGRAMMING INTRO PROGRAMMING USING JAVA INTRO TO CS USING PYTHON	
Technical Writing		3
EH 301	TECHNICAL WRITING	

Major Requirements (Note: An Exercise Physiology Minor is required for this concentration)

Code	Title	Semester Hours
Biology Core ⁵		18
BYS 119 & 119L & 119R	PRINCIPLES OF BIOLOGY and LABORATORY and RECITATION	
BYS 120 & 120L & 120R	ORGANISMAL BIOLOGY and ORGANISMAL BIOLOGY LAB and RECITATION	
BYS 219 & 219L & 219R	GENETICS AND EVOLUTION and LABORATORY and RECITATION	
BYS 300 & 300L	CELL & DEVELOPMENTAL BIOLOGY and CELL & DEVELOPMENT BIO LAB	
BYS 490	SENIOR CAPSTONE	
Exercise Physiology Concentration Requirements		18
BYS 313 & 313L	ANATOMY & PHYSIOLOGY I and LABORATORY	

BYS 314
& 314L ANATOMY & PHYSIOLOGY II
and ANATOMY/PHYSIOLOGY II LAB
BYS Elective Course 300 level or higher, 2 credits or more

Exercise Physiology Minor Requirements

Code	Title	Semester Hours
General Chemistry and lab		4
CH 101 or CH 121	INTRO TO CHEMISTRY GENERAL CHEMISTRY I	
CH 105 or CH 125	INTRO CHEMISTRY LAB GENERAL CHEMISTRY LAB I	
Organic Chemistry and lab		4
CH 201 or CH 331	ELEM ORGANIC CHEMISTRY ORGANIC CHEMISTRY I	
CH 205 or CH 335	ELEM ORGANIC CHEMISTRY LAB ORGANIC CHEMISTRY LAB I	
Biochemistry		3
CH 301 or CH 361	ELEMENTARY BIOCHEMISTRY GENERAL BIOCHEMISTRY	
Kinesiology Requirements		14
KIN 210	ATHLC INJURY PREVENTION & CARE	
KIN 240	HEALTH & WELLNESS CONCEPTS	
KIN 300	NUTRITION FOR FITNESS & SPORT	
KIN 351	EXER TEST & PRECR HEALTHY POP	
KIN 352 or KIN 363 or KIN 370	EXER TEST & PRECR SPECIAL POP TEACHING FITNESS & WELLNESS ADAPTED PHYSICAL EDUCATION	
or Any 400+ level KIN course		

Electives

Code	Title	Semester Hours
Elective Courses		15-20
Additional Elective courses 100+ level to reach 128 credit hours. Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credits of 100 level HPE courses can count toward degree requirements.		

Overall Requirements

Code	Title	Semester Hours
All College of Science degrees must have at least 128 credits		
At least 39 of the 128 credits must be at the 300+ level. These may be taken in any area including electives.		
Total Semester Hours		128

- Students must take one literature and one history course. Students must also take either a second literature or history course to complete a sequence. Acceptable Literature sequences must include one early literature (EH 207 or EH 242 or EH 209) and one later literature (EH 208 or EH 210). Acceptable history sequences are (HY 103 + HY 104), or (HY 221 + HY 222)
- Based on Math placement, (<http://www.uah.edu/science/departments/math/undergraduate-students/placement/>) prerequisite MA 112 and/or MA 113 Mathematics courses may be required. If the student intends to pursue a course of study requiring more advanced mathematics background, they should take MA 171 . Otherwise, MA 120 may be used to meet this requirement.
- No more than 6 credit hours can be taken in a single discipline.

⁴ For choices see the World Languages and Cultures (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/foreign-languages-literatures/>) department.

⁵ Biology pre requisites require a minimum grade of D- or higher. BYS 301 and BYS 314 pre requisites require a minimum grade of C- or higher.

Sample four year plan for Biological Sciences, Exercise Physiology Concentration, BS degree:

Note: This is only an example and variations are possible.

Year 1

		Semester Hours
Fall		
FYE 101S	CHARGER SUCCESS - SCIENCE	1
EH 101	COLLEGE WRITING I	3
BYS 119 & 119L & 119R	PRINCIPLES OF BIOLOGY and LABORATORY and RECITATION	4
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	4
MA 171 or MA 120	CALCULUS A or MATH PROFESSIONAL APPLICATIONS	4
BYS 100	INTRO HEALTH PROFESSIONS	1
Term Semester Hours:		17
Spring		
EH 102	COLLEGE WRITING II	3
BYS 120 & 120L & 120R	ORGANISMAL BIOLOGY and ORGANISMAL BIOLOGY LAB and RECITATION	4
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	4
Fine Art		3
See Requirements tab for approved list.		
KIN 260	FOUNDATIONS OF KINESIOLOGY	3
Term Semester Hours:		17

Year 2

Fall		
BYS 219 & 219L & 219R	GENETICS AND EVOLUTION and LABORATORY and RECITATION	4
CH 201 & CH 205	ELEM ORGANIC CHEMISTRY and ELEM ORGANIC CHEMISTRY LAB	4
PY 101	GENERAL PSYCHOLOGY I	3
KIN 240	HEALTH WELLNESS CONCEPTS	3
Elective		1
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		15
Spring		
BYS 300 & 300L	CELL & DEVELOPMENTAL BIOLOGY and CELL & DEVELOPMENT BIO LAB	4
BYS 215 & 215L	HUMAN ANATOMY & PHYSIOLOGY I and HA&P I LABORATORY	4
PY 201	LIFE-SPAN DEVELOPMENT	3

History		3
See Requirements tab for approved list.		
Elective		2
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		16
Year 3		
Fall		
BYS 216 & 216L	HUMAN ANATOMY & PHYSIOLOGY II and HA&P II LABORATORY	4
PH 101 & 101L	GENERAL PHYSICS I and GENERAL PHYSICS I LAB	4
CM 113	Intro to Rhetorical Communication	3
KIN 210	ATHLC INJURY PREVENTION CARE	3
Elective		3
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		17
Spring		
KIN 327 & KIN 328	EXERCISE PHYSIOLOGY and EXERCISE PHYSIOLOGY	4
PH 102 & 102L	GENERAL PHYSICS II and GENERAL PHYSICS LAB II	4
KIN 300	NUTRITION FOR FITNESS SPORT	3
2nd History or 3rd Social/Behavioral science		3
See Requirements tab for approved list.		
Term Semester Hours:		14
Year 4		
Fall		
BYS 320	MEDICAL TERMINOLOGY	3
KIN 351	EXER TEST PRECR HEALTHY POP	3
EH 301	TECHNICAL WRITING	3
PY 300 & 300L	PSYCHOLOGICAL STATISTICS and PSYCHOLOGICAL STATISTICS LAB	4
Literature		
See Requirements tab for approved list.		
Elective		3
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		16
Spring		
BYS 301 or CH 301	ELEMENTARY BIOCHEMISTRY or ELEMENTARY BIOCHEMISTRY	3
BYS 490	SENIOR CAPSTONE	2
CS 100 or CS 102	INTRO COMPUTERS PROGRAM or INTRO TO C PROGRAMMING	3

or CS 103	or INTRO PROGRAMMING USING JAVA	
or CS 104	or INTRO TO CS USING PYTHON	
KIN 352	EXER TEST PRECR SPECIAL POP	3
or KIN 363	or TEACHING FITNESS & WELLNESS	
or KIN 370	or ADAPTED PHYSICAL EDUCATION	
or Any 400 + level KIN Course		
Humanities, 2nd Fine art or 2nd Literature		3
See Requirements tab for approved list.		
Elective		2
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credits of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		16
Total Semester Hours:		128

Biological Sciences, BS - Microbiology Concentration

Biological Sciences, Microbiology Concentration, BS Requirements:

- All students are encouraged to see an advisor after completion of 24 credits.
- Biological Sciences, Microbiology concentration BS degree requires 128 credit hours.
- 39 of 128 credit hours must be taken at 300 level or higher (39 credits includes courses taken at the 300+ level in major, minor (if chosen), Pre professional area and electives).
- 12 credit hours of 300 level and above must be taken in the major or 6 credit hours in the major and 6 credit hours in the minor (if chosen).
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- Unless otherwise noted a C- or better is required for all College of Science prerequisite courses.
- No more than 64 credit hours from a two-year college can be applied toward a UAH degree.
- For graduation application instructions, see here (p. 812).

Degree Requirements

Charger Foundations Requirements

*Please see Area V for CoS requirements that can also be used to fulfill Charger Foundations Requirements.

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101	COLLEGE WRITING I	
or EH 101S	COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	

EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S	INTRO FOREIGN LANG I: SPANISH	
or WLC 101A	INTRO FOREIGN LANG I: ARABIC	
or WLC 101F	INTRO FOREIGN LANG I:FRENCH	
or WLC 101G	INTRO FOREIGN LANG I:GERMAN	
or WLC 101J	INTRO FOREIGN LANG I:JAPANESE	
or WLC 101R	INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S	INTRO FOREIGN LANG II:SPANISH	
or WLC 102A	INTRO FOREIGN LANG II: ARABIC	
or WLC 102F	INTRO FOREIGN LANG II:FRENCH	
or WLC 102G	INTRO FOREIGN LANG II:GERMAN	
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE	
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN	
WLC 201S	INTERM FOREIGN LANG:SPANISH	
or WLC 201A	INTERM FOREIGN LANG I: ARABIC	
or WLC 201F	INTERM FOREIGN LANG:FRENCH	
or WLC 201G	INTERM FOREIGN LANG:GERMAN	
or WLC 201J	INTERM FOREIGN LANG: JAPANESE	
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN	
WLC 202S	INTERM FOREIGN LANG II:SPANISH	
or WLC 202A	INTERM FOREIGN LANG II: ARABIC	
or WLC 202F	INTERM FOREIGN LANG II:FRENCH	
or WLC 202G	INTERM FOREIGN LANG II:GERMAN	
or WLC 202J	INTERM FORGN LANG II:JAPANESE	
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN	
WLC 204	INTERNATIONAL CINEMA	
PHL 101	INTRODUCTION TO PHILOSOPHY	
PHL 102	INTRO TO ETHICS	
PHL 103	INTRODUCTION TO LOGIC	
PHL 150	TECH, SCIENCE & HUMAN VALUES	
WGS 200	INTRO WOMEN'S & GENDER STUDIES	
AMS 229	ANCIENT & MEDIEVAL WORLDS	
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Area III: Mathematics and Sciences		11-12
Mathematics		3-4
MA 105	NATURE OF MATHEMATICS	
MA 107	ALGEBRA WITH APPLICATIONS	
MA 110	FINITE MATHEMATICS	
MA 112	PRECALCULUS ALGEBRA	
MA 113	PRECALCULUS TRIGONOMETRY	
MA 115	PRECALCULUS ALGEBRA & TRIG	

MA 120	MATH PROFESSIONAL APPLICATIONS	
MA 171	CALCULUS A	
Natural Sciences (Lab)		8
AST 100	SURVEY OF ASTRONOMY	
AST 106	EXPLORING THE COSMOS I	
AST 107	EXPLORING THE COSMOS II	
BYS 109	FUNDAMENTALS OF BIOLOGY	
BYS 119	PRINCIPLES OF BIOLOGY	
BYS 120	ORGANISMAL BIOLOGY	
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I	
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB	
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB	
ESS 103	ENVIRONMENTAL EARTH SCIENCE	
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG	
PH 100	CONCEPTUAL PHYSICS	
PH 101	GENERAL PHYSICS I	
PH 102	GENERAL PHYSICS II	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	
Area IV: History and Social and Behavioral Sciences*		12
History		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Sciences		6-9
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
ESS 105	WORLD REGIONAL GEOGRAPHY	
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS	
PY 101	GENERAL PSYCHOLOGY I	
PY 201	LIFE-SPAN DEVELOPMENT	
SOC 100	INTRO TO SOCIOLOGY	
SOC 102	ANALYSIS OF SOCIAL PROBLEMS	
SOC 103	INTRO TO CRIMINOLOGY	
SOC 105	INTRO CULTURAL ANTHROPOLOGY	

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Take no more than six hours in a single discipline in Area II or Area IV.

Area V: Pre Professional Requirements

Code	Title	Semester Hours
Courses in this area may also fulfill Charger Foundations requirements		
Communications		3
CM 113	Intro to Rhetorical Communication	
Calculus - Choose one		3-4
MA 120	MATH PROFESSIONAL APPLICATIONS	
MA 171	CALCULUS A	
Physics Sequence - Choose one		8
PH 101 & 101L	GENERAL PHYSICS I and GENERAL PHYSICS I LAB	
and		
PH 102 & 102L	GENERAL PHYSICS II and GENERAL PHYSICS LAB II	
OR		
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
and		
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
Computer Science: Choose one		3
CS 100	INTRO COMPUTERS & PROGRAM	
or CS 102	INTRO TO C PROGRAMMING	
or CS 103	INTRO PROGRAMMING USING JAVA	
or CS 104	INTRO TO CS USING PYTHON	
Technical Writing		3
EH 301	TECHNICAL WRITING	

Major Requirements

Code	Title	Semester Hours
Biology Core ⁵		18
BYS 119 & 119L & 119R	PRINCIPLES OF BIOLOGY and LABORATORY and RECITATION	
BYS 120 & 120L & 120R	ORGANISMAL BIOLOGY and ORGANISMAL BIOLOGY LAB and RECITATION	
BYS 219 & 219L & 219R	GENETICS AND EVOLUTION and LABORATORY and RECITATION	
BYS 300 & 300L	CELL & DEVELOPMENTAL BIOLOGY and CELL & DEVELOPMENT BIO LAB	
BYS 490	SENIOR CAPSTONE	
Microbiology Concentration Requirements		18
BYS 321 & 321L	GENERAL MICROBIOLOGY I and LABORATORY	
BYS 322 & 322L	GENERAL MICROBIOLOGY II and GENERAL MICROBIOLOGY II LAB	
BYS 361	GENERAL BIOCHEMISTRY	
BYS 430	IMMUNOLOGY	
Biology Elective course 300+ level or higher, 3 credits		

Chemistry Minor Requirements (this minor is required for this concentration)

Code	Title	Semester Hours
Chemistry Minor		21
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	
CH 223 & CH 224	QUANTITATIVE ANALYSIS and QUANTITATIVE ANALYSIS LAB	
CH 331 & CH 335	ORGANIC CHEMISTRY I and ORGANIC CHEMISTRY LAB I	
CH 332 & CH 336	ORGANIC CHEMISTRY II and ORGANIC CHEMISTRY LAB II	
CH 362	GENERAL BIOCHEMISTRY LAB	

Electives

Code	Title	Semester Hours
Elective Courses		24-25
Additional Elective courses 100+ level to reach 128 credit hours. Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credits of 100 level HPE courses can count toward degree requirements.		

Overall Requirements

Code	Title	Semester Hours
All College of Science degrees must have at least 128 credits.		
At least 39 of the 128 credits must be at the 300+ level. These may be taken in any area including electives.		
Total Semester Hours		128

- Students must take one literature and one history course. Students must also take either a second literature or history course to complete a sequence. Acceptable Literature sequences must include one early literature (EH 207 or EH 242 or EH 209) and one later literature (EH 208 or EH 210). Acceptable history sequences are (HY 103 + HY 104), or (HY 221 + HY 222)
- Based on Math placement, (<http://www.uah.edu/science/departments/math/undergraduate-students/placement/>) prerequisite MA 112 and/or MA 113 Mathematics courses may be required. If the student intends to pursue a course of study requiring more advanced mathematics background, they should take MA 171 . Otherwise, MA 120 may be used to meet this requirement.
- No more than 6 credit hours can be taken in a single discipline.
- For choices see the World Languages and Cultures (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/foreign-languages-literatures/>) department.
- Biology pre requisites require a minimum grade of D- or higher. BYS 301 and BYS 314 pre requisites require a minimum grade of C- or higher.

Sample four year plan for Biological Sciences, Microbiology Concentration BS degree:

Note: This is only an example and variations are possible.

Year 1

Fall		Semester Hours
FYE 101S	CHARGER SUCCESS - SCIENCE	1
BYS 119 & 119L & 119R	PRINCIPLES OF BIOLOGY and LABORATORY and RECITATION	4
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	4
MA 171 or MA 120	CALCULUS A or MATH PROFESSIONAL APPLICATIONS	4

EH 101	COLLEGE WRITING I	3
Term Semester Hours:		16
Spring		
BYS 120 & 120L & 120R	ORGANISMAL BIOLOGY and ORGANISMAL BIOLOGY LAB and RECITATION	4
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	4
EH 102	COLLEGE WRITING II	3
Fine Art		3
See Requirements tab for approved list.		
Elective		1
Elective		1
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		16
Year 2		
Fall		
BYS 219 & 219L & 219R	GENETICS AND EVOLUTION and LABORATORY and RECITATION	4
CH 223 & CH 224	QUANTITATIVE ANALYSIS and QUANTITATIVE ANALYSIS LAB	4
Literature		3
See Requirements tab for approved list.		
Social and Behavioral science		3
See Requirements tab for approved list.		
Elective		2
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		16
Spring		
BYS 300 & 300L	CELL & DEVELOPMENTAL BIOLOGY and CELL & DEVELOPMENT BIO LAB	4
CH 331 & CH 335	ORGANIC CHEMISTRY I and ORGANIC CHEMISTRY LAB I	4
Humanities, 2nd Fine Art or 2nd Literature		3
See Requirements tab for approved list.		
Social and Behavioral science		3
See Requirements tab for approved list.		
Elective		3
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		17
Year 3		
Fall		
BYS 321 & 321L	GENERAL MICROBIOLOGY I and LABORATORY	4

CH 332 & CH 336	ORGANIC CHEMISTRY II and ORGANIC CHEMISTRY LAB II	4
PH 101 & 101L	GENERAL PHYSICS I and GENERAL PHYSICS I LAB	4
History		3
See Requirements tab for approved list.		
Term Semester Hours:		15
Spring		
BYS 361 & CH 362	GENERAL BIOCHEMISTRY and GENERAL BIOCHEMISTRY LAB	4
BYS 300+ level or higher course		3
PH 102 & 102L	GENERAL PHYSICS II and GENERAL PHYSICS LAB II	4
2nd History or 3rd Social/Behavioral science		3
See Requirements tab for approved list.		
Elective		3
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		17
Year 4		
Fall		
BYS 419	MICROBIAL GENETICS	3
CM 113	Intro to Rhetorical Communication	3
EH 301	TECHNICAL WRITING	3
CS 100	INTRO COMPUTERS PROGRAM	3
or CS 102	or INTRO TO C PROGRAMMING	
or CS 103	or INTRO PROGRAMMING USING JAVA	
or CS 104	or INTRO TO CS USING PYTHON	
Elective		3
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		15
Spring		
BYS 430	IMMUNOLOGY	4
BYS 490	SENIOR CAPSTONE	2
Elective 300+ level course or higher		4
Elective		3
Elective		3
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		16
Total Semester Hours:		128

Biological Sciences, BS - Pre-Professional Health Careers Concentration

Biological Sciences, Pre Professional Health Careers Concentration, BS Requirements:

- All students are encouraged to see an advisor after completion of 24 credits.
- Biological Sciences, Pre Health concentration BS degree requires 128 credit hours.
- 39 of 128 credit hours must be taken at 300 level or higher (39 credits includes courses taken at the 300+ level in major, minor (if chosen), Pre professional area and electives).
- 12 credit hours of 300 level and above must be taken in the major or 6 credit hours in the major and 6 credit hours in the minor (if chosen).
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- Unless otherwise noted a C- or better is required for all College of Science prerequisite courses.
- No more than 64 credit hours from a two-year college can be applied toward a UAH degree.
- For graduation application instructions, see here (p. 812).
- See the Pre Professional Advising office (<http://www.uah.edu/ppa/>) for additional information.

Degree Requirements

Charger Foundations Requirements

*Please see Area V for CoS requirements that can also be used to fulfill Charger Foundations Requirements.

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S or WLC 101A or WLC 101F or WLC 101G or WLC 101J or WLC 101R	INTRO FOREIGN LANG I: SPANISH INTRO FOREIGN LANG I: ARABIC INTRO FOREIGN LANG I:FRENCH INTRO FOREIGN LANG I:GERMAN INTRO FOREIGN LANG I:JAPANESE INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S or WLC 102A	INTRO FOREIGN LANG II:SPANISH INTRO FOREIGN LANG II: ARABIC	

or WLC 102F	INTRO FOREIGN LANG II:FRENCH
or WLC 102G	INTRO FOREIGN LANG II:GERMAN
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN
WLC 201S	INTERM FOREIGN LANG:SPANISH
or WLC 201A	INTERM FOREIGN LANG I: ARABIC
or WLC 201F	INTERM FOREIGN LANG:FRENCH
or WLC 201G	INTERM FOREIGN LANG:GERMAN
or WLC 201J	INTERM FOREIGN LANG: JAPANESE
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN
WLC 202S	INTERM FOREIGN LANG II:SPANISH
or WLC 202A	INTERM FOREIGN LANG II: ARABIC
or WLC 202F	INTERM FOREIGN LANG II:FRENCH
or WLC 202G	INTERM FOREIGN LANG II:GERMAN
or WLC 202J	INTERM FORGN LANG II:JAPANESE
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN
WLC 204	INTERNATIONAL CINEMA
PHL 101	INTRODUCTION TO PHILOSOPHY
PHL 102	INTRO TO ETHICS
PHL 103	INTRODUCTION TO LOGIC
PHL 150	TECH, SCIENCE & HUMAN VALUES
WGS 200	INTRO WOMEN'S & GENDER STUDIES
AMS 229	ANCIENT & MEDIEVAL WORLDS
ARH 100	ARH SURV:ANCIENT-MEDIEVAL
ARH 101	ARH SURV:RENAISSANCE-MODERN
ARH 103	ARH SUR:NON-WESTERN TRADITIONS
ARS 160	DRAWING: FOUNDATIONS
TH 122	THEATRE APPRECIATION
TH 123	INTRO TO FILM STUDIES
MU 100	INTRO TO MUSIC LITERATURE
Area III: Mathematics and Sciences	
Mathematics	
MA 105	NATURE OF MATHEMATICS
MA 107	ALGEBRA WITH APPLICATIONS
MA 110	FINITE MATHEMATICS
MA 112	PRECALCULUS ALGEBRA
MA 113	PRECALCULUS TRIGONOMETRY
MA 115	PRECALCULUS ALGEBRA & TRIG
MA 120	MATH PROFESSIONAL APPLICATIONS
MA 171	CALCULUS A
Natural Sciences (Lab)	
AST 100	SURVEY OF ASTRONOMY
AST 106	EXPLORING THE COSMOS I
AST 107	EXPLORING THE COSMOS II
BYS 109	FUNDAMENTALS OF BIOLOGY
BYS 119	PRINCIPLES OF BIOLOGY
BYS 120	ORGANISMAL BIOLOGY
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I

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CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB
ESS 103	ENVIRONMENTAL EARTH SCIENCE
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG
PH 100	CONCEPTUAL PHYSICS
PH 101	GENERAL PHYSICS I
PH 102	GENERAL PHYSICS II
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III

Area IV: History and Social and Behavioral Sciences* **12**

History **3-6**

HY 103	WORLD HISTORY TO 1500
HY 104	WORLD HISTORY SINCE 1500
HY 221	UNITED STATES TO 1877
HY 222	UNITED STATES SINCE 1877

Social and Behavioral Sciences **6-9**

ECN 142	PRINC OF MACROECONOMICS
ECN 143	PRINC OF MICROECONOMICS
GS 200	GLOBAL SYSTEMS AND CULTURES
ESS 105	WORLD REGIONAL GEOGRAPHY
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY
PSC 101	INTRO TO AMERICAN GOVERNMENT
PSC 102	INTRO TO COMPARATIVE POLITICS
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS
PY 101	GENERAL PSYCHOLOGY I
PY 201	LIFE-SPAN DEVELOPMENT
SOC 100	INTRO TO SOCIOLOGY
SOC 102	ANALYSIS OF SOCIAL PROBLEMS
SOC 103	INTRO TO CRIMINOLOGY
SOC 105	INTRO CULTURAL ANTHROPOLOGY

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Take no more than six hours in a single discipline in Area II or Area IV.

Area V: Pre Professional Requirements

Code	Title	Semester Hours
Courses in this area may also fulfill Charger Foundations requirements		
Communications:		3
CM 113	Intro to Rhetorical Communication	
Calculus		3
MA 171	CALCULUS A	
Physics Sequence Choose one:		8
PH 101 & 101L	GENERAL PHYSICS I and GENERAL PHYSICS I LAB	
&		
PH 102 & 102L	GENERAL PHYSICS II and GENERAL PHYSICS LAB II	

OR		
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
&		
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	

Computer Programming - choose one:		3
CS 100	INTRO COMPUTERS & PROGRAM	
or CS 102	INTRO TO C PROGRAMMING	
or CS 103	INTRO PROGRAMMING USING JAVA	
or CS 104	INTRO TO CS USING PYTHON	

Technical Writing		3
EH 301	TECHNICAL WRITING	

Major Requirements

Code	Title	Semester Hours
Biology Core ⁵		18
BYS 119 & 119L & BYS 120L	PRINCIPLES OF BIOLOGY and LABORATORY and ORGANISMAL BIOLOGY LAB	
BYS 120 & 120L & 120R	ORGANISMAL BIOLOGY and ORGANISMAL BIOLOGY LAB and RECITATION	
BYS 219 & 219L & 219R	GENETICS AND EVOLUTION and LABORATORY and RECITATION	
BYS 300 & 300L	CELL & DEVELOPMENTAL BIOLOGY and CELL & DEVELOPMENT BIO LAB	
BYS 490	SENIOR CAPSTONE	
Pre Professional Health Concentration Requirements		18
BYS 321 & 321L	GENERAL MICROBIOLOGY I and LABORATORY	
BYS 361	GENERAL BIOCHEMISTRY	
Choose one sequence:		
BYS 215 & 215L	HUMAN ANATOMY & PHYSIOLOGY I and HA&P I LABORATORY	
and		
BYS 216 & 216L	HUMAN ANATOMY & PHYSIOLOGY II and HA&P II LABORATORY	
OR		
BYS 313 & 313L	ANATOMY & PHYSIOLOGY I and LABORATORY	
and		
BYS 314 & 314L	ANATOMY & PHYSIOLOGY II and ANATOMY/PHYSIOLOGY II LAB	
OR		
BYS 317 & BYS 318	VERTEBRATE ZOOLOGY and VERTEBRATE REPRODUCTION	
BYS Elective course 300+ level or higher, 3 credits		

Chemistry Minor Requirements (this minor is required for this concentration)

Code	Title	Semester Hours
Chemistry minor		21
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	
CH 223 & CH 224	QUANTITATIVE ANALYSIS and QUANTITATIVE ANALYSIS LAB	
CH 331 & CH 335	ORGANIC CHEMISTRY I and ORGANIC CHEMISTRY LAB I	
CH 332 & CH 336	ORGANIC CHEMISTRY II and ORGANIC CHEMISTRY LAB II	
CH 362	GENERAL BIOCHEMISTRY LAB	

Electives

Code	Title	Semester Hours
Elective Courses		23
Additional Elective courses 100+ level to reach 128 credit hours. Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credits of 100 level HPE courses can count toward degree requirements.		

Overall Requirements

Code	Title	Semester Hours
All College of Science degrees must have at least 128 credits.		
At least 39 of the 128 credits must be at the 300+ level. These may be taken in any area including electives.		
Total Semester Hours		128

- ¹ Students must take one literature and one history course. Students must also take either a second literature or history course to complete a sequence. Acceptable Literature sequences must include one early literature (EH 207 or EH 242 or EH 209) and one later literature (EH 208 or EH 210). Acceptable History sequences are (HY 103 + HY 104) or (HY 221 + HY 222)
- ² Based on Math placement, (<http://www.uah.edu/science/departments/math/undergraduate-students/placement/>) prerequisite MA 112 and/or MA 113 Mathematics courses may be required.
- ³ No more than 6 credit hours can be taken in a single discipline.
- ⁴ For choices see the World Languages and Cultures (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/foreign-languages-literatures/>) department.
- ⁵ Biology pre requisites require a minimum grade of D- or higher. BYS 301 and BYS 314 pre requisites require a minimum grade of C- or higher.

Sample four year plan for Biological Sciences, Pre Professional Health Careers Concentration, BS degree:

Note: This is only an example and variations are possible.

Plan of study based on Calculus A MA 171, Calculus B MA 172 and General Physics w/ Calculus I & II PH 111 & PH 112.

Year 1

Fall		Semester Hours
FYE 101S	CHARGER SUCCESS - SCIENCE	1
BYS 100	INTRO HEALTH PROFESSIONS	1
BYS 119 & 119L & 119R	PRINCIPLES OF BIOLOGY and LABORATORY and RECITATION	4
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	4
MA 171	CALCULUS A	4
EH 101	COLLEGE WRITING I	3
Term Semester Hours:		17

Spring

BYS 120 & 120L & 120R	ORGANISMAL BIOLOGY and ORGANISMAL BIOLOGY LAB and RECITATION	4
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	4
MA 172	CALCULUS B	4
EH 102	COLLEGE WRITING II	3
Elective		1

Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.

Term Semester Hours: 16

Year 2**Fall**

BYS 219 & 219L & 219R	GENETICS AND EVOLUTION and LABORATORY and RECITATION	4
CH 331 & CH 335	ORGANIC CHEMISTRY I and ORGANIC CHEMISTRY LAB I	4
CM 113	Intro to Rhetorical Communication	3
Fine Art		3

See Requirements tab for approved list.

History		3
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See Requirements tab for approved list.

Term Semester Hours: 17

Spring

BYS 300 & 300L	CELL & DEVELOPMENTAL BIOLOGY and CELL & DEVELOPMENT BIO LAB	4
CH 332 & CH 336	ORGANIC CHEMISTRY II and ORGANIC CHEMISTRY LAB II	4
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	4
PY 101	GENERAL PSYCHOLOGY I	3
Elective		1

Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.

Term Semester Hours: 16

Year 3**Fall**

BYS 361 & CH 362	GENERAL BIOCHEMISTRY and GENERAL BIOCHEMISTRY LAB	4
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	4
PY 201	LIFE-SPAN DEVELOPMENT	3
Literature		3

See Requirements tab for approved list.

Term Semester Hours: 14

Spring

BYS 321 & 321L	GENERAL MICROBIOLOGY I and LABORATORY	4
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SOC 100	INTRO TO SOCIOLOGY	3
ST 281	ELEMENTS OF STAT ANALYSIS	3
or PY 300	or PSYCHOLOGICAL STATISTICS	
Literature		3
See Requirements tab for approved list.		
Elective		3
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		16
Year 4		
Fall		
BYS 313	ANATOMY & PHYSIOLOGY I	4
& 313L	and LABORATORY	
CH 223	QUANTITATIVE ANALYSIS	4
& CH 224	and QUANTITATIVE ANALYSIS LAB	
EH 301	TECHNICAL WRITING	3
Elective		3
Elective		3
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		17
Spring		
BYS 314	ANATOMY & PHYSIOLOGY II	4
& 314L	and ANATOMY/PHYSIOLOGY II LAB	
BYS 300+ level or higher course		3
BYS 490	SENIOR CAPSTONE	2
CS 100	INTRO COMPUTERS PROGRAM	3
or CS 102	or INTRO TO C PROGRAMMING	
or CS 103	or INTRO PROGRAMMING USING JAVA	
or CS 104	or INTRO TO CS USING PYTHON	
Elective		3
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		15
Total Semester Hours:		128

Sample four year plan for Biological Sciences, Pre Professional Health Careers concentration, BS degree:

Note: This is only an example and variations are possible.

Plan of study based on Calculus A MA 171 and General Physics PH 101 & PH 102.

Year 1

		Semester Hours
Fall		
FYE 101S	CHARGER SUCCESS - SCIENCE	1
BYS 100	INTRO HEALTH PROFESSIONS	1
BYS 119	PRINCIPLES OF BIOLOGY	4
& 119L	and LABORATORY	
& 119R	and RECITATION	
CH 121	GENERAL CHEMISTRY I	4
& CH 125	and GENERAL CHEMISTRY LAB I	

MA 171	CALCULUS A	4
EH 101	COLLEGE WRITING I	3
Term Semester Hours:		17
Spring		
BYS 120 & 120L & 120R	ORGANISMAL BIOLOGY and ORGANISMAL BIOLOGY LAB and RECITATION	4
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	4
EH 102	COLLEGE WRITING II	3
Fine Art		3
See Requirements tab for approved list		
Elective		1
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		15
Year 2		
Fall		
BYS 219 & 219L & 219R	GENETICS AND EVOLUTION and LABORATORY and RECITATION	4
CH 331 & CH 335	ORGANIC CHEMISTRY I and ORGANIC CHEMISTRY LAB I	4
CM 113	Intro to Rhetorical Communication	3
PY 101	GENERAL PSYCHOLOGY I	3
Literature		3
See Requirements tab for approved list.		
Term Semester Hours:		17
Spring		
BYS 300 & 300L	CELL & DEVELOPMENTAL BIOLOGY and CELL & DEVELOPMENT BIO LAB	4
CH 332 & CH 336	ORGANIC CHEMISTRY II and ORGANIC CHEMISTRY LAB II	4
PY 201	LIFE-SPAN DEVELOPMENT	3
Literature		3
See Requirements tab for approved list.		
Elective		3
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		17
Year 3		
Fall		
BYS 361 & CH 362	GENERAL BIOCHEMISTRY and GENERAL BIOCHEMISTRY LAB	4
PH 101 & 101L	GENERAL PHYSICS I and GENERAL PHYSICS I LAB	4
SOC 100	INTRO TO SOCIOLOGY	3
History		3
See Requirements tab for approved list.		
Elective		1

Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.

	Term Semester Hours:	15
Spring		
BYS 321 & 321L	GENERAL MICROBIOLOGY I and LABORATORY	4
PH 102 & 102L	GENERAL PHYSICS II and GENERAL PHYSICS LAB II	4
ST 281 or PY 300	ELEMENTS OF STAT ANALYSIS or PSYCHOLOGICAL STATISTICS	3
Elective		3
Elective		1
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
	Term Semester Hours:	15
Year 4		
Fall		
BYS 313 & 313L	ANATOMY & PHYSIOLOGY I and LABORATORY	4
CH 223 & CH 224	QUANTITATIVE ANALYSIS and QUANTITATIVE ANALYSIS LAB	4
EH 301	TECHNICAL WRITING	3
Elective		3
Elective		3
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
	Term Semester Hours:	17
Spring		
BYS 314 & 314L	ANATOMY & PHYSIOLOGY II and ANATOMY/PHYSIOLOGY II LAB	4
BYS 490	SENIOR CAPSTONE	2
BYS 300+ level or higher course		3
CS 100 or CS 102 or CS 103 or CS 104	INTRO COMPUTERS PROGRAM or INTRO TO C PROGRAMMING or INTRO PROGRAMMING USING JAVA or INTRO TO CS USING PYTHON	3
Elective 300+ level or higher course		3
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
	Term Semester Hours:	15
	Total Semester Hours:	128

Biological Sciences, BS - Secondary Education Concentration

Biological Sciences, Secondary Education Concentration, BS Requirements:

- All students are encouraged to see an advisor after completion of 24 credits.
- Biological Sciences, Secondary Education Concentration BS degree requires a minimum of 131 credit hours.
- 39 of 131 credit hours must be taken at 300 level or higher (39 credits includes courses taken at the 300+ level in major, minor (if chosen), Pre professional area and electives).

- 12 credit hours of 300 level and above must be taken in the major or 6 credit hours in the major and 6 credit hours in the minor (if chosen).
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- Unless otherwise noted a C- or better is required for all College of Science prerequisite courses.
- No more than 64 credit hours from a two-year college can be applied toward a UAH degree.
- For graduation application instructions, see here (p. 812).

Degree Requirements

Charger Foundations Requirements

*Please see Area V for CoS requirements that can also be used to fulfill Charger Foundations Requirements.

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S or WLC 101A or WLC 101F or WLC 101G or WLC 101J or WLC 101R	INTRO FOREIGN LANG I: SPANISH INTRO FOREIGN LANG I: ARABIC INTRO FOREIGN LANG I:FRENCH INTRO FOREIGN LANG I:GERMAN INTRO FOREIGN LANG I:JAPANESE INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S or WLC 102A or WLC 102F or WLC 102G or WLC 102J or WLC 102R	INTRO FOREIGN LANG II:SPANISH INTRO FOREIGN LANG II: ARABIC INTRO FOREIGN LANG II:FRENCH INTRO FOREIGN LANG II:GERMAN INTRO FOREIGN LANG II:JAPANESE INTRO FOREIGN LANG II:RUSSIAN	
WLC 201S or WLC 201A or WLC 201F or WLC 201G or WLC 201J or WLC 201R	INTERM FOREIGN LANG:SPANISH INTERM FOREIGN LANG I: ARABIC INTERM FOREIGN LANG:FRENCH INTERM FOREIGN LANG:GERMAN INTERM FOREIGN LANG: JAPANESE INTERM FOREIGN LANG:RUSSIAN	

WLC 202S	INTERM FOREIGN LANG II:SPANISH
or WLC 202A	INTERM FOREIGN LANG II: ARABIC
or WLC 202F	INTERM FOREIGN LANG II:FRENCH
or WLC 202G	INTERM FOREIGN LANG II:GERMAN
or WLC 202J	INTERM FORGN LANG II:JAPANESE
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN
WLC 204	INTERNATIONAL CINEMA
PHL 101	INTRODUCTION TO PHILOSOPHY
PHL 102	INTRO TO ETHICS
PHL 103	INTRODUCTION TO LOGIC
PHL 150	TECH, SCIENCE & HUMAN VALUES
WGS 200	INTRO WOMEN'S & GENDER STUDIES
AMS 229	ANCIENT & MEDIEVAL WORLDS
ARH 100	ARH SURV:ANCIENT-MEDIEVAL
ARH 101	ARH SURV:RENAISSANCE-MODERN
ARH 103	ARH SUR:NON-WESTERN TRADITIONS
ARS 160	DRAWING: FOUNDATIONS
TH 122	THEATRE APPRECIATION
TH 123	INTRO TO FILM STUDIES
MU 100	INTRO TO MUSIC LITERATURE
Area III: Mathematics and Sciences	
Mathematics	
MA 105	NATURE OF MATHEMATICS
MA 107	ALGEBRA WITH APPLICATIONS
MA 110	FINITE MATHEMATICS
MA 112	PRECALCULUS ALGEBRA
MA 113	PRECALCULUS TRIGONOMETRY
MA 115	PRECALCULUS ALGEBRA & TRIG
MA 120	MATH PROFESSIONAL APPLICATIONS
MA 171	CALCULUS A
Natural Sciences (Lab)	
AST 100	SURVEY OF ASTRONOMY
AST 106	EXPLORING THE COSMOS I
AST 107	EXPLORING THE COSMOS II
BYS 109	FUNDAMENTALS OF BIOLOGY
BYS 119	PRINCIPLES OF BIOLOGY
BYS 120	ORGANISMAL BIOLOGY
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB
ESS 103	ENVIRONMENTAL EARTH SCIENCE
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG
PH 100	CONCEPTUAL PHYSICS
PH 101	GENERAL PHYSICS I
PH 102	GENERAL PHYSICS II
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I

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3-4

8

PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III

Area IV: History and Social and Behavioral Sciences* 12
History 3-6

HY 103	WORLD HISTORY TO 1500
HY 104	WORLD HISTORY SINCE 1500
HY 221	UNITED STATES TO 1877
HY 222	UNITED STATES SINCE 1877

Social and Behavioral Sciences 6-9

ECN 142	PRINC OF MACROECONOMICS
ECN 143	PRINC OF MICROECONOMICS
GS 200	GLOBAL SYSTEMS AND CULTURES
ESS 105	WORLD REGIONAL GEOGRAPHY
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY
PSC 101	INTRO TO AMERICAN GOVERNMENT
PSC 102	INTRO TO COMPARATIVE POLITICS
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS
PY 101	GENERAL PSYCHOLOGY I
PY 201	LIFE-SPAN DEVELOPMENT
SOC 100	INTRO TO SOCIOLOGY
SOC 102	ANALYSIS OF SOCIAL PROBLEMS
SOC 103	INTRO TO CRIMINOLOGY
SOC 105	INTRO CULTURAL ANTHROPOLOGY

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Take no more than six hours in a single discipline in Area II or Area IV.

Area V: Pre Professional Requirements

Code	Title	Semester Hours
Courses in this area may also fulfill Charger Foundations requirements		
Communications:		3
CM 113	Intro to Rhetorical Communication	
Calculus - choose one:		3-4
MA 120 or MA 171	MATH PROFESSIONAL APPLICATIONS CALCULUS A	
Physics Sequence Choose one:		8
PH 101 & 101L &	GENERAL PHYSICS I and GENERAL PHYSICS I LAB	
PH 102 & 102L	GENERAL PHYSICS II and GENERAL PHYSICS LAB II	
OR		
PH 111 & PH 114 &	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
Psychology		6
PY 101	GENERAL PSYCHOLOGY I	
PY 201	LIFE-SPAN DEVELOPMENT	
General Chemistry and lab		4

CH 101 or CH 121	INTRO TO CHEMISTRY GENERAL CHEMISTRY I	
CH 105 or CH 125	INTRO CHEMISTRY LAB GENERAL CHEMISTRY LAB I	
Organic Chemistry and lab		4
CH 201 or CH 331	ELEM ORGANIC CHEMISTRY ORGANIC CHEMISTRY I	
CH 205 or CH 335	ELEM ORGANIC CHEMISTRY LAB ORGANIC CHEMISTRY LAB I	
Computer Programming - choose one:		3
CS 100 or CS 102 or CS 103 or CS 104	INTRO COMPUTERS & PROGRAM INTRO TO C PROGRAMMING INTRO PROGRAMMING USING JAVA INTRO TO CS USING PYTHON	
Technical Writing		3
EH 301	TECHNICAL WRITING	

Major Requirements

Code	Title	Semester Hours
Biology Core ⁵		18
BYS 119 & 119L & 119R	PRINCIPLES OF BIOLOGY and LABORATORY and RECITATION	
BYS 120 & 120L & 120R	ORGANISMAL BIOLOGY and ORGANISMAL BIOLOGY LAB and RECITATION	
BYS 219 & 219L & 219R	GENETICS AND EVOLUTION and LABORATORY and RECITATION	
BYS 300 & 300L	CELL & DEVELOPMENTAL BIOLOGY and CELL & DEVELOPMENT BIO LAB	
BYS 490	SENIOR CAPSTONE	
Biology Secondary Ed Concentration Requirements		18
BYS 312	PRINCIPLES OF ECOLOGY	
BYS 321 & 321L	GENERAL MICROBIOLOGY I and LABORATORY	
BYS 301	ELEMENTARY BIOCHEMISTRY	
BYS elective courses, 7 credits		

Education Certification Requirements

Code	Title	Semester Hours
Secondary Education Courses		40
ED 301	INTRO TO EDUCATION PRACTICUM	
ED 307	MULTICULTURAL FND EDUCATION	
ED 308	EDUCATIONAL PSYCHOLOGY	
EDC 301	TCHG THE EXCEPTIONAL CHILD	
EDC 311	INSTR STRATEGIES INCLUSIVE CLR	
ED 410	FOUNDATIONS EDUC EVALUAT	
ED 423	TCHNG SCIENCE MID & SEC SCH I	
ED 350	TECHNOLOGY IN CLASSROOM	
ED 408	TCHG READING/CONTENT AREA	
ED 309	CLASSROOM & BEHAVIOR MGMT	

ED 497	HIGH SCHOOL INTERNSHIP	
Total Semester Hours		131-136

- 1 Students must take one literature and one history course. Students must also take either a second literature or history course to complete a sequence. Acceptable Literature sequences must include one early literature (EH 207 or EH 242 or EH 209) and one later literature (EH 208 or EH 210). Acceptable history sequences are (HY 103 + HY 104), or (HY 221 + HY 222)
- 2 Based on Math placement, (<http://www.uah.edu/science/departments/math/undergraduate-students/placement/>) prerequisite MA 112 and/or MA 113 Mathematics courses may be required. If the student intends to pursue a course of study requiring more advanced mathematics background, they should take MA 171 . Otherwise, MA 120 may be used to meet this requirement.
- 3 No more than 6 credit hours can be taken in a single discipline.
- 4 For choices see the World Languages and Cultures (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/foreign-languages-literatures/>) department.
- 5 Biology pre requisites require a minimum grade of D- or higher. BYS 301 and BYS 314 pre requisites require a minimum grade of C- or higher.

Sample four year plan for Biological Sciences, Secondary Education Concentration, BS degree:

Note: This is only an example and variations are possible.

Year 1

Fall		Semester Hours
FYE 101S	CHARGER SUCCESS - SCIENCE	1
BYS 119 & 119L & 119R	PRINCIPLES OF BIOLOGY and LABORATORY and RECITATION	4
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	4
MA 171	CALCULUS A	4
EH 101	COLLEGE WRITING I	3
Term Semester Hours:		16
Spring		
EH 102	COLLEGE WRITING II	3
BYS 120 & 120L & 120R	ORGANISMAL BIOLOGY and ORGANISMAL BIOLOGY LAB and RECITATION	4
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	4
PY 101	GENERAL PSYCHOLOGY I	3
Term Semester Hours:		14

Year 2

Fall		
BYS 219 & 219L	GENETICS AND EVOLUTION and LABORATORY	4
CH 201 & CH 205	ELEM ORGANIC CHEMISTRY and ELEM ORGANIC CHEMISTRY LAB	4
PY 201	LIFE-SPAN DEVELOPMENT	3
CM 113	Intro to Rhetorical Communication	3
Literature		3
See Requirements tab for approved list.		
Term Semester Hours:		17
Spring		
BYS 300 & 300L	CELL & DEVELOPMENTAL BIOLOGY and CELL & DEVELOPMENT BIO LAB	4
BYS 301	ELEMENTARY BIOCHEMISTRY	3
History		3

See Requirements tab for approved list.		
Fine Art		3
See Requirements tab for approved list.		
Humanities, 2nd Fine Art or 2nd Literature		3
See Requirements tab for approved list.		
Term Semester Hours:		16
Year 3		
Fall		
BYS 312	PRINCIPLES OF ECOLOGY	4
BYS 321 & 321L	GENERAL MICROBIOLOGY I and LABORATORY	4
PH 101 & 101L	GENERAL PHYSICS I and GENERAL PHYSICS I LAB	4
2nd History or 3rd Social/Behavioral science		3
See Requirements tab for approved list.		
Term Semester Hours:		15
Spring		
BYS 300+ level or higher course		3
BYS 300+ level or higher course		4
PH 102 & 102L	GENERAL PHYSICS II and GENERAL PHYSICS LAB II	4
CS 100	INTRO COMPUTERS PROGRAM	3
or CS 102	or INTRO TO C PROGRAMMING	
or CS 103	or INTRO PROGRAMMING USING JAVA	
or CS 104	or INTRO TO CS USING PYTHON	
Term Semester Hours:		14
Year 4		
Fall		
ED 301	INTRO TO EDUCATION PRACTICUM	1
ED 307	MULTICULTURAL FND EDUCATION	3
ED 308	EDUCATIONAL PSYCHOLOGY	3
EDC 301	TCHG THE EXCEPTIONAL CHILD	3
EDC 311	INSTR STRATEGIES INCLUSIVE CLR	3
Term Semester Hours:		13
Spring		
ED 410	FOUNDATIONS EDUC EVALUAT	3
ED 423	TCHNG SCIENCE MID SEC SCH I	3
ED 350	TECHNOLOGY IN CLASSROOM	3
EH 301	TECHNICAL WRITING	3
Term Semester Hours:		12
Fifth Year		
Fall		
ED 309	CLASSROOM BEHAVIOR MGMT	3
ED 408	TCHG READING/CONTENT AREA	3
Term Semester Hours:		6
Spring		

ED 497	HIGH SCHOOL INTERNSHIP	12
	Term Semester Hours:	12
	Total Semester Hours:	135

Biological Sciences Minor

A minor in Biological Sciences consists of:

Code	Title	Semester Hours
Chemistry Requirement		4
CH 201 & CH 205	ELEM ORGANIC CHEMISTRY and ELEM ORGANIC CHEMISTRY LAB	
or		
CH 331 & CH 335	ORGANIC CHEMISTRY I and ORGANIC CHEMISTRY LAB I	
Note: CH 101/105 or CH 123/126 may be needed as prerequisites to these chemistry courses.		
Biology Requirements		21
BYS 119	PRINCIPLES OF BIOLOGY	
BYS 120	ORGANISMAL BIOLOGY	
BYS 219	GENETICS AND EVOLUTION	
BYS 300	CELL & DEVELOPMENTAL BIOLOGY	
BYS Elective courses, 300+ level, 5 credits		
Total Semester Hours		25

Chemistry

203-C Materials Science Building

Telephone: 256.824.6153

Email: chem.admin@uah.edu (chem@uah.edu)

The Chemistry department, approved by the American Chemical Society, offers a Chemistry degree in the following concentrations:

- Chemistry, BS - Biochemistry Concentration (p. 483) (Leading to an ACS-certified degree, includes Biology minor, possible double major)
- Chemistry, BS - Pure Chemistry Concentration (p. 530) (Leading to an ACS-certified degree)
- Chemistry, BS - Chemical Physics Concentration (p. 503) (Leading to an ACS-certified degree)
- Chemistry, BS - Chemical Education Concentration (p. 496) (Leading to an ACS-certified degree)
- Chemistry, BS - Environmental Chemistry Concentration (p. 509) (Leading to an ACS-certified degree)
- Chemistry, BS - Chemical Business Concentration (p. 490) (includes Business minor)
- Chemistry, BS - Basic Chemistry Concentration (p. 477)

Program Objectives

The mission of the Department of Chemistry is to provide high quality undergraduate and graduate education in all aspects of chemistry, with a special emphasis in materials science and biotechnology. Our goal is to educate our students in chemistry, and to provide them with life-long learning skills allowing them to adapt to an ever-changing environment. Our faculty and students strive to generate new knowledge through research and other creative activities that will benefit the residents of Huntsville, the state of Alabama, the nation, and the world.

Learning Outcomes

Graduates in Chemistry will demonstrate:

- Sound conceptual understanding of basic concepts, methods, terminology, and theories of modern chemistry
- Ability to operate a suite of modern chemical instrumentation
- Ability to effectively present chemical knowledge

- Chemistry, BS - Biochemistry Concentration (p. 483) (Leading to an ACS-certified degree, includes Biology minor, possible double major)
- Chemistry, BS - Pure Chemistry Concentration (p. 530) (Leading to an ACS-certified degree)
- Chemistry, BS - Chemical Physics Concentration (p. 503) (Leading to an ACS-certified degree)
- Chemistry, BS - Chemical Education Concentration (p. 496) (Leading to an ACS-certified degree)
- Chemistry, BS - Environmental Chemistry Concentration (p. 509) (Leading to an ACS-certified degree)
- Chemistry, BS - Chemical Business Concentration (p. 490) (includes Business minor)
- Chemistry, BS - Basic Chemistry Concentration (p. 477)

Minors in Chemistry

- Chemistry Minor (p. 537)
- Chemistry Minor for Chemical Engineering Majors (<http://catalog.uah.edu/undergrad/colleges-departments/science/chemistry/chemistry-minor-eng/>)

UAH's Joint Undergraduate Master's Program (JUMP) allows undergraduate students to study at the graduate level. Completing graduate courses during the senior year reduces the time to earn a graduate (MS) degree. Please visit the JUMP (p. 18) page for general information.

Requirements For Admissions

1. Cumulative overall 3.5 GPA
2. Major GPA of 3.5
3. Student shall complete CH 121 + CH 125, CH 123 + CH 126, CH 223 + CH 224, CH 331 + CH 335, CH 332 + CH 336 by Junior year

Additional Information

- Maximum of 12 credit hours count toward both degrees

Designated Faculty Contact/Advisor

Dr. John Foster
chemchair@uah.edu
256.824.2416

CH 101 - INTRO TO CHEMISTRY

Semester Hours: 3

Properties of solids, liquids, gases, and solutions, atomic theory and bonding, concentration concepts, and physical and chemical properties of the more common elements and their compounds. No placement examination is required. Prerequisite: MA 110 or prerequisites with concurrency MA 112 or higher and CH 105.

CH 101R - RECITATION

Semester Hours: 0

CH 105 - INTRO CHEMISTRY LAB

Semester Hour: 1

Complements the lecture material for CH 101. Laboratory fundamentals and basic chemical principles. Prerequisite with concurrency: CH 101.

CH 121 - GENERAL CHEMISTRY I

Semester Hours: 3

For science and engineering majors. Chemical properties of elements, their periodic groups, and their compounds. Reactions and stoichiometry. Nature of the chemical bond, molecular structure, thermochemistry. Properties of gases, liquids, and solids. Prerequisite: CH 101 or placement test. Prerequisites with concurrency: MA 113 or higher, and CH 125.

CH 121R - RECITATION

Semester Hours: 0

CH 122 - GENERAL CHEMISTRY ENGINEERS

Semester Hours: 3

This course is designed as a one semester presentation of key aspects in general chemistry and is recommended for all engineering majors except chemical engineers. Covers topic on atoms and molecules: reactions and stoichiometry; gases; the periodic table; atomic structure, chemical bonding and molecular structure; materials; energy, entropy, and free energy; kinetics and equilibrium; and electrochemistry. Substitutes for CH 121 when transferred to any other curriculum.

CH 123 - GENERAL CHEMISTRY II

Semester Hours: 3

Continuation of CH 121 with in-depth study of topics listed. To be taken concurrently with CH 126. Prerequisite: CH 121.

CH 123R - RECITATION

Semester Hours: 0

CH 125 - GENERAL CHEMISTRY LAB I

Semester Hour: 1

Complements the lecture material for CH 121. Includes the determination of chemical and physical properties of materials, synthesis and characterization, and introduction to spectroscopy. Prerequisite with concurrency: CH 121.

CH 126 - GENERAL CHEMISTRY LAB II

Semester Hour: 1

Complements the lecture material of CH 123. Includes an introduction to qualitative and quantitative analytical techniques. Prerequisite with concurrency: CH 123.

CH 151 - GENERAL, ORGANIC, BIOCHEMISTRY

Semester Hours: 3

Explore forms and behaviors of matter, composition of atoms with inorganic, nuclear, organic and biochemical reactions. Use bonding and nonbonding interactions to predict physical and chemical properties of atoms and compounds. Apply these concepts to nomenclature, reactivity, biological activity. Prerequisite: MA 112 with concurrency Co-requisite: CH 155.

CH 155 - GENORGBIOCHEM LAB

Semester Hour: 1

Complements the lecture material for CH 151. Laboratory fundamentals and basic chemical principles. Introduction to laboratory safety, practices, equipment and principles. This will include exploration of chemical bonding, gas laws, preparation of solutions, organic and biochemical concepts such as carbohydrates, lipids, and protein synthesis. Prerequisite with concurrency: CH 151.

CH 191 - FUNDAMENTALS OF CHEMICAL RES

Semester Hour: 1

Personalized programs to introduce beginning students to undergraduate research. Introduction to laboratory research techniques. Approval of supervising faculty member and chemistry chair required. Registration utilizes last digit of course number to designate semester-hour credit.

CH 192 - FUNDAMENTALS OF CHEMICAL RES

Semester Hours: 2

Personalized programs to introduce beginning students to undergraduate research. Introduction to laboratory research techniques. Approval of supervising faculty member and chemistry chair required. Registration utilizes last digit of course number to designate semester-hour credit.

CH 193 - FUNDAMENTALS OF CHEMICAL RES

Semester Hours: 3

Personalized programs to introduce beginning students to undergraduate research. Introduction to laboratory research techniques. Approval of supervising faculty member and chemistry chair required. Registration utilizes last digit of course number to designate semester-hour credit.

CH 201 - ELEM ORGANIC CHEMISTRY

Semester Hours: 3

Survey of nomenclature, structure, functional groups, properties and reactions of organic compounds. Prerequisites: CH 101 and 105 OR CH 121 and 125. Prerequisite with concurrency: CH 205.

CH 205 - ELEM ORGANIC CHEMISTRY LAB

Semester Hour: 1

Laboratory component of CH 201. Includes reactions of organic compounds and functional group modifications. Prerequisite with concurrency: CH 201. Prerequisites: (CH 101 and CH 105) or CH 201 and CH 205).

CH 223 - QUANTITATIVE ANALYSIS

Semester Hours: 3

Introduction to quantitative analytical chemistry including instrumentation. Data treatment, ionic equilibria, elementary electrochemical, spectrochemical, gravimetric, and volumetric techniques. Prerequisite: CH 126. Prerequisite with concurrency: CH 224.

CH 224 - QUANTITATIVE ANALYSIS LAB

Semester Hour: 1

Introduction to quantitative analytical chemistry laboratory. Experiments include pH measurements, spectrochemical, gravimetric, and volumetric titrations. Prerequisite: CH 126. Prerequisite with concurrency: CH 223.

CH 301 - ELEMENTARY BIOCHEMISTRY

Semester Hours: 3

Survey of structure and function of carbohydrates, lipids, proteins and nucleic acids. Enzyme properties and functions. Major metabolic pathways, interactions, and regulation. No credit given to chemistry majors or minors. Credit in CH 361 precludes credit in CH 301. Same as BYS 301.

Prerequisites: BYS 120 and either CH 201 or 331.

CH 311L - ORGANIC CHEM I LAB/OAKWOOD

Semester Hour: 1

CH 315 - CHEMISTRY TEACHING METHODS

Semester Hours: 3

Designed for students pursuing a Class B High School Teacher's Certificate. The course explores methods of presentation of chemical principles, including chemical demonstrations. Prerequisites: CH 201 or 223. Permission of instructor.

CH 331 - ORGANIC CHEMISTRY I

Semester Hours: 3

Lecture/Lab includes one two-hour recitation per week. Chemistry of organic compounds. Synthetic methods, theory, and reaction mechanisms.

Prerequisite: CH 123.

CH 331R - ORGANIC CHEM I RECITATION

Semester Hours: 0

To be taken as a co-requisite with CH 331. Organic chemistry problem solving, including nomenclature, reactions, mechanisms, spectroscopy, and test-taking strategy.

CH 332 - ORGANIC CHEMISTRY II

Semester Hours: 3

Lecture/Lab Includes one two-hour recitation per week. Continuation of CH 331. Prerequisite: CH 331.

CH 332R - ORGANIC CHEM II RECITATION

Semester Hours: 0

To be taken as a co-requisite with CH 332. Organic chemistry problem solving, including nomenclature, reactions, mechanisms, spectroscopy, and test-taking strategy.

CH 335 - ORGANIC CHEMISTRY LAB I

Semester Hour: 1

Techniques of organic chemistry including synthesis, separation, and identification of organic compounds with use of chemical and spectroscopic methods. Prerequisite with concurrency: CH 331. Prerequisite: CH 126.

CH 336 - ORGANIC CHEMISTRY LAB II

Semester Hour: 1

Continuation of CH 335. Prerequisite: CH 335. Prerequisite with concurrency: CH 332.

CH 337 - ORGANIC CHEMISTRY LAB III

Semester Hours: 2

Advanced organic chemistry laboratory treating reactions and techniques not covered in CH 335 and 336. Pursuit of a special open-ended problem by each student. Prerequisite: CH 336 and approval of instructor.

CH 341 - PHYSICAL CHEMISTRY I

Semester Hours: 3

An introduction to physical chemistry encompassing: the kinetic theory of gases, the laws of thermodynamics, chemical equilibrium, phase equilibria, electrolyte solutions, electrochemistry and elementary theories of statistical thermodynamics. Credit in CH 341 precludes credit in CH 347. Prerequisites: CH 123, PH 112, MA 201, PH 115.

CH 342 - PHYSICAL CHEMISTRY II

Semester Hours: 3

A survey of additional fundamental concepts of physical chemistry including: chemical kinetics, quantum chemistry, atomic structure, group theory, spectroscopy (i.e. IR, Raman, NMR, EMR, etc.), and surface and colloid chemistry. Credit in 342 precludes credit in CH 348. Prerequisite: CH 341.

CH 343 - INTRO TO QUANTUM CHEM

Semester Hours: 3

Quantum mechanical treatment of atoms, molecules, and spectroscopy. Prerequisites: CH 341 and MA 238.

CH 345 - EXPERIMENTAL PHYSICAL CHEM I

Semester Hour: 1

Laboratory and computer investigation into topics covered in physical chemistry CH 341. Includes thermodynamics, chemical equilibria and electrochemistry. The lab involves report writing, data and error analysis, error propagation and linear and nonlinear regression using appropriate software. Prerequisites: CH 223 and 224. Prerequisite with concurrency: CH 341 or 347.

CH 346 - EXPERIMENTAL PHYSICAL CHEM II

Semester Hour: 1

Laboratory and computer investigations into topics covered in physical chemistry CH 342. Includes kinetics, quantum mechanics and spectroscopy. The lab involves report writing, data and error analysis, error propagation and linear and nonlinear regression using appropriate software. Prerequisite: CH 345. Prerequisite with concurrency: CH 342 or 348.

CH 347 - BIOPHYSICAL CHEMISTRY I

Semester Hours: 3

Computers for data analysis and simulations. First and second laws of thermodynamics. Free energy and equilibrium. Calorimetry. Protein stability. Binding and Interactions. Solution thermodynamics. Electrolytes. Electrochemistry. Biochemical reaction kinetics. Enzyme catalysis. Same as BYS 347. Prerequisites: CH 332, PH 112 and MA 172, PH 115.

CH 348 - BIOPHYSICAL CHEMISTRY II

Semester Hours: 3

Quantum mechanics. Statistical thermodynamics. Spectroscopy, including UV-VIS, Fluorescence. Circular dichroism, NMR. Structure determinations. Same as BYS 348. Prerequisite: CH 347.

CH 351 - PHYS CHEM IN PRACTICE

Semester Hours: 3

Fundamental concepts and principles from chemical thermodynamics and reaction dynamics in practice. States of matter; energy and entropy; thermodynamic laws; chemical and phase equilibria; mixtures; and reaction rates, kinetics, and mechanisms. Derivations and computer applications of formula. Restricted to Chemical Engineering major only. Prerequisites: ENG 101 and CH 123 and MA 201 and either PH 112 or CHE 201.

CH 361 - GENERAL BIOCHEMISTRY

Semester Hours: 3

Nomenclature, structure, function, properties, and metabolism of amino acids, carbohydrates, lipids, and nucleic acids. Enzyme function, major catabolic pathways, their interrelations and control mechanisms. Glycolysis, Citric Acid Cycle, and oxidative phosphorylation. Same as BYS 361. Prerequisites: (BYS 120, CH 332 and CH 335) or (BYS 311, CH 332 and CH 335).

CH 362 - GENERAL BIOCHEMISTRY LAB

Semester Hour: 1

Lecture/Lab One 3-hour lab a week. Practical experience in isolation, qualitative identification, and quantitative estimation of biomolecules. Same as BYS 362. Prerequisites: CH 335 and 336. Prerequisite with concurrency: CH 361.

CH 363 - GEN BIOCHEMISTRY II

Semester Hours: 3

A continuation of CH 361 to include fatty acid and amino acid oxidation, enzymatic synthesis of biomolecules, integration of metabolic processes, DNA and RNA metabolism including replication and transcription, translation and protein synthesis, and regulation of gene expression. Same as BYS 363. Prerequisite: CH 361.

CH 364 - GEN BIOCHEMISTRY LAB II

Semester Hour: 1

Experimental course illustrating the topics in CH 363. Prerequisites: CH 361 and 362. Prerequisite with concurrency: CH 363.

CH 401 - INORGANIC CHEMISTRY

Semester Hours: 3

Fundamental topics in inorganic chemistry. Atomic structure, chemical bonding, symmetry, acid-base theories, non-aqueous solvents, coordination chemistry, crystal field and ligand field theory, main group and transition metal chemistry, organometallics, catalysis, and bioinorganic chemistry.

Prerequisite: CH 332.

CH 402 - INORGANIC CHEMISTRY LAB

Semester Hour: 1

Laboratory techniques of inorganic chemistry including synthesis, purification, isolation, and identification of inorganic compounds. Prerequisite with concurrency: CH 401.

CH 421 - INSTRUMENTAL ANALYSIS

Semester Hours: 4

Introduction to modern analytical instrumentation including IR, UV and atomic absorption spectrophotometers, nuclear magnetic resonance, electroanalytical equipment, and gas and liquid chromatographs. Lecture and laboratory. Prerequisite with concurrency: CH 347, or BYS 347, or CH 341.

CH 435 - CHEMICAL TOXICOLOGY

Semester Hours: 3

An introduction to the principles of chemical toxicology, including the effects of drugs, environmental pollutants, natural toxins and venoms, and other potentially hazardous chemicals, at the physiological, cellular, and molecular level. Prerequisites: CH 332 and CH 361.

CH 440 - POLYMER SYNTHESIS & CHARACTERI

Semester Hours: 3

Synthesis of commercially relevant and novel polymers. Polymer characteristics and a discussion of the structural dependence of polymer properties. Course completion and/or grade requirements for undergraduate credit will differ from those for graduate credit. Prerequisites: CH 331 and CH 332.

CH 480 - SELECTED TOPICS IN CHEM

Semester Hours: 1-3

Special offerings to students in areas of interest not covered in present curriculum. Prerequisites: senior standing and approval of instructor.

CH 491 - INTRO TO CHEMICAL RESEARCH

Semester Hour: 1

Personalized programs to round out the undergraduate curriculum of students with various goals. Registration utilizes last digit of course number to designate semester hour credit. Student normally may elect only up to 6 hours. Prerequisites: Senior standing. Approval of supervising faculty member and chemistry chair required.

CH 492 - INTRO TO CHEMICAL RESEARCH

Semester Hours: 2

Personalized programs to round out the undergraduate curriculum of students with various goals. Registration utilizes last digit of course number to designate semester hour credit. Student normally may elect only up to 6 hours. Prerequisites: Senior standing. Approval of supervising faculty member and chemistry chair required.

CH 493 - INTRO TO CHEMICAL RESEARCH

Semester Hours: 3

Personalized programs to round out the undergraduate curriculum of students with various goals. Registration utilizes last digit of course number to designate semester hour credit. Student normally may elect only up to 6 hours. Prerequisites: Senior standing. Approval of supervising faculty member and chemistry chair required.

Chemistry, BS

The BS degree in Chemistry consists of the University Charger Foundation requirements, the major core courses, the major elective courses, and ancillary requirements. Beyond these the student may elect other course work to attain 128 semester hours with at least 39 semester hours at the level of 300 or above. The student may also elect a particular concentration. The concentration may require more than 128 semester hours of course work.

The B.S. in Chemistry consists of:

- Major core
- Major electives
- BS General Education Requirements (GER)

- Ancillary requirements
- General electives

Overview of Degree Requirements

See: Academic Policies and Procedures (p. 812).

Code	Title	Semester Hours
Charger Foundations		
College General Education Requirements		41
Major Core Courses		
CH 121	GENERAL CHEMISTRY I	3
CH 123	GENERAL CHEMISTRY II	3
CH 125	GENERAL CHEMISTRY LAB I	1
CH 126	GENERAL CHEMISTRY LAB II	1
CH 223	QUANTITATIVE ANALYSIS	3
CH 224	QUANTITATIVE ANALYSIS LAB	1
CH 331	ORGANIC CHEMISTRY I	3
CH 332	ORGANIC CHEMISTRY II	3
CH 335	ORGANIC CHEMISTRY LAB I	1
CH 361	GENERAL BIOCHEMISTRY	3
CH 401	INORGANIC CHEMISTRY	3
Additional Requirements used in Various Concentrations		
CH 315	CHEMISTRY TEACHING METHODS	3
CH 336	ORGANIC CHEMISTRY LAB II	1
CH 337	ORGANIC CHEMISTRY LAB III	2
CH 341	PHYSICAL CHEMISTRY I	3
CH 342	PHYSICAL CHEMISTRY II	3
CH 345	EXPERIMENTAL PHYSICAL CHEM I	1
CH 346	EXPERIMENTAL PHYSICAL CHEM II	1
CH 347	BIOPHYSICAL CHEMISTRY I	3
CH 348	BIOPHYSICAL CHEMISTRY II	3
CH 362	GENERAL BIOCHEMISTRY LAB	1
CH 363	GEN BIOCHEMISTRY II	3
CH 364	GEN BIOCHEMISTRY LAB II	1
CH 402	INORGANIC CHEMISTRY LAB	1
CH 421	INSTRUMENTAL ANALYSIS	4
CH 435	CHEMICAL TOXICOLOGY	3
CH 440	POLYMER SYNTHESIS & CHARACTERI	3
CH 480	SELECTED TOPICS IN CHEM	1-3
Select one of the following:		
CH 491	INTRO TO CHEMICAL RESEARCH	
CH 492	INTRO TO CHEMICAL RESEARCH	
CH 493	INTRO TO CHEMICAL RESEARCH	
Required Ancillary Courses		
Ancillary course work required for the major. These courses may also satisfy Charger Foundation requirements or requirements for a minor if desired.		
BYS 119	PRINCIPLES OF BIOLOGY	4
BYS 120	ORGANISMAL BIOLOGY	4
MA 171	CALCULUS A	4
MA 172	CALCULUS B	4
PH 111	GEN PHYSICS W/CALCULUS I	3
PH 112	GEN PHYSICS W/CALC II	3

PH 114	GENERAL PHYSICS LAB I	1
PH 115	GENERAL PHYSICS LAB II	1
EH 301	TECHNICAL WRITING	3

Select one of the following:

CS 100	INTRO COMPUTERS & PROGRAM
CS 102	INTRO TO C PROGRAMMING
CS 103	INTRO PROGRAMMING USING JAVA
CS 121	COMPUTER SCIENCE I

Total Semester Hours

130-132

Chemistry, BS - Basic Chemistry Concentration

This curriculum meets the minimum university requirements for a major in chemistry.

Chemistry: Basic Chemistry Concentration, BS Requirements:

- All students are encouraged to see an advisor after completion of 24 credits.
- Chemistry, Basic Chemistry Concentration, BS degree requires 128 credit hours.
- 39 of 128 credit hours must be taken at 300 level or higher (39 credits includes courses taken at the 300+ level in major, minor (if chosen), Pre professional area and electives).
- 12 credit hours of 300 level and above must be taken in the major or 6 credit hours in the major and 6 credit hours in the minor (if chosen).
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- Unless otherwise noted a C- or better is required for all College of Science prerequisite courses.
- No more than 64 credit hours from a two-year college can be applied toward a UAH degree.
- For graduation application instructions, see here (p. 812).

Courses in organic chemistry completed at the junior college level may be used to satisfy semester hour and prerequisite requirements for upper level chemistry courses at UAH but do not count toward the 300-level requirements of the minor.

Degree Requirements

Charger Foundations Requirements

*Please see Area V for CoS requirements that can also be used to fulfill Charger Foundations Requirements.

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	

Humanities and Fine Arts

3-6

CM 113	Intro to Rhetorical Communication
WLC 101S	INTRO FOREIGN LANG I: SPANISH
or WLC 101A	INTRO FOREIGN LANG I: ARABIC
or WLC 101F	INTRO FOREIGN LANG I:FRENCH
or WLC 101G	INTRO FOREIGN LANG I:GERMAN
or WLC 101J	INTRO FOREIGN LANG I:JAPANESE
or WLC 101R	INTRO FOREIGN LANG I:RUSSIAN
WLC 102S	INTRO FOREIGN LANG II:SPANISH
or WLC 102A	INTRO FOREIGN LANG II: ARABIC
or WLC 102F	INTRO FOREIGN LANG II:FRENCH
or WLC 102G	INTRO FOREIGN LANG II:GERMAN
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN
WLC 201S	INTERM FOREIGN LANG:SPANISH
or WLC 201A	INTERM FOREIGN LANG I: ARABIC
or WLC 201F	INTERM FOREIGN LANG:FRENCH
or WLC 201G	INTERM FOREIGN LANG:GERMAN
or WLC 201J	INTERM FOREIGN LANG: JAPANESE
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN
WLC 202S	INTERM FOREIGN LANG II:SPANISH
or WLC 202A	INTERM FOREIGN LANG II: ARABIC
or WLC 202F	INTERM FOREIGN LANG II:FRENCH
or WLC 202G	INTERM FOREIGN LANG II:GERMAN
or WLC 202J	INTERM FORGN LANG II:JAPANESE
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN
WLC 204	INTERNATIONAL CINEMA
PHL 101	INTRODUCTION TO PHILOSOPHY
PHL 102	INTRO TO ETHICS
PHL 103	INTRODUCTION TO LOGIC
PHL 150	TECH, SCIENCE & HUMAN VALUES
WGS 200	INTRO WOMEN'S & GENDER STUDIES
AMS 229	ANCIENT & MEDIEVAL WORLDS
ARH 100	ARH SURV:ANCIENT-MEDIEVAL
ARH 101	ARH SURV:RENAISSANCE-MODERN
ARH 103	ARH SUR:NON-WESTERN TRADITIONS
ARS 160	DRAWING: FOUNDATIONS
TH 122	THEATRE APPRECIATION
TH 123	INTRO TO FILM STUDIES
MU 100	INTRO TO MUSIC LITERATURE

Area III: Mathematics and Sciences

11-12

Mathematics

3-4

MA 105	NATURE OF MATHEMATICS
MA 107	ALGEBRA WITH APPLICATIONS
MA 110	FINITE MATHEMATICS
MA 112	PRECALCULUS ALGEBRA
MA 113	PRECALCULUS TRIGONOMETRY
MA 115	PRECALCULUS ALGEBRA & TRIG
MA 120	MATH PROFESSIONAL APPLICATIONS
MA 171	CALCULUS A

Natural Sciences (Lab)

8

AST 100	SURVEY OF ASTRONOMY
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AST 106	EXPLORING THE COSMOS I
AST 107	EXPLORING THE COSMOS II
BYS 109	FUNDAMENTALS OF BIOLOGY
BYS 119	PRINCIPLES OF BIOLOGY
BYS 120	ORGANISMAL BIOLOGY
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB
ESS 103	ENVIRONMENTAL EARTH SCIENCE
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG
PH 100	CONCEPTUAL PHYSICS
PH 101	GENERAL PHYSICS I
PH 102	GENERAL PHYSICS II
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III

Area IV: History and Social and Behavioral Sciences***12**

History 3-6

HY 103	WORLD HISTORY TO 1500
HY 104	WORLD HISTORY SINCE 1500
HY 221	UNITED STATES TO 1877
HY 222	UNITED STATES SINCE 1877

Social and Behavioral Sciences 6-9

ECN 142	PRINC OF MACROECONOMICS
ECN 143	PRINC OF MICROECONOMICS
GS 200	GLOBAL SYSTEMS AND CULTURES
ESS 105	WORLD REGIONAL GEOGRAPHY
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY
PSC 101	INTRO TO AMERICAN GOVERNMENT
PSC 102	INTRO TO COMPARATIVE POLITICS
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS
PY 101	GENERAL PSYCHOLOGY I
PY 201	LIFE-SPAN DEVELOPMENT
SOC 100	INTRO TO SOCIOLOGY
SOC 102	ANALYSIS OF SOCIAL PROBLEMS
SOC 103	INTRO TO CRIMINOLOGY
SOC 105	INTRO CULTURAL ANTHROPOLOGY

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Take no more than six hours in a single discipline in Area II or Area IV.

Area V: Pre Professional Requirements

Code	Title	Semester Hours
Courses in this area may also be used to fulfill Charger Foundations requirements		
Communications		3
CM 113	Intro to Rhetorical Communication	
Biology		8
BYS 119 & 119L & 119R	PRINCIPLES OF BIOLOGY and LABORATORY and RECITATION	
BYS 120 & 120L & 120R	ORGANISMAL BIOLOGY and ORGANISMAL BIOLOGY LAB and RECITATION	
Calculus		8
MA 171	CALCULUS A	
MA 172	CALCULUS B	
Physics		8
PH 111 & PH 114 and	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
Computer Science: Choose one		3
CS 100 or CS 102 or CS 103 or CS 104	INTRO COMPUTERS & PROGRAM INTRO TO C PROGRAMMING INTRO PROGRAMMING USING JAVA INTRO TO CS USING PYTHON	
Technical Writing		3
EH 301	TECHNICAL WRITING	

Major Requirements

Code	Title	Semester Hours
Chemistry		25
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	
CH 223 & CH 224	QUANTITATIVE ANALYSIS and QUANTITATIVE ANALYSIS LAB	
CH 331 & CH 335	ORGANIC CHEMISTRY I and ORGANIC CHEMISTRY LAB I ⁵	
CH 332	ORGANIC CHEMISTRY II ⁵	
CH 361	GENERAL BIOCHEMISTRY	
CH 401	INORGANIC CHEMISTRY	
Basic Chemistry Courses		12
CH 336	ORGANIC CHEMISTRY LAB II ⁵	
CH 345	EXPERIMENTAL PHYSICAL CHEM I	
CH 421	INSTRUMENTAL ANALYSIS	
Choose one option:		
CH 341 & CH 342 OR	PHYSICAL CHEMISTRY I and PHYSICAL CHEMISTRY II	
CH 347 & CH 348	BIOPHYSICAL CHEMISTRY I and BIOPHYSICAL CHEMISTRY II	

Elective Requirements

Code	Title	Semester Hours
Elective Courses		31

Additional elective courses, 100+ level, to reach 128 credits. Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credits of 100 level HPE courses can count toward degree requirements.

Overall Requirements

Code	Title	Semester Hours
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All College of Science degrees must have at least 128 credits.

At least 39 of the 128 credits must be at the 300+ level. These may be taken in any area including electives.

Total Semester Hours	128
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- 1 Students must take one literature and one history course. Students must also take either a second literature or history course to complete a sequence. Acceptable Literature sequences must include one early literature (EH 207 or EH 242 or EH 209) and one later literature (EH 208 or EH 210). Acceptable history sequences are (HY 103 + HY 104), or (HY 221 + HY 222)
- 2 Based on Math placement (<http://www.uah.edu/science/departments/math/undergraduate-students/placement/>), prerequisite (MA 112 and/or MA 113) Mathematics courses may be required.
- 3 No more than 6 hours can be taken in a single discipline.
- 4 For choices see the World Languages and Cultures (p. 205) department.
- 5 Courses in organic chemistry completed at the 2-year college level may be used to satisfy semester hour and prerequisite requirements for upper level chemistry courses at UAH but do not count toward the 300-level requirements of the minor.

Sample four year plan for Chemistry, Basic Chemistry Concentration BS degree:

Note: This is only an example and variations are possible.

Year 1

Fall		Semester Hours
FYE 101S	CHARGER SUCCESS - SCIENCE	1
EH 101	COLLEGE WRITING I	3
MA 171	CALCULUS A	4
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	4
BYS 119 & 119L & 119R	PRINCIPLES OF BIOLOGY and LABORATORY and RECITATION	4
Term Semester Hours:		16
Spring		
EH 102	COLLEGE WRITING II	3
MA 172	CALCULUS B	4
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	4
BYS 120 & 120L & 120R	ORGANISMAL BIOLOGY and ORGANISMAL BIOLOGY LAB and RECITATION	4
Elective		1
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		16

Year 2

Fall		
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	4

CH 331 & CH 335 CM 113 Literature	ORGANIC CHEMISTRY I and ORGANIC CHEMISTRY LAB I Intro to Rhetorical Communication	4 3 3
See Requirements tab for approved list.		
Elective		2
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 HPE 100 level courses can count toward degree requirements.		
Term Semester Hours:		16
Spring		
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	4
CH 332 & CH 336	ORGANIC CHEMISTRY II and ORGANIC CHEMISTRY LAB II	4
CH 223 & CH 224	QUANTITATIVE ANALYSIS and QUANTITATIVE ANALYSIS LAB	4
Fine Art		3
See Requirements tab for approved list.		
Elective		1
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 HPE 100 level courses can count toward degree requirements.		
Term Semester Hours:		16
Year 3		
Fall		
CH 341 or CH 347	PHYSICAL CHEMISTRY I or BIOPHYSICAL CHEMISTRY I	3
CH 345	EXPERIMENTAL PHYSICAL CHEM I	1
History		3
See Requirements tab for approved list.		
Social and Behavioral science		3
See Requirements tab for approved list.		
Humanities, 2nd Fine art or 2nd Literature		3
See Requirements tab for approved list.		
Elective		3
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 HPE 100 level courses can count toward degree requirements.		
Term Semester Hours:		16
Spring		
CH 342 or CH 348	PHYSICAL CHEMISTRY II or BIOPHYSICAL CHEMISTRY II	3
CH 361	GENERAL BIOCHEMISTRY	3
CS 100 or CS 102 or CS 103 or CS 104	INTRO COMPUTERS PROGRAM or INTRO TO C PROGRAMMING or INTRO PROGRAMMING USING JAVA or INTRO TO CS USING PYTHON	3 3
Social and Behavioral science		3
See Requirements tab for approved list.		
History		3

See Requirements tab for approved list.

Elective 300+ level or higher course (ex: CH 362 or CH 346)	1
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Term Semester Hours:		16
Year 4		
Fall		
CH 401	INORGANIC CHEMISTRY	3
CH 421	INSTRUMENTAL ANALYSIS	4
Elective 300+ level or higher course		3
Elective 300+ level or higher course		3
Elective		3
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 HPE 100 level courses can count toward degree requirements.		
Term Semester Hours:		16
Spring		
EH 301	TECHNICAL WRITING	3
Elective 300+ level or higher course		3
Elective 300+ level or higher course (ex: CH 402)		1
Elective		3
Elective		3
Elective		3
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 HPE 100 level courses can count toward degree requirements.		
Term Semester Hours:		16
Total Semester Hours:		128

Chemistry, BS - Biochemistry Concentration

This concentration meets the requirements of the American Chemical Society for certification and serves as preparation for medical school, dental school, veterinary school, pharmacy school, graduate study in biochemistry or employment as a clinical chemist.

Chemistry: Biochemistry Concentration, BS Requirements:

- All students are encouraged to see an advisor after completion of 24 credits.
- Chemistry, Biochemistry Concentration, BS degree requires 128 credit hours.
- 39 of 128 credit hours must be taken at 300 level or higher (39 credits includes courses taken at the 300+ level in major, minor (if chosen), Pre professional area and electives).
- 12 credit hours of 300 level and above must be taken in the major or 6 credit hours in the major and 6 credit hours in the minor (if chosen).
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- Unless otherwise noted a C- or better is required for all College of Science prerequisite courses.
- No more than 64 credit hours from a two-year college can be applied toward a UAH degree.
- For graduation application instructions, see here (p. 812).
- Please see the Pre-Professional Advising Office (<http://www.uah.edu/ppa/>) for information about requirements for admission to specific professional schools.

Degree Requirements

Charger Foundations Requirements

*Please see Area V for CoS requirements that can also be used to fulfill Charger Foundations Requirements.

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S or WLC 101A or WLC 101F or WLC 101G or WLC 101J or WLC 101R	INTRO FOREIGN LANG I: SPANISH INTRO FOREIGN LANG I: ARABIC INTRO FOREIGN LANG I:FRENCH INTRO FOREIGN LANG I:GERMAN INTRO FOREIGN LANG I:JAPANESE INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S or WLC 102A or WLC 102F or WLC 102G or WLC 102J or WLC 102R	INTRO FOREIGN LANG II:SPANISH INTRO FOREIGN LANG II: ARABIC INTRO FOREIGN LANG II:FRENCH INTRO FOREIGN LANG II:GERMAN INTRO FOREIGN LANG II:JAPANESE INTRO FOREIGN LANG II:RUSSIAN	
WLC 201S or WLC 201A or WLC 201F or WLC 201G or WLC 201J or WLC 201R	INTERM FOREIGN LANG:SPANISH INTERM FOREIGN LANG I: ARABIC INTERM FOREIGN LANG:FRENCH INTERM FOREIGN LANG:GERMAN INTERM FOREIGN LANG: JAPANESE INTERM FOREIGN LANG:RUSSIAN	
WLC 202S or WLC 202A or WLC 202F or WLC 202G or WLC 202J or WLC 202R	INTERM FOREIGN LANG II:SPANISH INTERM FOREIGN LANG II: ARABIC INTERM FOREIGN LANG II:FRENCH INTERM FOREIGN LANG II:GERMAN INTERM FORGN LANG II:JAPANESE INTERM FOREIGN LANG II:RUSSIAN	
WLC 204	INTERNATIONAL CINEMA	
PHL 101	INTRODUCTION TO PHILOSOPHY	
PHL 102	INTRO TO ETHICS	

PHL 103	INTRODUCTION TO LOGIC
PHL 150	TECH, SCIENCE & HUMAN VALUES
WGS 200	INTRO WOMEN'S & GENDER STUDIES
AMS 229	ANCIENT & MEDIEVAL WORLDS
ARH 100	ARH SURV:ANCIENT-MEDIEVAL
ARH 101	ARH SURV:RENAISSANCE-MODERN
ARH 103	ARH SUR:NON-WESTERN TRADITIONS
ARS 160	DRAWING: FOUNDATIONS
TH 122	THEATRE APPRECIATION
TH 123	INTRO TO FILM STUDIES
MU 100	INTRO TO MUSIC LITERATURE

Area III: Mathematics and Sciences**11-12****Mathematics** **3-4**

MA 105	NATURE OF MATHEMATICS
MA 107	ALGEBRA WITH APPLICATIONS
MA 110	FINITE MATHEMATICS
MA 112	PRECALCULUS ALGEBRA
MA 113	PRECALCULUS TRIGONOMETRY
MA 115	PRECALCULUS ALGEBRA & TRIG
MA 120	MATH PROFESSIONAL APPLICATIONS
MA 171	CALCULUS A

Natural Sciences (Lab) **8**

AST 100	SURVEY OF ASTRONOMY
AST 106	EXPLORING THE COSMOS I
AST 107	EXPLORING THE COSMOS II
BYS 109	FUNDAMENTALS OF BIOLOGY
BYS 119	PRINCIPLES OF BIOLOGY
BYS 120	ORGANISMAL BIOLOGY
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB
ESS 103	ENVIRONMENTAL EARTH SCIENCE
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG
PH 100	CONCEPTUAL PHYSICS
PH 101	GENERAL PHYSICS I
PH 102	GENERAL PHYSICS II
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III

Area IV: History and Social and Behavioral Sciences***12****History** **3-6**

HY 103	WORLD HISTORY TO 1500
HY 104	WORLD HISTORY SINCE 1500
HY 221	UNITED STATES TO 1877

HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Sciences		6-9
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
ESS 105	WORLD REGIONAL GEOGRAPHY	
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS	
PY 101	GENERAL PSYCHOLOGY I	
PY 201	LIFE-SPAN DEVELOPMENT	
SOC 100	INTRO TO SOCIOLOGY	
SOC 102	ANALYSIS OF SOCIAL PROBLEMS	
SOC 103	INTRO TO CRIMINOLOGY	
SOC 105	INTRO CULTURAL ANTHROPOLOGY	

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Take no more than six hours in a single discipline in Area II or Area IV.

Area V: Pre Professional Requirements

Code	Title	Semester Hours
Courses in this area may also fulfill Charger Foundations requirements		
Communications		3
CM 113	Intro to Rhetorical Communication	
Calculus		8
MA 171	CALCULUS A	
MA 172	CALCULUS B	
Physics Sequence		8
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
Computer Programming - choose one:		3
CS 100	INTRO COMPUTERS & PROGRAM	
or CS 102	INTRO TO C PROGRAMMING	
or CS 103	INTRO PROGRAMMING USING JAVA	
or CS 104	INTRO TO CS USING PYTHON	
Technical Writing		3
EH 301	TECHNICAL WRITING	

Major Requirements

Code	Title	Semester Hours
Chemistry Core		25
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	
CH 223 & CH 224	QUANTITATIVE ANALYSIS and QUANTITATIVE ANALYSIS LAB	
CH 331 & CH 335	ORGANIC CHEMISTRY I and ORGANIC CHEMISTRY LAB I ⁵	

CH 332	ORGANIC CHEMISTRY II ⁵
CH 361	GENERAL BIOCHEMISTRY
CH 401	INORGANIC CHEMISTRY

Biochemistry Concentration Requirements **20-22**

CH 336	ORGANIC CHEMISTRY LAB II ⁵
CH 347 & CH 345	BIOPHYSICAL CHEMISTRY I and EXPERIMENTAL PHYSICAL CHEM I
CH 348 & CH 346	BIOPHYSICAL CHEMISTRY II and EXPERIMENTAL PHYSICAL CHEM II
CH 362	GENERAL BIOCHEMISTRY LAB
CH 363 & CH 364	GEN BIOCHEMISTRY II and GEN BIOCHEMISTRY LAB II
CH 402	INORGANIC CHEMISTRY LAB
CH 421	INSTRUMENTAL ANALYSIS
CH 491	INTRO TO CHEMICAL RESEARCH
or CH 492	INTRO TO CHEMICAL RESEARCH
or CH 493	INTRO TO CHEMICAL RESEARCH

Biology Minor Requirements (this minor is required for this concentration)

Code	Title	Semester Hours
Biology Minor Requirements		23-24

BYS 119	PRINCIPLES OF BIOLOGY
BYS 120	ORGANISMAL BIOLOGY
BYS 219	GENETICS AND EVOLUTION
BYS 300	CELL & DEVELOPMENTAL BIOLOGY
BYS 321	GENERAL MICROBIOLOGY I
Choose one	
BYS 430	IMMUNOLOGY
BYS 464	EVOLUTION

(Immunology is required for admission to many Pharmacy schools)

For a double major with Biology, count Biochemistry I and lab as Biology and add BYS 490 and 8 hours of Biology credit (BYS 313+ BYS 314 for example).

Elective Requirements

Code	Title	Semester Hours
Elective Courses		5-8

Additional elective courses, 100+ level, to reach 128 credits. Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credits of 100 level HPE courses can count toward degree requirements.

Overall Requirements

Code	Title	Semester Hours
All College of Science degrees must have at least 128 credits.		
At least 39 of the 128 credits must be at the 300+ level. These may be taken in any area including electives.		
Total Semester Hours		128

- ¹ Students must take one literature and one history course. Students must also take either a second literature or history course to complete a sequence. Acceptable Literature sequences must include one early literature (EH 207 or EH 242 or EH 209) and one later literature (EH 208 or EH 210). Acceptable history sequences are (HY 103 + HY 104), or (HY 221 + HY 222)
- ² Based on Math placement (<http://www.uah.edu/science/departments/math/undergraduate-students/placement/>), prerequisite (MA 112 and/or MA 113) Mathematics courses may be required.
- ³ No more than 6 hours can be taken in a single discipline.

⁴ For choices see the World Languages and Cultures (p. 205) department.

⁵ Courses in organic chemistry completed at the 2-year college level may be used to satisfy semester hour and prerequisite requirements for upper level chemistry courses at UAH but do not count toward the 300-level requirements of the major.

Sample four year plans for Chemistry, Biochemistry Concentration BS degree:

Note: This is only an example and variations are possible.

Year 1

Fall		Semester Hours
FYE 101S	CHARGER SUCCESS - SCIENCE	1
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	4
BYS 119 & 119L & 119R	PRINCIPLES OF BIOLOGY and LABORATORY and RECITATION	4
MA 171	CALCULUS A	4
EH 101	COLLEGE WRITING I	3
Term Semester Hours:		16
Spring		
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	4
BYS 120 & 120L & 120R	ORGANISMAL BIOLOGY and ORGANISMAL BIOLOGY LAB and RECITATION	4
MA 172	CALCULUS B	4
EH 102	COLLEGE WRITING II	3
Elective		1
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		16

Year 2

Fall		
CH 331 & CH 335	ORGANIC CHEMISTRY I and ORGANIC CHEMISTRY LAB I	4
BYS 219 & 219L & 219R	GENETICS AND EVOLUTION and LABORATORY and RECITATION	4
Fine Art		3
See Requirements tab for approved list.		
Literature		3
See Requirements tab for approved list.		
Social and Behavioral science		3
See Requirements tab for approved list.		
Term Semester Hours:		17
Spring		
CH 332 & CH 336	ORGANIC CHEMISTRY II and ORGANIC CHEMISTRY LAB II	4
BYS 300 & 300L	CELL & DEVELOPMENTAL BIOLOGY and CELL & DEVELOPMENT BIO LAB	4
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	4
Social and Behavioral science		3

See Requirements tab for approved list.

	Term Semester Hours:	15
Year 3		
Fall		
CH 361 & CH 362	GENERAL BIOCHEMISTRY and GENERAL BIOCHEMISTRY LAB	4
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	4
BYS 464	EVOLUTION	3
BYS 464 Fall only course or take BY 430 Immunology, Spring only course. One of these courses required for BY 430 minor.		
CM 113	Intro to Rhetorical Communication	3
History		3
See Requirements tab for approved list.		
	Term Semester Hours:	17
Spring		
CH 363 & CH 364	GEN BIOCHEMISTRY II and GEN BIOCHEMISTRY LAB II	4
BYS 321 & 321L	GENERAL MICROBIOLOGY I and LABORATORY	4
CH 223 & CH 224	QUANTITATIVE ANALYSIS and QUANTITATIVE ANALYSIS LAB	4
2nd History or 3rd Social and Behavioral science		3
See Requirements tab for approved list.		
	Term Semester Hours:	15
Year 4		
Fall		
CH 347 & CH 345	BIOPHYSICAL CHEMISTRY I and EXPERIMENTAL PHYSICAL CHEM I	4
CH 401	INORGANIC CHEMISTRY	3
CH 421	INSTRUMENTAL ANALYSIS	4
CS 100	INTRO COMPUTERS PROGRAM	3
or CS 102	or INTRO TO C PROGRAMMING	
or CS 103	or INTRO PROGRAMMING USING JAVA	
or CS 104	or INTRO TO CS USING PYTHON	
Humanities, 2nd Fine art or 2nd Literature		3
See Requirements tab for approved list.		
	Term Semester Hours:	17
Spring		
CH 348 & CH 346	BIOPHYSICAL CHEMISTRY II and EXPERIMENTAL PHYSICAL CHEM II	4
CH 402	INORGANIC CHEMISTRY LAB	1
CH 493	INTRO TO CHEMICAL RESEARCH	3
or CH 491	or INTRO TO CHEMICAL RESEARCH	
or CH 492	or INTRO TO CHEMICAL RESEARCH	
BYS 430	IMMUNOLOGY	4

This course required for BYS minor if BYS 464 not taken.

EH 301	TECHNICAL WRITING	3
Term Semester Hours:		15
Total Semester Hours:		128

Chemistry, BS - Chemical Business Concentration

This curriculum is designed to prepare a student to perform business functions in the chemical or pharmaceutical industry.

Chemistry: Chemical Business Concentration, BS Requirements:

- All students are encouraged to see an advisor after completion of 24 credits.
- Chemistry, Chemical Business Concentration, BS degree requires 128 credit hours.
- 39 of 128 credit hours must be taken at 300 level or higher (39 credits includes courses taken at the 300+ level in major, minor (if chosen), Pre professional area and electives).
- 12 credit hours of 300 level and above must be taken in the major or 6 credit hours in the major and 6 credit hours in the minor (if chosen).
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- Unless otherwise noted a C- or better is required for all College of Science prerequisite courses.
- No more than 64 credit hours from a two-year college can be applied toward a UAH degree.
- For graduation application instructions, see here (p. 812).

Degree Requirements

Charger Foundations Requirements

*Please see Area V for CoS requirements that can also be used to fulfill Charger Foundations Requirements.

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S or WLC 101A or WLC 101F or WLC 101G or WLC 101J	INTRO FOREIGN LANG I: SPANISH INTRO FOREIGN LANG I: ARABIC INTRO FOREIGN LANG I:FRENCH INTRO FOREIGN LANG I:GERMAN INTRO FOREIGN LANG I:JAPANESE	

or WLC 101R	INTRO FOREIGN LANG I:RUSSIAN
WLC 102S	INTRO FOREIGN LANG II:SPANISH
or WLC 102A	INTRO FOREIGN LANG II: ARABIC
or WLC 102F	INTRO FOREIGN LANG II:FRENCH
or WLC 102G	INTRO FOREIGN LANG II:GERMAN
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN
WLC 201S	INTERM FOREIGN LANG:SPANISH
or WLC 201A	INTERM FOREIGN LANG I: ARABIC
or WLC 201F	INTERM FOREIGN LANG:FRENCH
or WLC 201G	INTERM FOREIGN LANG:GERMAN
or WLC 201J	INTERM FOREIGN LANG: JAPANESE
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN
WLC 202S	INTERM FOREIGN LANG II:SPANISH
or WLC 202A	INTERM FOREIGN LANG II: ARABIC
or WLC 202F	INTERM FOREIGN LANG II:FRENCH
or WLC 202G	INTERM FOREIGN LANG II:GERMAN
or WLC 202J	INTERM FORGN LANG II:JAPANESE
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN
WLC 204	INTERNATIONAL CINEMA
PHL 101	INTRODUCTION TO PHILOSOPHY
PHL 102	INTRO TO ETHICS
PHL 103	INTRODUCTION TO LOGIC
PHL 150	TECH, SCIENCE & HUMAN VALUES
WGS 200	INTRO WOMEN'S & GENDER STUDIES
AMS 229	ANCIENT & MEDIEVAL WORLDS
ARH 100	ARH SURV:ANCIENT-MEDIEVAL
ARH 101	ARH SURV:RENAISSANCE-MODERN
ARH 103	ARH SUR:NON-WESTERN TRADITIONS
ARS 160	DRAWING: FOUNDATIONS
TH 122	THEATRE APPRECIATION
TH 123	INTRO TO FILM STUDIES
MU 100	INTRO TO MUSIC LITERATURE
Area III: Mathematics and Sciences	
Mathematics	
MA 105	NATURE OF MATHEMATICS
MA 107	ALGEBRA WITH APPLICATIONS
MA 110	FINITE MATHEMATICS
MA 112	PRECALCULUS ALGEBRA
MA 113	PRECALCULUS TRIGONOMETRY
MA 115	PRECALCULUS ALGEBRA & TRIG
MA 120	MATH PROFESSIONAL APPLICATIONS
MA 171	CALCULUS A
Natural Sciences (Lab)	
AST 100	SURVEY OF ASTRONOMY
AST 106	EXPLORING THE COSMOS I
AST 107	EXPLORING THE COSMOS II
BYS 109	FUNDAMENTALS OF BIOLOGY
BYS 119	PRINCIPLES OF BIOLOGY
BYS 120	ORGANISMAL BIOLOGY
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I

11-12

3-4

8

CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB	
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB	
ESS 103	ENVIRONMENTAL EARTH SCIENCE	
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG	
PH 100	CONCEPTUAL PHYSICS	
PH 101	GENERAL PHYSICS I	
PH 102	GENERAL PHYSICS II	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	
Area IV: History and Social and Behavioral Sciences*		12
History		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Sciences		6-9
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
ESS 105	WORLD REGIONAL GEOGRAPHY	
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS	
PY 101	GENERAL PSYCHOLOGY I	
PY 201	LIFE-SPAN DEVELOPMENT	
SOC 100	INTRO TO SOCIOLOGY	
SOC 102	ANALYSIS OF SOCIAL PROBLEMS	
SOC 103	INTRO TO CRIMINOLOGY	
SOC 105	INTRO CULTURAL ANTHROPOLOGY	

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Take no more than six hours in a single discipline in Area II or Area IV.

Area V: Pre Professional Requirements

Code	Title	Semester Hours
Courses in this area may also be used to fulfill Charger Foundations requirements		
Communications		3
CM 113	Intro to Rhetorical Communication	
Calculus		8
MA 171	CALCULUS A	
MA 172	CALCULUS B	
Biology		8

BYS 119 & 119L & 119R	PRINCIPLES OF BIOLOGY and LABORATORY and RECITATION	
BYS 120 & 120L & 120R	ORGANISMAL BIOLOGY and ORGANISMAL BIOLOGY LAB and RECITATION	
Physics		8
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
Computer Science: Choose one		3
CS 100 or CS 102 or CS 103 or CS 104	INTRO COMPUTERS & PROGRAM INTRO TO C PROGRAMMING INTRO PROGRAMMING USING JAVA INTRO TO CS USING PYTHON	
Technical Writing		3
EH 301	TECHNICAL WRITING	

Major Requirements

Code	Title	Semester Hours
Chemistry		25
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	
CH 223 & CH 224	QUANTITATIVE ANALYSIS and QUANTITATIVE ANALYSIS LAB	
CH 331 & CH 335	ORGANIC CHEMISTRY I and ORGANIC CHEMISTRY LAB I ⁵	
CH 332	ORGANIC CHEMISTRY II ⁵	
CH 361	GENERAL BIOCHEMISTRY	
CH 401	INORGANIC CHEMISTRY	
Chemical Business Courses		15
CH 336	ORGANIC CHEMISTRY LAB II ⁵	
CH 362	GENERAL BIOCHEMISTRY LAB	
CH 341 or CH 347	PHYSICAL CHEMISTRY I BIOPHYSICAL CHEMISTRY I	
CH 345	EXPERIMENTAL PHYSICAL CHEM I	
CH 402	INORGANIC CHEMISTRY LAB	
CH 421	INSTRUMENTAL ANALYSIS	

Business Minor Requirements (a Business minor is required for this concentration)

Code	Title	Semester Hours
Business Minor		22
Note: ECN 142 + ECN 143 may be used to fulfill Charger Foundations Social and Behavioral Science requirements.		
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
ACC 210	ACCOUNTING FOR BUSINESS	
MSC 287 or ISE 390 or MA 385	BUSINESS STATISTICS I PROB & ENGR STATISTICS I INTRO TO PROBABILITY & STATIST	

or PY 300	PSYCHOLOGICAL STATISTICS
or SOC 303	STATISTICS/SOCIAL SCIENCES
FIN 301	PRINCIPLES OF FINANCE
MGT 301	MANAGING ORGANIZATIONS
MKT 301	PRINCIPLES OF MARKETING

Elective Requirements

Code	Title	Semester Hours
Elective Courses		13

Additional elective courses, 100+ level, to reach 128 credits. Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credits of 100 level HPE courses can count toward degree requirements.

Overall Requirements

Code	Title	Semester Hours
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All College of Science degrees must have at least 128 credits.

At least 39 of the 128 credits must be at the 300+ level. These may be taken in any area including electives.

Total Semester Hours	128
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- Students must take one literature and one history course. Students must also take either a second literature or history course to complete a sequence. Acceptable Literature sequences must include one early literature (EH 207 or EH 242 or EH 209) and one later literature (EH 208 or EH 210). Acceptable history sequences are (HY 103 + HY 104), or (HY 221 + HY 222)
- Based on Math placement (<http://www.uah.edu/science/departments/math/undergraduate-students/placement/>), prerequisite (MA 112 and/or MA 113) Mathematics courses may be required.
- No more than 6 hours can be taken in a single discipline.
- For choices see the World Languages and Cultures (p. 205) department.
- Courses in organic chemistry completed at the 2-year college level may be used to satisfy semester hour and prerequisite requirements for upper level chemistry courses at UAH but do not count toward the 300-level requirements of the minor.

Sample four year plan for Chemistry, Chemical Business Concentration BS degree:

Note: This is only an example and variations are possible.

Year 1

Fall		Semester Hours
FYE 101S	CHARGER SUCCESS - SCIENCE	1
EH 101	COLLEGE WRITING I	3
MA 171	CALCULUS A	4
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	4
BYS 119 & 119L & 119R	PRINCIPLES OF BIOLOGY and LABORATORY and RECITATION	4
Term Semester Hours:		16
Spring		
EH 102	COLLEGE WRITING II	3
MA 172	CALCULUS B	4
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	4
BYS 120 & 120L & 120R	ORGANISMAL BIOLOGY and ORGANISMAL BIOLOGY LAB and RECITATION	4
Term Semester Hours:		15

Year 2

Fall

CH 331 & CH 335	ORGANIC CHEMISTRY I and ORGANIC CHEMISTRY LAB I	4
ECN 142	PRINC OF MACROECONOMICS	3
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	4
Fine art		3
See Requirements tab for approved list.		
Elective		2
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 HPE 100 level courses can count toward degree requirements.		
Term Semester Hours:		16
Spring		
CH 332 & CH 336	ORGANIC CHEMISTRY II and ORGANIC CHEMISTRY LAB II	4
CH 223 & CH 224	QUANTITATIVE ANALYSIS and QUANTITATIVE ANALYSIS LAB	4
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	4
ECN 143	PRINC OF MICROECONOMICS	3
Elective		1
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 HPE 100 level courses can count toward degree requirements.		
Term Semester Hours:		16
Year 3		
Fall		
CH 341 or CH 347	PHYSICAL CHEMISTRY I or BIOPHYSICAL CHEMISTRY I	3
CH 345	EXPERIMENTAL PHYSICAL CHEM I	1
MSC 287	BUSINESS STATISTICS I	3
Literature		3
See Requirements tab for approved list.		
History		3
See Requirements tab for approved list.		
Elective		3
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		16
Spring		
CH 361 & CH 362	GENERAL BIOCHEMISTRY and GENERAL BIOCHEMISTRY LAB	4
ACC 210	ACCOUNTING FOR BUSINESS	4
CM 113	Intro to Rhetorical Communication	3
Humanities, 2nd Fine art or 2nd Literature		3
See Requirements tab for approved list.		
2nd History or 3rd Social and Behavioral science		3
See Requirements tab for approved list.		
Term Semester Hours:		17

Year 4**Fall**

CH 401	INORGANIC CHEMISTRY	3
CH 421	INSTRUMENTAL ANALYSIS	4
EH 301	TECHNICAL WRITING	3
MKT 301	PRINCIPLES OF MARKETING	3
CS 100	INTRO COMPUTERS PROGRAM	3
or CS 102	or INTRO TO C PROGRAMMING	
or CS 103	or INTRO PROGRAMMING USING JAVA	
or CS 104	or INTRO TO CS USING PYTHON	

Term Semester Hours:	16
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Spring

CH 402	INORGANIC CHEMISTRY LAB	1
MGT 301	MANAGING ORGANIZATIONS	3
FIN 301	PRINCIPLES OF FINANCE	3
Elective 300+ level or higher course		3
Elective		3
Elective		3

Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 HPE 100 level courses can count toward degree requirements.

Term Semester Hours:	16
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Total Semester Hours:	128
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Chemistry, BS - Chemical Education Concentration

This concentration meets the requirements of the American Chemical Society for certification and meets the requirements for an Alabama Class B High School Teacher's Certificate.

Chemistry: Chemical Education Concentration, BS Requirements:

- All students are encouraged to see an advisor after completion of 24 credits.
- Chemistry, Chemical Education Concentration, BS degree requires 140 credit hours.
- 39 of 128 credit hours must be taken at 300 level or higher (39 credits includes courses taken at the 300+ level in major, minor (if chosen), Pre professional area and electives).
- 12 credit hours of 300 level and above must be taken in the major or 6 credit hours in the major and 6 credit hours in the minor (if chosen).
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- Unless otherwise noted a C- or better is required for all College of Science prerequisite courses.
- No more than 64 credit hours from a two-year college can be applied toward a UAH degree.
- For graduation application instructions, see here (p. 812).

Degree Requirements

Charger Foundations Requirements

*Please see Area V for CoS requirements that can also be used to fulfill Charger Foundations Requirements.

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101	COLLEGE WRITING I	
or EH 101S	COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3

ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S	INTRO FOREIGN LANG I: SPANISH	
or WLC 101A	INTRO FOREIGN LANG I: ARABIC	
or WLC 101F	INTRO FOREIGN LANG I:FRENCH	
or WLC 101G	INTRO FOREIGN LANG I:GERMAN	
or WLC 101J	INTRO FOREIGN LANG I:JAPANESE	
or WLC 101R	INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S	INTRO FOREIGN LANG II:SPANISH	
or WLC 102A	INTRO FOREIGN LANG II: ARABIC	
or WLC 102F	INTRO FOREIGN LANG II:FRENCH	
or WLC 102G	INTRO FOREIGN LANG II:GERMAN	
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE	
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN	
WLC 201S	INTERM FOREIGN LANG:SPANISH	
or WLC 201A	INTERM FOREIGN LANG I: ARABIC	
or WLC 201F	INTERM FOREIGN LANG:FRENCH	
or WLC 201G	INTERM FOREIGN LANG:GERMAN	
or WLC 201J	INTERM FOREIGN LANG: JAPANESE	
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN	
WLC 202S	INTERM FOREIGN LANG II:SPANISH	
or WLC 202A	INTERM FOREIGN LANG II: ARABIC	
or WLC 202F	INTERM FOREIGN LANG II:FRENCH	
or WLC 202G	INTERM FOREIGN LANG II:GERMAN	
or WLC 202J	INTERM FORGN LANG II:JAPANESE	
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN	
WLC 204	INTERNATIONAL CINEMA	
PHL 101	INTRODUCTION TO PHILOSOPHY	
PHL 102	INTRO TO ETHICS	
PHL 103	INTRODUCTION TO LOGIC	
PHL 150	TECH, SCIENCE & HUMAN VALUES	
WGS 200	INTRO WOMEN'S & GENDER STUDIES	
AMS 229	ANCIENT & MEDIEVAL WORLDS	
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	

MU 100	INTRO TO MUSIC LITERATURE	
Area III: Mathematics and Sciences		11-12
Mathematics		3-4
MA 105	NATURE OF MATHEMATICS	
MA 107	ALGEBRA WITH APPLICATIONS	
MA 110	FINITE MATHEMATICS	
MA 112	PRECALCULUS ALGEBRA	
MA 113	PRECALCULUS TRIGONOMETRY	
MA 115	PRECALCULUS ALGEBRA & TRIG	
MA 120	MATH PROFESSIONAL APPLICATIONS	
MA 171	CALCULUS A	
Natural Sciences (Lab)		8
AST 100	SURVEY OF ASTRONOMY	
AST 106	EXPLORING THE COSMOS I	
AST 107	EXPLORING THE COSMOS II	
BYS 109	FUNDAMENTALS OF BIOLOGY	
BYS 119	PRINCIPLES OF BIOLOGY	
BYS 120	ORGANISMAL BIOLOGY	
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I	
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB	
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB	
ESS 103	ENVIRONMENTAL EARTH SCIENCE	
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG	
PH 100	CONCEPTUAL PHYSICS	
PH 101	GENERAL PHYSICS I	
PH 102	GENERAL PHYSICS II	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	
Area IV: History and Social and Behavioral Sciences*		12
History		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Sciences		6-9
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
ESS 105	WORLD REGIONAL GEOGRAPHY	
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS	

PY 101	GENERAL PSYCHOLOGY I
PY 201	LIFE-SPAN DEVELOPMENT
SOC 100	INTRO TO SOCIOLOGY
SOC 102	ANALYSIS OF SOCIAL PROBLEMS
SOC 103	INTRO TO CRIMINOLOGY
SOC 105	INTRO CULTURAL ANTHROPOLOGY

Area V: Pre Professional Requirements

Code	Title	Semester Hours
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Courses in this area may also be used to fulfill Charger Foundations requirements

Communications	3
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CM 113	Intro to Rhetorical Communication
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Biology	8
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BYS 119 & 119L & 119R	PRINCIPLES OF BIOLOGY and LABORATORY and RECITATION
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BYS 120 & 120L & 120R	ORGANISMAL BIOLOGY and ORGANISMAL BIOLOGY LAB and RECITATION
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Calculus	8
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MA 171	CALCULUS A
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MA 172	CALCULUS B
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Physics	8
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PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I
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and

PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II
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Psychology (required to enter the Education Program)	6
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PY 101	GENERAL PSYCHOLOGY I
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PY 201	LIFE-SPAN DEVELOPMENT
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Computer Science: Choose one	3
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CS 100	INTRO COMPUTERS & PROGRAM
or CS 102	INTRO TO C PROGRAMMING
or CS 103	INTRO PROGRAMMING USING JAVA
or CS 104	INTRO TO CS USING PYTHON

Technical Writing	3
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EH 301	TECHNICAL WRITING
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Major Requirements

Code	Title	Semester Hours
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Chemistry	25
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CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I
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CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II
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CH 223 & CH 224	QUANTITATIVE ANALYSIS and QUANTITATIVE ANALYSIS LAB
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CH 331 & CH 335	ORGANIC CHEMISTRY I and ORGANIC CHEMISTRY LAB I ⁵
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CH 332	ORGANIC CHEMISTRY II
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CH 361	GENERAL BIOCHEMISTRY
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CH 401	INORGANIC CHEMISTRY	
Chemical Education Courses		13-14
CH 315	CHEMISTRY TEACHING METHODS	
CH 341	PHYSICAL CHEMISTRY I	
or CH 347	BIOPHYSICAL CHEMISTRY I	
CH 345	EXPERIMENTAL PHYSICAL CHEM I	
Choose one:		3
CH 342	PHYSICAL CHEMISTRY II	
CH 348	BIOPHYSICAL CHEMISTRY II	
CH 363	GEN BIOCHEMISTRY II	
CH 421	INSTRUMENTAL ANALYSIS	
Choose at least 3 credits from:		3
CH 336	ORGANIC CHEMISTRY LAB II ⁵	
CH 346	EXPERIMENTAL PHYSICAL CHEM II	
CH 362	GENERAL BIOCHEMISTRY LAB	
CH 364	GEN BIOCHEMISTRY LAB II	
CH 402	INORGANIC CHEMISTRY LAB	
CH 421	INSTRUMENTAL ANALYSIS	

Education Certification Requirements

Code	Title	Semester Hours
Education courses		40
ED 301	INTRO TO EDUCATION PRACTICUM	
ED 307	MULTICULTURAL FND EDUCATION	
ED 308	EDUCATIONAL PSYCHOLOGY	
EDC 301	TCHG THE EXCEPTIONAL CHILD	
EDC 311	INSTR STRATEGIES INCLUSIVE CLR	
ED 410	FOUNDATIONS EDUC EVALUAT	
ED 423	TCHNG SCIENCE MID & SEC SCH I	
ED 350	TECHNOLOGY IN CLASSROOM	
ED 309	CLASSROOM & BEHAVIOR MGMT	
ED 408	TCHG READING/CONTENT AREA	
ED 497	HIGH SCHOOL INTERNSHIP	

Overall Requirements

Code	Title	Semester Hours
All College of Science degrees must have at least 128 credits.		
At least 39 of the 128 credits must be at the 300+ level. These may be taken in any area including electives.		
Total Semester Hours		128

- ¹ Students must take one literature and one history course. Students must also take either a second literature or history course to complete a sequence. Acceptable Literature sequences must include one early literature (EH 207 or EH 242 or EH 209) and one later literature (EH 208 or EH 210). Acceptable history sequences are (HY 103 + HY 104), or (HY 221 + HY 222)
- ² Based on Math placement (<http://www.uah.edu/science/departments/math/undergraduate-students/placement/>), prerequisite (MA 112 and/or MA 113) Mathematics courses may be required.
- ³ No more than 6 hours can be taken in a single discipline.
- ⁴ For choices see the World Languages and Cultures (p. 205) department.
- ⁵ Courses in organic chemistry completed at the 2-year college level may be used to satisfy semester hour and prerequisite requirements for upper level chemistry courses at UAH but do not count toward the 300-level requirements of the minor.

Sample four year plan for Chemistry, Chemical Education Concentration BS degree:

Note: This is only an example and variations are possible.

Year 1

Fall		Semester Hours
FYE 101S	CHARGER SUCCESS - SCIENCE	1
EH 101	COLLEGE WRITING I	3
MA 171	CALCULUS A	4
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	4
BYS 119 & 119L & 119R	PRINCIPLES OF BIOLOGY and LABORATORY and RECITATION	4
Term Semester Hours:		16
Spring		
EH 102	COLLEGE WRITING II	3
MA 172	CALCULUS B	4
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	4
BYS 120 & 120L & 120R	ORGANISMAL BIOLOGY and ORGANISMAL BIOLOGY LAB and RECITATION	4
Term Semester Hours:		15

Year 2

Fall		
CH 331 & CH 335	ORGANIC CHEMISTRY I and ORGANIC CHEMISTRY LAB I	4
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	4
PY 101	GENERAL PSYCHOLOGY I	3
CM 113	Intro to Rhetorical Communication	3
Fine art		3
See Requirements tab for approved list.		
Term Semester Hours:		17
Spring		
CH 332 & CH 336	ORGANIC CHEMISTRY II and ORGANIC CHEMISTRY LAB II	4
CH 223 & CH 224	QUANTITATIVE ANALYSIS and QUANTITATIVE ANALYSIS LAB	4
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	4
PY 201	LIFE-SPAN DEVELOPMENT	3
Term Semester Hours:		15

Year 3

Fall		
CH 347 & CH 345	BIOPHYSICAL CHEMISTRY I and EXPERIMENTAL PHYSICAL CHEM I	4
CH 401	INORGANIC CHEMISTRY	3
History		3
See Requirements tab for approved list.		
Literature		3
See Requirements tab for approved list.		
Term Semester Hours:		13

Spring

CH 348 & CH 346	BIOPHYSICAL CHEMISTRY II and EXPERIMENTAL PHYSICAL CHEM II	4
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CH 361 & CH 362	GENERAL BIOCHEMISTRY and GENERAL BIOCHEMISTRY LAB	4
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2nd History or 3rd Social and Behavioral science		3
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See Requirements tab for approved list.

Humanities, 2nd Fine art or 2nd Literature		3
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See Requirements tab for approved list.

Term Semester Hours:	14
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Year 4**Fall**

ED 301	INTRO TO EDUCATION PRACTICUM	1
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ED 307	MULTICULTURAL FND EDUCATION	3
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ED 308	EDUCATIONAL PSYCHOLOGY	3
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EDC 301	TCHG THE EXCEPTIONAL CHILD	3
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EDC 311	INSTR STRATEGIES INCLUSIVE CLR	3
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Term Semester Hours:	13
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Spring

ED 410	FOUNDATIONS EDUC EVALUAT	3
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ED 423	TCHNG SCIENCE MID SEC SCH I	3
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ED 350 or ED 309	TECHNOLOGY IN CLASSROOM or CLASSROOM & BEHAVIOR MGMT	3
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CS 100 or CS 102 or CS 103	INTRO COMPUTERS PROGRAM or INTRO TO C PROGRAMMING or INTRO PROGRAMMING USING JAVA	3
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or CS 104	or INTRO TO CS USING PYTHON	
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Term Semester Hours:	12
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Fifth Year**Fall**

ED 408	TCHG READING/CONTENT AREA	3
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ED 350 or ED 309	TECHNOLOGY IN CLASSROOM or CLASSROOM & BEHAVIOR MGMT	3
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CH 315	CHEMISTRY TEACHING METHODS	3
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EH 301	TECHNICAL WRITING	3
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Term Semester Hours:	12
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Spring

ED 497	HIGH SCHOOL INTERNSHIP	12
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Term Semester Hours:	12
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Total Semester Hours:	139
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Chemistry, BS - Chemical Physics Concentration

This concentration meets the requirements of the American Chemical Society for certification and is designed for students interested in physicochemical phenomena of atoms, molecules, and condensed matter.

Chemistry: Chemical Physics Concentration, BS Requirements:

- All students are encouraged to see an advisor after completion of 24 credits.
- Chemistry, Chemical Physics Concentration, BS degree requires 128 credit hours.
- 39 of 128 credit hours must be taken at 300 level or higher (39 credits includes courses taken at the 300+ level in major, minor (if chosen), Pre professional area and electives).
- 12 credit hours of 300 level and above must be taken in the major or 6 credit hours in the major and 6 credit hours in the minor (if chosen).
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- Unless otherwise noted a C- or better is required for all College of Science prerequisite courses.
- No more than 64 credit hours from a two-year college can be applied toward a UAH degree.
- For graduation application instructions, see here (p. 812).

Degree Requirements

Charger Foundations Requirements

*Please see Area V for CoS requirements that can also be used to fulfill Charger Foundations Requirements.

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S or WLC 101A or WLC 101F or WLC 101G or WLC 101J or WLC 101R	INTRO FOREIGN LANG I: SPANISH INTRO FOREIGN LANG I: ARABIC INTRO FOREIGN LANG I:FRENCH INTRO FOREIGN LANG I:GERMAN INTRO FOREIGN LANG I:JAPANESE INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S or WLC 102A or WLC 102F	INTRO FOREIGN LANG II:SPANISH INTRO FOREIGN LANG II: ARABIC INTRO FOREIGN LANG II:FRENCH	

or WLC 102G	INTRO FOREIGN LANG II:GERMAN
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN
WLC 201S	INTERM FOREIGN LANG:SPANISH
or WLC 201A	INTERM FOREIGN LANG I: ARABIC
or WLC 201F	INTERM FOREIGN LANG:FRENCH
or WLC 201G	INTERM FOREIGN LANG:GERMAN
or WLC 201J	INTERM FOREIGN LANG: JAPANESE
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN
WLC 202S	INTERM FOREIGN LANG II:SPANISH
or WLC 202A	INTERM FOREIGN LANG II: ARABIC
or WLC 202F	INTERM FOREIGN LANG II:FRENCH
or WLC 202G	INTERM FOREIGN LANG II:GERMAN
or WLC 202J	INTERM FORGN LANG II:JAPANESE
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN
WLC 204	INTERNATIONAL CINEMA
PHL 101	INTRODUCTION TO PHILOSOPHY
PHL 102	INTRO TO ETHICS
PHL 103	INTRODUCTION TO LOGIC
PHL 150	TECH, SCIENCE & HUMAN VALUES
WGS 200	INTRO WOMEN'S & GENDER STUDIES
AMS 229	ANCIENT & MEDIEVAL WORLDS
ARH 100	ARH SURV:ANCIENT-MEDIEVAL
ARH 101	ARH SURV:RENAISSANCE-MODERN
ARH 103	ARH SUR:NON-WESTERN TRADITIONS
ARS 160	DRAWING: FOUNDATIONS
TH 122	THEATRE APPRECIATION
TH 123	INTRO TO FILM STUDIES
MU 100	INTRO TO MUSIC LITERATURE
Area III: Mathematics and Sciences	
Mathematics	
MA 105	NATURE OF MATHEMATICS
MA 107	ALGEBRA WITH APPLICATIONS
MA 110	FINITE MATHEMATICS
MA 112	PRECALCULUS ALGEBRA
MA 113	PRECALCULUS TRIGONOMETRY
MA 115	PRECALCULUS ALGEBRA & TRIG
MA 120	MATH PROFESSIONAL APPLICATIONS
MA 171	CALCULUS A
Natural Sciences (Lab)	
AST 100	SURVEY OF ASTRONOMY
AST 106	EXPLORING THE COSMOS I
AST 107	EXPLORING THE COSMOS II
BYS 109	FUNDAMENTALS OF BIOLOGY
BYS 119	PRINCIPLES OF BIOLOGY
BYS 120	ORGANISMAL BIOLOGY
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II

11-12

3-4

8

CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB
ESS 103	ENVIRONMENTAL EARTH SCIENCE
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG
PH 100	CONCEPTUAL PHYSICS
PH 101	GENERAL PHYSICS I
PH 102	GENERAL PHYSICS II
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III

Area IV: History and Social and Behavioral Sciences* **12**

History **3-6**

HY 103	WORLD HISTORY TO 1500
HY 104	WORLD HISTORY SINCE 1500
HY 221	UNITED STATES TO 1877
HY 222	UNITED STATES SINCE 1877

Social and Behavioral Sciences **6-9**

ECN 142	PRINC OF MACROECONOMICS
ECN 143	PRINC OF MICROECONOMICS
GS 200	GLOBAL SYSTEMS AND CULTURES
ESS 105	WORLD REGIONAL GEOGRAPHY
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY
PSC 101	INTRO TO AMERICAN GOVERNMENT
PSC 102	INTRO TO COMPARATIVE POLITICS
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS
PY 101	GENERAL PSYCHOLOGY I
PY 201	LIFE-SPAN DEVELOPMENT
SOC 100	INTRO TO SOCIOLOGY
SOC 102	ANALYSIS OF SOCIAL PROBLEMS
SOC 103	INTRO TO CRIMINOLOGY
SOC 105	INTRO CULTURAL ANTHROPOLOGY

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Take no more than six hours in a single discipline in Area II or Area IV.

Area V: Pre Professional Requirements

Code	Title	Semester Hours
Courses in this area may also be used to fulfill Charger Foundations requirements		
Communications		3
CM 113	Intro to Rhetorical Communication	
Biology		8
BYS 119 & 119L & 119R	PRINCIPLES OF BIOLOGY and LABORATORY and RECITATION	
BYS 120 & 120L & 120R	ORGANISMAL BIOLOGY and ORGANISMAL BIOLOGY LAB and RECITATION	
Math		18
MA 171	CALCULUS A	
MA 172	CALCULUS B	

MA 201	CALCULUS C
MA 238	APPL DIFFERENTIAL EQUATIONS
MA 244	INTRO TO LINEAR ALGEBRA

Physics 18

(Note: take one additional 300+ Physics course (3 cr.) if a PH minor is desired.) 10

PH 110	FRONTIERS IN SCIENCE
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III
PH 499	PHYSICS PRACTICUM

Computer Science: Choose one 3

CS 100	INTRO COMPUTERS & PROGRAM
or CS 102	INTRO TO C PROGRAMMING
or CS 103	INTRO PROGRAMMING USING JAVA
or CS 104	INTRO TO CS USING PYTHON

Technical Writing 3

EH 301	TECHNICAL WRITING
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Major Requirements

Code	Title	Semester Hours
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Chemistry 25

CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I
CH 223 & CH 224	QUANTITATIVE ANALYSIS and QUANTITATIVE ANALYSIS LAB
CH 331 & CH 335	ORGANIC CHEMISTRY I and ORGANIC CHEMISTRY LAB I ⁵
CH 332	ORGANIC CHEMISTRY II ⁵
CH 361	GENERAL BIOCHEMISTRY
CH 401	INORGANIC CHEMISTRY

Chemical Physics Courses 16-18

CH 336	ORGANIC CHEMISTRY LAB II ⁵
CH 341 & CH 345	PHYSICAL CHEMISTRY I and EXPERIMENTAL PHYSICAL CHEM I
CH 342 & CH 346	PHYSICAL CHEMISTRY II and EXPERIMENTAL PHYSICAL CHEM II
CH 362	GENERAL BIOCHEMISTRY LAB
CH 402	INORGANIC CHEMISTRY LAB
CH 421	INSTRUMENTAL ANALYSIS
CH 491 or CH 492 or CH 493	INTRO TO CHEMICAL RESEARCH INTRO TO CHEMICAL RESEARCH INTRO TO CHEMICAL RESEARCH

Elective Requirements

Code	Title	Semester Hours
Elective Courses		5-7

Additional elective courses, 100+ level, to reach 128 credits. Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credits of 100 level HPE courses can count toward degree requirements.

Overall Requirements

Code	Title	Semester Hours
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All College of Science degrees must have at least 128 credits.

At least 39 of the 128 credits must be at the 300+ level. These may be taken in any area including electives.

- Students must take one literature and one history course. Students must also take either a second literature or history course to complete a sequence. Acceptable Literature sequences must include one early literature (EH 207 or EH 242 or EH 209) and one later literature (EH 208 or EH 210). Acceptable history sequences are (HY 103 + HY 104), or (HY 221 + HY 222)
- Based on Math placement (<http://www.uah.edu/science/departments/math/undergraduate-students/placement/>), prerequisite (MA 112 and/or MA 113) Mathematics courses may be required.
- No more than 6 hours can be taken in a single discipline.
- For choices see the World Languages and Cultures (p. 205) department.
- Courses in organic chemistry completed at the 2-year college level may be used to satisfy semester hour and prerequisite requirements for upper level chemistry courses at UAH but do not count toward the 300-level requirements of the minor.

Sample four year plan for Chemistry, Chemical Physics Concentration BS degree:

Note: This is only an example and variations are possible.

Year 1

Fall		Semester Hours
FYE 101S	CHARGER SUCCESS - SCIENCE	1
EH 101	COLLEGE WRITING I	3
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	4
MA 171	CALCULUS A	4
PH 110	FRONTIERS IN SCIENCE	3
Fine art		3
See Requirements tab for approved list.		
Term Semester Hours:		18

Spring

EH 102	COLLEGE WRITING II	3
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	4
MA 172	CALCULUS B	4
BYS 119 & 119L & 119R	PRINCIPLES OF BIOLOGY and LABORATORY and RECITATION	4
Term Semester Hours:		15

Year 2

Fall		
CH 331 & CH 335	ORGANIC CHEMISTRY I and ORGANIC CHEMISTRY LAB I	4
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	4
MA 201	CALCULUS C	4

BYS 120 & 120L & 120R	ORGANISMAL BIOLOGY and ORGANISMAL BIOLOGY LAB and RECITATION	4
Term Semester Hours:		16
Spring		
CH 332 & CH 336	ORGANIC CHEMISTRY II and ORGANIC CHEMISTRY LAB II	4
CH 223 & CH 224	QUANTITATIVE ANALYSIS and QUANTITATIVE ANALYSIS LAB	4
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	4
MA 238	APPL DIFFERENTIAL EQUATIONS	3
Term Semester Hours:		15
Year 3		
Fall		
CH 341 & CH 345	PHYSICAL CHEMISTRY I and EXPERIMENTAL PHYSICAL CHEM I	4
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	4
MA 244	INTRO TO LINEAR ALGEBRA	3
CS 100	INTRO COMPUTERS PROGRAM	3
or CS 102	or INTRO TO C PROGRAMMING	
or CS 103	or INTRO PROGRAMMING USING JAVA	
or CS 104	or INTRO TO CS USING PYTHON	
Social and Behavioral science		3
See Requirements tab for approved list.		
Term Semester Hours:		17
Spring		
CH 342 & CH 346	PHYSICAL CHEMISTRY II and EXPERIMENTAL PHYSICAL CHEM II	4
CH 361 & CH 362	GENERAL BIOCHEMISTRY and GENERAL BIOCHEMISTRY LAB	4
PH 251	SPECIAL RELATIVITY	1
CM 113	Intro to Rhetorical Communication	3
Social and Behavioral science		3
See Requirements tab for approved list.		
Term Semester Hours:		15
Year 4		
Fall		
CH 401	INORGANIC CHEMISTRY	3
CH 421	INSTRUMENTAL ANALYSIS	4
PH 300+ level or higher course		3
EH 301	TECHNICAL WRITING	3
History		3
See Requirements tab for approved list.		
Term Semester Hours:		16
Spring		
CH 402	INORGANIC CHEMISTRY LAB	1
CH 493	INTRO TO CHEMICAL RESEARCH	3

or CH 491	or INTRO TO CHEMICAL RESEARCH	
or CH 492	or INTRO TO CHEMICAL RESEARCH	
PH 300+ level or higher course		3
Literature		3
See Requirements tab for approved list.		
2nd History or 3rd Social and Behavioral science		3
See Requirements tab for approved list.		
Humanities, 2nd Fine art or 2nd Literature		3
See Requirements tab for approved list.		
Term Semester Hours:		16
Total Semester Hours:		128

Chemistry, BS - Environmental Chemistry Concentration

This concentration meets the requirements of the American Chemical Society for certification and is designed for students interested in the sources, transport, reactions, effects, and fates of chemicals in the atmospheric, soil, and aquatic environments.

Chemistry: Environmental Chemistry Concentration, BS Requirements:

- All students are encouraged to see an advisor after completion of 24 credits.
- Chemistry, Environmental Chemistry Concentration, BS degree requires 128 credit hours.
- 39 of 128 credit hours must be taken at 300 level or higher (39 credits includes courses taken at the 300+ level in major, minor (if chosen), Pre professional area and electives).
- 12 credit hours of 300 level and above must be taken in the major or 6 credit hours in the major and 6 credit hours in the minor (if chosen).
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- Unless otherwise noted a C- or better is required for all College of Science prerequisite courses.
- No more than 64 credit hours from a two-year college can be applied toward a UAH degree.
- For graduation application instructions, see here (p. 812).

Degree Requirements

Charger Foundations Requirements

*Please see Area V for CoS requirements that can also be used to fulfill Charger Foundations Requirements.

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	

EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S	INTRO FOREIGN LANG I: SPANISH	
or WLC 101A	INTRO FOREIGN LANG I: ARABIC	
or WLC 101F	INTRO FOREIGN LANG I:FRENCH	
or WLC 101G	INTRO FOREIGN LANG I:GERMAN	
or WLC 101J	INTRO FOREIGN LANG I:JAPANESE	
or WLC 101R	INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S	INTRO FOREIGN LANG II:SPANISH	
or WLC 102A	INTRO FOREIGN LANG II: ARABIC	
or WLC 102F	INTRO FOREIGN LANG II:FRENCH	
or WLC 102G	INTRO FOREIGN LANG II:GERMAN	
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE	
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN	
WLC 201S	INTERM FOREIGN LANG:SPANISH	
or WLC 201A	INTERM FOREIGN LANG I: ARABIC	
or WLC 201F	INTERM FOREIGN LANG:FRENCH	
or WLC 201G	INTERM FOREIGN LANG:GERMAN	
or WLC 201J	INTERM FOREIGN LANG: JAPANESE	
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN	
WLC 202S	INTERM FOREIGN LANG II:SPANISH	
or WLC 202A	INTERM FOREIGN LANG II: ARABIC	
or WLC 202F	INTERM FOREIGN LANG II:FRENCH	
or WLC 202G	INTERM FOREIGN LANG II:GERMAN	
or WLC 202J	INTERM FORGN LANG II:JAPANESE	
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN	
WLC 204	INTERNATIONAL CINEMA	
PHL 101	INTRODUCTION TO PHILOSOPHY	
PHL 102	INTRO TO ETHICS	
PHL 103	INTRODUCTION TO LOGIC	
PHL 150	TECH, SCIENCE & HUMAN VALUES	
WGS 200	INTRO WOMEN'S & GENDER STUDIES	
AMS 229	ANCIENT & MEDIEVAL WORLDS	
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Area III: Mathematics and Sciences		11-12
Mathematics		3-4
MA 105	NATURE OF MATHEMATICS	
MA 107	ALGEBRA WITH APPLICATIONS	
MA 110	FINITE MATHEMATICS	
MA 112	PRECALCULUS ALGEBRA	
MA 113	PRECALCULUS TRIGONOMETRY	
MA 115	PRECALCULUS ALGEBRA & TRIG	

MA 120	MATH PROFESSIONAL APPLICATIONS	
MA 171	CALCULUS A	
Natural Sciences (Lab)		8
AST 100	SURVEY OF ASTRONOMY	
AST 106	EXPLORING THE COSMOS I	
AST 107	EXPLORING THE COSMOS II	
BYS 109	FUNDAMENTALS OF BIOLOGY	
BYS 119	PRINCIPLES OF BIOLOGY	
BYS 120	ORGANISMAL BIOLOGY	
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I	
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB	
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB	
ESS 103	ENVIRONMENTAL EARTH SCIENCE	
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG	
PH 100	CONCEPTUAL PHYSICS	
PH 101	GENERAL PHYSICS I	
PH 102	GENERAL PHYSICS II	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	
Area IV: History and Social and Behavioral Sciences*		12
History		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Sciences		6-9
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
ESS 105	WORLD REGIONAL GEOGRAPHY	
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS	
PY 101	GENERAL PSYCHOLOGY I	
PY 201	LIFE-SPAN DEVELOPMENT	
SOC 100	INTRO TO SOCIOLOGY	
SOC 102	ANALYSIS OF SOCIAL PROBLEMS	
SOC 103	INTRO TO CRIMINOLOGY	
SOC 105	INTRO CULTURAL ANTHROPOLOGY	

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Take no more than six hours in a single discipline in Area II or Area IV.

Area V: Pre Professional Requirements

Code	Title	Semester Hours
Courses in this area may also be used to fulfill Charger Foundations requirements		
Communications		3
CM 113	Intro to Rhetorical Communication	
Calculus		12
MA 171	CALCULUS A	
MA 172	CALCULUS B	
MA 201	CALCULUS C	
Biology:		8
BYS 119 & 119L & 119R	PRINCIPLES OF BIOLOGY and LABORATORY and RECITATION	
BYS 120 & 120L & 120R	ORGANISMAL BIOLOGY and ORGANISMAL BIOLOGY LAB and RECITATION	
Earth System Science		20
ESS 103 & 103L	ENVIRONMENTAL EARTH SCIENCE and LABORATORY	
ESS 111 & 111L	WEATHER, CLIMATE & GLOBAL CHNG and LABORATORY	
ESS 301	INTRO TO EARTH & ATMOSPHERIC PHYS	
ESS 305	HYDROLOGY	
ESS 321	POLLUTION PROBLEMS	
ESS 420	INTRO ATMOSPHERIC CHEM & AIR POLLU	
Physics		8
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
Computer Science: Choose one		3
CS 100 or CS 102 or CS 103 or CS 104	INTRO COMPUTERS & PROGRAM INTRO TO C PROGRAMMING INTRO PROGRAMMING USING JAVA INTRO TO CS USING PYTHON	
Technical Writing		3
EH 301	TECHNICAL WRITING	

Major Requirements

Code	Title	Semester Hours
Chemistry		25
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	
CH 223 & CH 224	QUANTITATIVE ANALYSIS and QUANTITATIVE ANALYSIS LAB	
CH 331 & CH 335	ORGANIC CHEMISTRY I and ORGANIC CHEMISTRY LAB I ⁵	
CH 332	ORGANIC CHEMISTRY II ⁵	
CH 361	GENERAL BIOCHEMISTRY	
CH 401	INORGANIC CHEMISTRY	

Environmental Chemistry Courses**16-18**

CH 336	ORGANIC CHEMISTRY LAB II ⁵
CH 341 & CH 345	PHYSICAL CHEMISTRY I and EXPERIMENTAL PHYSICAL CHEM I
CH 342 & CH 346	PHYSICAL CHEMISTRY II and EXPERIMENTAL PHYSICAL CHEM II
CH 362	GENERAL BIOCHEMISTRY LAB
CH 402	INORGANIC CHEMISTRY LAB
CH 421	INSTRUMENTAL ANALYSIS
CH 491 or CH 492 or CH 493	INTRO TO CHEMICAL RESEARCH INTRO TO CHEMICAL RESEARCH INTRO TO CHEMICAL RESEARCH

Elective Requirements

Code	Title	Semester Hours
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Elective Courses**1-3**

Additional elective courses, 100+ level, to reach 128 credits. Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credits of 100 level HPE courses can count toward degree requirements.

Overall Requirements

Code	Title	Semester Hours
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All College of Science degrees must have at least 128 credits.

At least 39 of the 128 credits must be at the 300+ level. These may be taken in any area including electives.

Total Semester Hours**128**

- Students must take one literature and one history course. Students must also take either a second literature or history course to complete a sequence. Acceptable Literature sequences must include one early literature (EH 207 or EH 242 or EH 209) and one later literature (EH 208 or EH 210). Acceptable history sequences are (HY 103 + HY 104), or (HY 221 + HY 222)
- Based on Math placement (<http://www.uah.edu/science/departments/math/undergraduate-students/placement/>), prerequisite (MA 112 and/or MA 113) Mathematics courses may be required.
- No more than 6 hours can be taken in a single discipline.
- For choices see the World Languages and Cultures (p. 205) department.
- Courses in organic chemistry completed at the 2-year college level may be used to satisfy semester hour and prerequisite requirements for upper level chemistry courses at UAH but do not count toward the 300-level requirements of the minor.

Year 1

Fall		Semester Hours
FYE 101S	CHARGER SUCCESS - SCIENCE	1
EH 101	COLLEGE WRITING I	3
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	4
MA 171	CALCULUS A	4
BYS 119 & 119L & 119R	PRINCIPLES OF BIOLOGY and LABORATORY and RECITATION	4
Term Semester Hours:		16
Spring		
EH 102	COLLEGE WRITING II	3
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	4
MA 172	CALCULUS B	4

BYS 120 & 120L & 120R	ORGANISMAL BIOLOGY and ORGANISMAL BIOLOGY LAB and RECITATION	4
Term Semester Hours:		15
Year 2		
Fall		
CH 331 & CH 335	ORGANIC CHEMISTRY I and ORGANIC CHEMISTRY LAB I	4
ESS 103 & 103L	ENVIRONMENTAL EARTH SCIENCE and LABORATORY	4
MA 201	CALCULUS C	4
CS 102 or CS 103	INTRO TO C PROGRAMMING or INTRO PROGRAMMING USING JAVA	3
or CS 104	or INTRO TO CS USING PYTHON	
Term Semester Hours:		15
Spring		
CH 332 & CH 336	ORGANIC CHEMISTRY II and ORGANIC CHEMISTRY LAB II	4
CH 223 & CH 224	QUANTITATIVE ANALYSIS and QUANTITATIVE ANALYSIS LAB	4
ESS 111 & 111L	WEATHER, CLIMATE & GLOBAL CHNG and LABORATORY	4
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	4
Term Semester Hours:		16
Year 3		
Fall		
CH 341 & CH 345	PHYSICAL CHEMISTRY I and EXPERIMENTAL PHYSICAL CHEM I	4
CH 361 & CH 362	GENERAL BIOCHEMISTRY and GENERAL BIOCHEMISTRY LAB	4
ESS 209	DATA ANALYSIS TOOLS	2
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	4
Fine art		3
See Requirements tab for approved list.		
Term Semester Hours:		17
Spring		
CH 342 & CH 346	PHYSICAL CHEMISTRY II and EXPERIMENTAL PHYSICAL CHEM II	4
ESS 301	INTRO TO EARTH ATMOSPHERIC PHYS	3
ESS 305	HYDROLOGY	3
Literature		3
See Requirements tab for approved list.		
Social and Behavioral science		3
See Requirements tab for approved list.		
Term Semester Hours:		16
Year 4		

Fall

CH 401	INORGANIC CHEMISTRY	3
CH 421	INSTRUMENTAL ANALYSIS	4
ESS 321	POLLUTION PROBLEMS	3
Humanities, 2nd Fine art or 2nd Literature		3
See Requirements tab for approved list.		
History		3
See Requirements tab for approved list.		

Term Semester Hours:	16
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Spring

CH 402	INORGANIC CHEMISTRY LAB	1
CH 491	INTRO TO CHEMICAL RESEARCH	1
or CH 492	or INTRO TO CHEMICAL RESEARCH	
or CH 493	or INTRO TO CHEMICAL RESEARCH	
ESS 420	INTRO ATMOSP CHEM AIR POLLU	3
EH 301	TECHNICAL WRITING	3
CM 113	Intro to Rhetorical Communication	3
Social and Behavioral science		3
See Requirements tab for approved list.		
2nd History or 3rd Social and Behavioral science		3
See Requirements tab for approved list.		

Term Semester Hours:	17
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Total Semester Hours:	128
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Chemistry, BS - Forensics Chemistry Concentration

This concentration meets the requirements of the American Chemical Society for certification and is designed for a student who plans to do graduate work in forensics chemistry or a related science or desires a forensics science position.

Chemistry: Forensics Chemistry Concentration, BS Requirements:

- Chemistry, Forensics Chemistry Concentration, BS degree requires 128 credit hours.
- 39 of 128 credit hours must be taken at 300 level or higher (39 credits includes courses taken at the 300+ level in major, minor (if chosen), Pre professional area and electives).
- 12 credit hours of 300 level and above must be taken in the major--or 6 credit hours in the major and 6 credit hours in the minor (if chosen).
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- No more than 64 credit hours from a two-year college can be applied toward a UAH degree.
- For graduation application instructions, see here (p. 812).

Degree Requirements

Code	Title	Semester Hours
Freshman Composition		6
EH 101	COLLEGE WRITING I	
EH 102	COLLEGE WRITING II	
Humanities and Fine Arts		12
Fine Arts: Choose one		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
TH 122	THEATRE APPRECIATION	

ARS 160	DRAWING: FOUNDATIONS	
MU 100	INTRO TO MUSIC LITERATURE	
Literature: Choose one		3
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
Speech		3
CM 113	Intro to Rhetorical Communication	
Humanities or 2nd Fine Art or 2nd Literature: Choose one		3
PHL 101	INTRODUCTION TO PHILOSOPHY	
PHL 102	INTRO TO ETHICS	
PHL 150	TECH, SCIENCE & HUMAN VALUES	
PHL 103	INTRODUCTION TO LOGIC	
Any 100 or 200 level Foreign Language ⁴		
WLC 204	INTERNATIONAL CINEMA	
WGS 200	INTRO WOMEN'S & GENDER STUDIES	
2nd Literature ¹		
2nd Fine Art		
Mathematics and Sciences		12
Mathematics: ²		4
MA 171	CALCULUS A	
Natural Sciences: Physics		8
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
and		
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
History and Social and Behavioral Sciences		12
History: Choose one ¹		3
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Sciences: Choose two		6
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
SOC 100	INTRO TO SOCIOLOGY	
SOC 102	ANALYSIS OF SOCIAL PROBLEMS	
SOC 105	INTRO CULTURAL ANTHROPOLOGY	
PY 101	GENERAL PSYCHOLOGY I	
PY 201	LIFE-SPAN DEVELOPMENT	
2nd History or 3rd Social and Behavioral Science: Choose one ³		3
2nd History ¹		
3rd Social and Behavioral Science ³		
Pre Professional		10
Computer Science: Choose one		3
CS 100	INTRO COMPUTERS & PROGRAM	
CS 102	INTRO TO C PROGRAMMING	
CS 103	INTRO PROGRAMMING USING JAVA	

Technical Writing		3
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EH 301	TECHNICAL WRITING	
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Additional Required Mathematics		4
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MA 172	CALCULUS B	
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Code	Title	Semester Hours
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Chemistry		25
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CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
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CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	
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CH 223 & CH 224	QUANTITATIVE ANALYSIS and QUANTITATIVE ANALYSIS LAB	
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CH 331 & CH 335	ORGANIC CHEMISTRY I and ORGANIC CHEMISTRY LAB I	
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CH 332	ORGANIC CHEMISTRY II	
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CH 361	GENERAL BIOCHEMISTRY	
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CH 401	INORGANIC CHEMISTRY	
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Forensics Courses		20-22
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CH 336	ORGANIC CHEMISTRY LAB II	
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CH 347 & CH 345	BIOPHYSICAL CHEMISTRY I and EXPERIMENTAL PHYSICAL CHEM I	
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CH 348 & CH 346	BIOPHYSICAL CHEMISTRY II and EXPERIMENTAL PHYSICAL CHEM II	
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CH 362	GENERAL BIOCHEMISTRY LAB	
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CH 363 & CH 364	GEN BIOCHEMISTRY II and GEN BIOCHEMISTRY LAB II	
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CH 402	INORGANIC CHEMISTRY LAB	
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CH 421	INSTRUMENTAL ANALYSIS	
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CH 491	INTRO TO CHEMICAL RESEARCH	
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or CH 492	INTRO TO CHEMICAL RESEARCH	
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or CH 493	INTRO TO CHEMICAL RESEARCH	
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Biology Minor		23-24
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BYS 119	PRINCIPLES OF BIOLOGY	
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BYS 120	ORGANISMAL BIOLOGY	
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BYS 219	GENETICS AND EVOLUTION	
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BYS 300	CELL & DEVELOPMENTAL BIOLOGY	
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BYS 321	GENERAL MICROBIOLOGY I	
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BYS 430 or BYS 543	IMMUNOLOGY MOLECULAR BIOLOGY OF THE CELL	
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Elective Courses		5-7
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	Additional Elective courses 100+ level to reach 128 credit hours. Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 HPE 100 level courses can count towards degree requirements.	
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Total Semester Hours		128
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¹ Students must take one literature and one history course. Students must also take either a second literature or history course to complete a sequence. (EH 207 + EH 208, EH 209 + EH 210, HY 103 + HY 104, or HY 221 + HY 222)

² Based on Math placement (<http://www.uah.edu/science/departments/math/undergraduate-students/placement/>), prerequisite (MA 112 and/or MA 113) Mathematics courses may be required.

³ No more than 6 hours can be taken in a single discipline.

⁴ For choices see the World Languages and Cultures (p. 205) department.

Sample four year plan for Chemistry, Forensics Concentration BS degree:

Note: This is only an example and variations are possible.

Year 1

Fall		Semester Hours
FYE 101	CHARGER SUCCESS	1
EH 101	COLLEGE WRITING I	3
MA 171	CALCULUS A	4
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	4
BYS 119	PRINCIPLES OF BIOLOGY	4
Term Semester Hours:		16
Spring		
EH 102	COLLEGE WRITING II	3
MA 172	CALCULUS B	4
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	4
BYS 120	ORGANISMAL BIOLOGY	4
Elective		1
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 HPE 100 level courses can count toward degree requirements.		
Term Semester Hours:		16

Year 2

Fall		
CH 331 & CH 335	ORGANIC CHEMISTRY I and ORGANIC CHEMISTRY LAB I	4
CH 223 & CH 224	QUANTITATIVE ANALYSIS and QUANTITATIVE ANALYSIS LAB	4
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	4
Literature		3
See Requirements tab for approved list.		
Term Semester Hours:		15
Spring		
CH 332 & CH 336	ORGANIC CHEMISTRY II and ORGANIC CHEMISTRY LAB II	4
BYS 219	GENETICS AND EVOLUTION	4
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	4
CM 113	Intro to Rhetorical Communication	3
Term Semester Hours:		15

Year 3

Fall		
CH 347 & CH 345	BIOPHYSICAL CHEMISTRY I and EXPERIMENTAL PHYSICAL CHEM I	4
CH 361 & CH 362	GENERAL BIOCHEMISTRY and GENERAL BIOCHEMISTRY LAB	4
BYS 300	CELL DEVELOPMENTAL BIOLOGY	4
History		3
See Requirements tab for approved list.		
Elective		1

Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 HPE 100 level courses can count toward degree requirements.

	Term Semester Hours:	16
Spring		
CH 348 & CH 346	BIOPHYSICAL CHEMISTRY II and EXPERIMENTAL PHYSICAL CHEM II	4
CH 363 & CH 364	GEN BIOCHEMISTRY II and GEN BIOCHEMISTRY LAB II	4
BYS 321	GENERAL MICROBIOLOGY I	4
Social/Behavioral Science		3
See Requirements tab for approved list.		
Elective		1
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 HPE 100 level courses can count toward degree requirements.		
	Term Semester Hours:	16
Year 4		
Fall		
CH 401	INORGANIC CHEMISTRY	3
CH 421	INSTRUMENTAL ANALYSIS	4
CS 100	INTRO COMPUTERS PROGRAM	3
or CS 102	or INTRO TO C PROGRAMMING	
or CS 103	or INTRO PROGRAMMING USING JAVA	
BYS 430	IMMUNOLOGY (or Fine Art)	4
Social/Behavioral Science		3
See Requirements tab for approved list.		
	Term Semester Hours:	17
Spring		
CH 402	INORGANIC CHEMISTRY LAB	1
EH 301	TECHNICAL WRITING	3
CH 493	INTRO TO CHEMICAL RESEARCH	3
or CH 491	or INTRO TO CHEMICAL RESEARCH	
or CH 492	or INTRO TO CHEMICAL RESEARCH	
BYS 543	MOLECULAR BIOLOGY OF THE CELL (or Fine Art)	3
Literature/Humanities/Fine Art		3
History or Social/Behavioral Science		3
See Requirements tab for approved list.		
Elective		1
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 HPE 100 level courses can count toward degree requirements.		
	Term Semester Hours:	17
	Total Semester Hours:	128

Chemistry, BS - Materials Chemistry Concentration

This concentration meets the requirements of the American Chemical Society for certification and is designed for students who want to pursue graduate studies or employment in materials chemistry.

Chemistry: Materials Chemistry Concentration, BS Requirements:

- Chemistry, Materials Chemistry Concentration, BS degree requires 128 credit hours.
- 39 of 128 credit hours must be taken at 300 level or higher (39 credits includes courses taken at the 300+ level in major, minor (if chosen), Pre professional area and electives).
- 12 credit hours of 300 level and above must be taken in the major--or 6 credit hours in the major and 6 credit hours in the minor (if chosen).
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- No more than 64 credit hours from a two-year college can be applied toward a UAH degree.
- For graduation application instructions, see here (p. 812).

Degree Requirements

Code	Title	Semester Hours
Freshman Composition		6
EH 101	COLLEGE WRITING I	
EH 102	COLLEGE WRITING II	
Humanities and Fine Arts		12
Fine Arts: Choose one		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
TH 122	THEATRE APPRECIATION	
ARS 160	DRAWING: FOUNDATIONS	
MU 100	INTRO TO MUSIC LITERATURE	
Literature: Choose one		3
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
Speech		3
CM 113	Intro to Rhetorical Communication	
Humanities or 2nd Fine Art or 2nd Literature: Choose one		3
PHL 101	INTRODUCTION TO PHILOSOPHY	
PHL 102	INTRO TO ETHICS	
PHL 103	INTRODUCTION TO LOGIC	
PHL 150	TECH, SCIENCE & HUMAN VALUES	
Any 100 or 200 level Foreign Language ⁴		
WLC 204	INTERNATIONAL CINEMA	
WGS 200	INTRO WOMEN'S & GENDER STUDIES	
2nd Literature ¹		
2nd Fine Art		
Mathematics and Sciences		12
Mathematics: ²		4
MA 171	CALCULUS A	
Natural Sciences: Physics		8
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
and		
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
History and Social and Behavioral Sciences		12
History: Choose one ¹		3
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	

Social and Behavioral Sciences: Choose two		6
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
SOC 100	INTRO TO SOCIOLOGY	
SOC 102	ANALYSIS OF SOCIAL PROBLEMS	
SOC 105	INTRO CULTURAL ANTHROPOLOGY	
PY 101	GENERAL PSYCHOLOGY I	
PY 201	LIFE-SPAN DEVELOPMENT	
2nd History or 3rd Social and Behavioral Science: Choose one ³		3
2nd History ¹		
3rd Social and Behavioral Science ³		
Pre Professional		39
Computer Science: Choose one		3
CS 100	INTRO COMPUTERS & PROGRAM	
CS 102	INTRO TO C PROGRAMMING	
CS 103	INTRO PROGRAMMING USING JAVA	
Technical Writing		3
EH 301	TECHNICAL WRITING	
Additional Required Biology		8
BYS 119	PRINCIPLES OF BIOLOGY	
BYS 120	ORGANISMAL BIOLOGY	
Additional Required Mathematics		14
MA 172	CALCULUS B	
MA 201	CALCULUS C	
MA 238	APPL DIFFERENTIAL EQUATIONS	
MA 244	INTRO TO LINEAR ALGEBRA	
Additional Required Physics		4
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	
Additional Required Chemical Engineering		
CHE 294 & CHE 295	NATURE & PROPERTIES OF MATLS and NATURE & PROPERTIES MATLS LAB	
CHE 494	APPLIED MATERIALS ENGINEERING	
Code	Title	Semester Hours
Chemistry		25
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	
CH 223 & CH 224	QUANTITATIVE ANALYSIS and QUANTITATIVE ANALYSIS LAB	
CH 331 & CH 335	ORGANIC CHEMISTRY I and ORGANIC CHEMISTRY LAB I	
CH 332	ORGANIC CHEMISTRY II	
CH 361	GENERAL BIOCHEMISTRY	
CH 401	INORGANIC CHEMISTRY	
Materials Chemistry Courses		
CH 336	ORGANIC CHEMISTRY LAB II	

CH 341 & CH 345	PHYSICAL CHEMISTRY I and EXPERIMENTAL PHYSICAL CHEM I
CH 342 & CH 346	PHYSICAL CHEMISTRY II and EXPERIMENTAL PHYSICAL CHEM II
CH 362	GENERAL BIOCHEMISTRY LAB
CH 402	INORGANIC CHEMISTRY LAB
CH 421	INSTRUMENTAL ANALYSIS
CH 440	POLYMER SYNTHESIS & CHARACTERI
CH 491	INTRO TO CHEMICAL RESEARCH
or CH 492	INTRO TO CHEMICAL RESEARCH
or CH 493	INTRO TO CHEMICAL RESEARCH

Elective Courses	1-3
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Elective course 300+ level, 0-1 credit

Additional elective courses, 100+ level, 0-2 credits. Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credits of 100 level HPE courses can count toward degree requirements.

Total Semester Hours	128
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- 1 Students must take one literature and one history course. Students must also take either a second literature or history course to complete a sequence. (EH 207 + EH 208, EH 209 + EH 210, HY 103 + HY 104, or HY 221 + HY 222)
- 2 Based on Math placement (<http://www.uah.edu/science/departments/math/undergraduate-students/placement/>), prerequisite (MA 112 and/or MA 113) Mathematics courses may be required.
- 3 No more than 6 hours can be taken in a single discipline.
- 4 For choices see the World Languages and Cultures (p. 205) department.

Chemistry, BS - Pre-Pharmacy Concentration

Chemistry-biological sciences program designed to prepare students for admission to pharmacy doctorate or pharmacology Ph.D. graduate programs. This major meets all of the requirements for admission to Auburn or Samford pharmacy schools.

Chemistry: Prepharmacy Concentration, BS Requirements:

- Chemistry, Prepharmacy Concentration, BS degree requires 128 credit hours.
- 39 of 128 credit hours must be taken at 300 level or higher (39 credits includes courses taken at the 300+ level in major, minor (if chosen), Pre professional area and electives).
- 12 credit hours of 300 level and above must be taken in the major--or 6 credit hours in the major and 6 credit hours in the minor (if chosen).
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- No more than 64 credit hours from a two-year college can be applied toward a UAH degree.
- For graduation application instructions, see here (p. 812).

Degree Requirements

Code	Title	Semester Hours
Freshman Composition		6
EH 101	COLLEGE WRITING I	
EH 102	COLLEGE WRITING II	
Humanities and Fine Arts		12
Fine Arts: Choose one		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
TH 122	THEATRE APPRECIATION	
ARS 160	DRAWING: FOUNDATIONS	
MU 100	INTRO TO MUSIC LITERATURE	
Literature: Choose one		3
EH 207	READINGS LITERATURE/CULTURE I	

EH 208	READINGS LITERATURE/CULTURE 2	
Speech		3
CM 113	Intro to Rhetorical Communication	
Humanities/2nd Fine Art/2nd Literature: Choose one		3
PHL 101	INTRODUCTION TO PHILOSOPHY	
PHL 102	INTRO TO ETHICS	
PHL 103	INTRODUCTION TO LOGIC	
PHL 150	TECH, SCIENCE & HUMAN VALUES	
Any 100 or 200 level Foreign Language ⁴		
WLC 204	INTERNATIONAL CINEMA	
WGS 200	INTRO WOMEN'S & GENDER STUDIES	
2nd Literature ¹		
2nd Fine Art		
Mathematics and Sciences		12
Mathematics: ²		4
MA 171	CALCULUS A	
Natural Sciences: Physics		8
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
and		
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
History and Social and Behavioral Sciences		12
History: Choose one ¹		3
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Sciences: Choose two		6
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
SOC 100	INTRO TO SOCIOLOGY	
SOC 102	ANALYSIS OF SOCIAL PROBLEMS	
SOC 105	INTRO CULTURAL ANTHROPOLOGY	
PY 101	GENERAL PSYCHOLOGY I	
PY 201	LIFE-SPAN DEVELOPMENT	
2nd History or 3rd Social and Behavioral Science: Choose one ³		3
2nd History ¹		
3rd Social and Behavioral Science ³		
Pre Professional		13
Computer Science: Choose one		3
CS 100	INTRO COMPUTERS & PROGRAM	
CS 102	INTRO TO C PROGRAMMING	
CS 103	INTRO PROGRAMMING USING JAVA	
Technical Writing		3
EH 301	TECHNICAL WRITING	
Additional Required Mathematics		7

ST/MA 281	ELEMENTS OF STAT ANALYSIS
MA 172	CALCULUS B

Code	Title	Semester Hours
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Chemistry		25
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CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II
CH 223 & CH 224	QUANTITATIVE ANALYSIS and QUANTITATIVE ANALYSIS LAB
CH 331 & CH 335	ORGANIC CHEMISTRY I and ORGANIC CHEMISTRY LAB I ⁵
CH 332	ORGANIC CHEMISTRY II ⁵
CH 361	GENERAL BIOCHEMISTRY
CH 401	INORGANIC CHEMISTRY

Pre-Pharmacy Courses		13
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CH 336	ORGANIC CHEMISTRY LAB II ⁵
CH 347 & CH 345	BIOPHYSICAL CHEMISTRY I and EXPERIMENTAL PHYSICAL CHEM I
CH 348 & CH 346	BIOPHYSICAL CHEMISTRY II and EXPERIMENTAL PHYSICAL CHEM II
CH 362	GENERAL BIOCHEMISTRY LAB
CH 402	INORGANIC CHEMISTRY LAB
CH 421	INSTRUMENTAL ANALYSIS

Biology Double Major		34
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BYS/CH 361 will fulfill requirements for both majors

BYS 119	PRINCIPLES OF BIOLOGY
BYS 120	ORGANISMAL BIOLOGY
BYS 219	GENETICS AND EVOLUTION
BYS 300	CELL & DEVELOPMENTAL BIOLOGY
BYS 490	SENIOR CAPSTONE
BYS 313	ANATOMY & PHYSIOLOGY I
BYS 314	ANATOMY & PHYSIOLOGY II
BYS 321	GENERAL MICROBIOLOGY I
BYS/CH 361	GENERAL BIOCHEMISTRY
BYS 430	IMMUNOLOGY

Electives	
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Additional Elective courses 100+ level, 1 credit to reach 128 credit hours. Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 HPE 100 level courses can count towards degree requirements.

Total Semester Hours	128
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- ¹ Students must take one literature and one history course. Students must also take either a second literature or history course to complete a sequence. (EH 207 + EH 208, EH 209 + EH 210, HY 103 + HY 104, or HY 221 + HY 222)
- ² Based on Math placement (<http://www.uah.edu/science/departments/math/undergraduate-students/placement/>), prerequisite (MA 112 and/or MA 113) Mathematics courses may be required.
- ³ No more than 6 hours can be taken in a single discipline.
- ⁴ For choices see the World Languages and Cultures (p. 205) department.
- ⁵ Courses in organic chemistry completed at the junior college level may be used to satisfy semester hour and prerequisite requirements for upper level chemistry courses at UAH but do not count toward the 300-level requirements of the minor.

Sample four year plan for Chemistry, Pre-Pharmacy Concentration BS degree:

Note: This is only an example and variations are possible.

Year 1

Fall		Semester Hours
FYE 101	CHARGER SUCCESS	1
EH 101	COLLEGE WRITING I	3
MA 171	CALCULUS A	4
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	4
BYS 119	PRINCIPLES OF BIOLOGY	4
Term Semester Hours:		16

Spring

EH 102	COLLEGE WRITING II	3
MA 172	CALCULUS B	4
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	4
BYS 120	ORGANISMAL BIOLOGY	4
Term Semester Hours:		15

Year 2

Fall		
CH 331 & CH 335	ORGANIC CHEMISTRY I and ORGANIC CHEMISTRY LAB I	4
CH 223 & CH 224	QUANTITATIVE ANALYSIS and QUANTITATIVE ANALYSIS LAB	4
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	4
Fine Art		3
See Requirements tab for approved list.		
Term Semester Hours:		15

Spring

CH 332 & CH 336	ORGANIC CHEMISTRY II and ORGANIC CHEMISTRY LAB II	4
BYS 219	GENETICS AND EVOLUTION	4
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	4
ST 281	ELEMENTS OF STAT ANALYSIS	3
CM 113	Intro to Rhetorical Communication	3
Term Semester Hours:		18

Year 3

Fall		
CH 347 & CH 345	BIOPHYSICAL CHEMISTRY I and EXPERIMENTAL PHYSICAL CHEM I	4
BYS 300	CELL DEVELOPMENTAL BIOLOGY	4
BYS 313	ANATOMY PHYSIOLOGY I	4
Literature		3
History		3
See Requirements tab for approved list.		
Term Semester Hours:		18

Spring

CH 348 & CH 346	BIOPHYSICAL CHEMISTRY II and EXPERIMENTAL PHYSICAL CHEM II	4
CH 361 & CH 362	GENERAL BIOCHEMISTRY and GENERAL BIOCHEMISTRY LAB	4

BYS 321	GENERAL MICROBIOLOGY I	4
BYS 314	ANATOMY PHYSIOLOGY II	4
Term Semester Hours:		16
Year 4		
Fall		
CH 401	INORGANIC CHEMISTRY	3
CH 421	INSTRUMENTAL ANALYSIS	4
BYS 430	IMMUNOLOGY	4
Literature/Fine Art/Humanities		3
Social/Behavioral Science		3
See Requirements tab for approved list.		
Term Semester Hours:		17
Spring		
CH 402	INORGANIC CHEMISTRY LAB	1
BYS 490	SENIOR CAPSTONE	2
EH 301	TECHNICAL WRITING	3
CS 100	INTRO COMPUTERS PROGRAM	3
or CS 102	or INTRO TO C PROGRAMMING	
or CS 103	or INTRO PROGRAMMING USING JAVA	
Social/Behavioral Science		3
History or Social/Behavioral Science		3
See Requirements tab for approved list.		
Term Semester Hours:		15
Total Semester Hours:		130

Chemistry, BS - Pre-Professional Concentration

The reduced course requirement for the major in chemistry in this curriculum permits the student to prepare for medical or dental school and to sample courses and subjects outside of the major.

Chemistry: Preprofessional Concentration, BS Requirements:

- Chemistry, Preprofessional Concentration, BS degree requires 128 credit hours.
- 39 of 128 credit hours must be taken at 300 level or higher (39 credits includes courses taken at the 300+ level in major, minor (if chosen), Pre professional area and electives).
- 12 credit hours of 300 level and above must be taken in the major--or 6 credit hours in the major and 6 credit hours in the minor (if chosen).
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- No more than 64 credit hours from a two-year college can be applied toward a UAH degree.
- For graduation application instructions, see here (p. 812).

Degree Requirements

Code	Title	Semester Hours
Freshman Composition		6
EH 101	COLLEGE WRITING I	
EH 102	COLLEGE WRITING II	
Humanities and Fine Arts		12
Fine Arts: Choose one		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
TH 122	THEATRE APPRECIATION	
ARS 160	DRAWING: FOUNDATIONS	

MU 100	INTRO TO MUSIC LITERATURE	
Literature: Choose one		3
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
Speech		3
CM 113	Intro to Rhetorical Communication	
Humanities/2nd Fine Art/2nd Literature: Choose one		3
PHL 101	INTRODUCTION TO PHILOSOPHY	
PHL 102	INTRO TO ETHICS	
PHL 103	INTRODUCTION TO LOGIC	
PHL 150	TECH, SCIENCE & HUMAN VALUES	
Any 100 or 200 level Foreign Language ⁴		
WLC 204	INTERNATIONAL CINEMA	
WGS 200	INTRO WOMEN'S & GENDER STUDIES	
2nd Literature ¹		
2nd Fine Art		
Mathematics and Sciences		12
Mathematics: ²		4
MA 171	CALCULUS A	
Natural Sciences: Physics		8
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
and		
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
History and Social and Behavioral Sciences		12
History: Choose one ¹		3
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Sciences: Choose two		6
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
SOC 100	INTRO TO SOCIOLOGY	
SOC 102	ANALYSIS OF SOCIAL PROBLEMS	
SOC 105	INTRO CULTURAL ANTHROPOLOGY	
PY 101	GENERAL PSYCHOLOGY I	
PY 201	LIFE-SPAN DEVELOPMENT	
2nd History or 3rd Social and Behavioral Science: Choose one ³		3
2nd History ¹		
3rd Social and Behavioral Science ³		
Pre Professional		18
Computer Science: Choose one		3
CS 100	INTRO COMPUTERS & PROGRAM	
CS 102	INTRO TO C PROGRAMMING	
CS 103	INTRO PROGRAMMING USING JAVA	
Technical Writing		3

EH 301	TECHNICAL WRITING	
Additional Required Biology		8
BYS 119	PRINCIPLES OF BIOLOGY	
BYS 120	ORGANISMAL BIOLOGY	
Additional Required Mathematics		4
MA 172	CALCULUS B	
Code	Title	Semester Hours
Chemistry		25
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	
CH 223 & CH 224	QUANTITATIVE ANALYSIS and QUANTITATIVE ANALYSIS LAB	
CH 331 & CH 335	ORGANIC CHEMISTRY I and ORGANIC CHEMISTRY LAB I ⁵	
CH 332	ORGANIC CHEMISTRY II ⁵	
CH 361	GENERAL BIOCHEMISTRY	
CH 401	INORGANIC CHEMISTRY	
Pre-Professional Chemistry Courses		18
CH 336	ORGANIC CHEMISTRY LAB II ⁵	
CH 347 & CH 345	BIOPHYSICAL CHEMISTRY I and EXPERIMENTAL PHYSICAL CHEM I	
CH 348 & CH 346	BIOPHYSICAL CHEMISTRY II and EXPERIMENTAL PHYSICAL CHEM II	
CH 362	GENERAL BIOCHEMISTRY LAB	
CH 402	INORGANIC CHEMISTRY LAB	
CH 421	INSTRUMENTAL ANALYSIS	
CH 300+		
Elective Courses		25
Elective courses 300+ level, 5 credits		
Additional elective courses, 100+ level, 20 credits. Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credits of 100 level HPE courses can count toward degree requirements.		
Total Semester Hours		128

- ¹ Students must take one literature and one history course. Students must also take either a second literature or history course to complete a sequence. (EH 207 + EH 208, EH 209 + EH 210, HY 103 + HY 104, or HY 221 + HY 222)
- ² Based on Math placement (<http://www.uah.edu/science/departments/math/undergraduate-students/placement/>), prerequisite (MA 112 and/or MA 113) Mathematics courses may be required.
- ³ No more than 6 hours can be taken in a single discipline.
- ⁴ For choices see the World Languages and Cultures (p. 205) department.
- ⁵ Courses in organic chemistry completed at the junior college level may be used to satisfy semester hour and prerequisite requirements for upper level chemistry courses at UAH but do not count toward the 300-level requirements of the minor.

Sample four year plan for Chemistry, Pre-Professional Concentration BS degree:

Note: This is only an example and variations are possible.

Year 1

Fall		Semester Hours
FYE 101	CHARGER SUCCESS	1
EH 101	COLLEGE WRITING I	3
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	4

MA 171	CALCULUS A	4
BYS 119	PRINCIPLES OF BIOLOGY	4
Term Semester Hours:		16
Spring		
EH 102	COLLEGE WRITING II	3
CH 123 & CH 125	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB I	4
MA 172	CALCULUS B	4
BYS 120	ORGANISMAL BIOLOGY	4
Elective		1
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 HPE 100 level courses can count toward degree requirements.		
Term Semester Hours:		16
Year 2		
Fall		
CH 331 & CH 335	ORGANIC CHEMISTRY I and ORGANIC CHEMISTRY LAB I	4
CH 223 & CH 224	QUANTITATIVE ANALYSIS and QUANTITATIVE ANALYSIS LAB	4
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	4
Literature		3
See Requirements tab for approved list.		
Term Semester Hours:		15
Spring		
CH 332 & CH 336	ORGANIC CHEMISTRY II and ORGANIC CHEMISTRY LAB II	4
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	4
CM 113	Intro to Rhetorical Communication	3
Fine Art		3
See Requirements tab for approved list.		
Elective		3
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 HPE 100 level courses can count toward degree requirements.		
Term Semester Hours:		17
Year 3		
Fall		
CH 347 & CH 345	BIOPHYSICAL CHEMISTRY I and EXPERIMENTAL PHYSICAL CHEM I	4
CS 100 or CS 102 or CS 103	INTRO COMPUTERS PROGRAM or INTRO TO C PROGRAMMING or INTRO PROGRAMMING USING JAVA	3
Social/Behavioral Science		3
History		3
See Requirements tab for approved list.		
Elective		3

Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 HPE 100 level courses can count toward degree requirements.

	Term Semester Hours:	16
Spring		
CH 348 & CH 346	BIOPHYSICAL CHEMISTRY II and EXPERIMENTAL PHYSICAL CHEM II	4
CH 361 & CH 362	GENERAL BIOCHEMISTRY and GENERAL BIOCHEMISTRY LAB	4
Literature/Humanities/Fine Art		3
Social/Behavioral Science		3
See Requirements tab for approved list.		
Elective		2
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 HPE 100 level courses can count toward degree requirements.		
	Term Semester Hours:	16
Year 4		
Fall		
CH 401	INORGANIC CHEMISTRY	3
CH 421	INSTRUMENTAL ANALYSIS	4
History or Social/Behavioral Science		3
See Requirements tab for approved list.		
Elective 300+ level		3
Elective		3
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 HPE 100 level courses can count toward degree requirements.		
	Term Semester Hours:	16
Spring		
CH 402	INORGANIC CHEMISTRY LAB	1
EH 301	TECHNICAL WRITING	3
Elective 300+ level		3
Elective 300+ level		3
Elective		3
Elective		3
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 HPE 100 level courses can count toward degree requirements.		
	Term Semester Hours:	16
	Total Semester Hours:	128

Chemistry, BS - Pure Chemistry Concentration

This concentration meets the requirements of the American Chemical Society for certification and is designed for a student who plans to do graduate work in chemistry or a related science or desires an industrial position that requires a strong chemical background.

Chemistry: Pure Chemistry Concentration, BS Requirements:

- All students are encouraged to see an advisor after completion of 24 credits.
- Chemistry, Pure Chemistry Concentration, BS degree requires 128 credit hours.
- 39 of 128 credit hours must be taken at 300 level or higher (39 credits includes courses taken at the 300+ level in major, minor (if chosen), Pre professional area and electives).
- 12 credit hours of 300 level and above must be taken in the major or 6 credit hours in the major and 6 credit hours in the minor (if chosen).

- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- Unless otherwise noted a C- or better is required for all College of Science prerequisite courses.
- No more than 64 credit hours from a two-year college can be applied toward a UAH degree.
- For graduation application instructions, see here (p. 812).

Degree Requirements

Charger Foundations Requirements

*Please see Area V for CoS requirements that can also be used to fulfill Charger Foundations Requirements.

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S or WLC 101A or WLC 101F or WLC 101G or WLC 101J or WLC 101R	INTRO FOREIGN LANG I: SPANISH INTRO FOREIGN LANG I: ARABIC INTRO FOREIGN LANG I:FRENCH INTRO FOREIGN LANG I:GERMAN INTRO FOREIGN LANG I:JAPANESE INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S or WLC 102A or WLC 102F or WLC 102G or WLC 102J or WLC 102R	INTRO FOREIGN LANG II:SPANISH INTRO FOREIGN LANG II: ARABIC INTRO FOREIGN LANG II:FRENCH INTRO FOREIGN LANG II:GERMAN INTRO FOREIGN LANG II:JAPANESE INTRO FOREIGN LANG II:RUSSIAN	
WLC 201S or WLC 201A or WLC 201F or WLC 201G or WLC 201J or WLC 201R	INTERM FOREIGN LANG:SPANISH INTERM FOREIGN LANG I: ARABIC INTERM FOREIGN LANG:FRENCH INTERM FOREIGN LANG:GERMAN INTERM FOREIGN LANG: JAPANESE INTERM FOREIGN LANG:RUSSIAN	
WLC 202S	INTERM FOREIGN LANG II:SPANISH	

or WLC 202A	INTERM FOREIGN LANG II: ARABIC	
or WLC 202F	INTERM FOREIGN LANG II:FRENCH	
or WLC 202G	INTERM FOREIGN LANG II:GERMAN	
or WLC 202J	INTERM FORGN LANG II:JAPANESE	
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN	
WLC 204	INTERNATIONAL CINEMA	
PHL 101	INTRODUCTION TO PHILOSOPHY	
PHL 102	INTRO TO ETHICS	
PHL 103	INTRODUCTION TO LOGIC	
PHL 150	TECH, SCIENCE & HUMAN VALUES	
WGS 200	INTRO WOMEN'S & GENDER STUDIES	
AMS 229	ANCIENT & MEDIEVAL WORLDS	
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Area III: Mathematics and Sciences		11-12
Mathematics		3-4
MA 105	NATURE OF MATHEMATICS	
MA 107	ALGEBRA WITH APPLICATIONS	
MA 110	FINITE MATHEMATICS	
MA 112	PRECALCULUS ALGEBRA	
MA 113	PRECALCULUS TRIGONOMETRY	
MA 115	PRECALCULUS ALGEBRA & TRIG	
MA 120	MATH PROFESSIONAL APPLICATIONS	
MA 171	CALCULUS A	
Natural Sciences (Lab)		8
AST 100	SURVEY OF ASTRONOMY	
AST 106	EXPLORING THE COSMOS I	
AST 107	EXPLORING THE COSMOS II	
BYS 109	FUNDAMENTALS OF BIOLOGY	
BYS 119	PRINCIPLES OF BIOLOGY	
BYS 120	ORGANISMAL BIOLOGY	
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I	
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB	
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB	
ESS 103	ENVIRONMENTAL EARTH SCIENCE	
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG	
PH 100	CONCEPTUAL PHYSICS	
PH 101	GENERAL PHYSICS I	
PH 102	GENERAL PHYSICS II	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	

PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	
Area IV: History and Social and Behavioral Sciences*		12
History		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Sciences		6-9
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
ESS 105	WORLD REGIONAL GEOGRAPHY	
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS	
PY 101	GENERAL PSYCHOLOGY I	
PY 201	LIFE-SPAN DEVELOPMENT	
SOC 100	INTRO TO SOCIOLOGY	
SOC 102	ANALYSIS OF SOCIAL PROBLEMS	
SOC 103	INTRO TO CRIMINOLOGY	
SOC 105	INTRO CULTURAL ANTHROPOLOGY	

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Take no more than six hours in a single discipline in Area II or Area IV.

Area V: Pre Professional Requirements

Code	Title	Semester Hours
Courses in this area may also be used to fulfill Charger Foundations requirements		
Communications		3
CM 113	Intro to Rhetorical Communication	
Biology		8
BYS 119 & 119L & 119R	PRINCIPLES OF BIOLOGY and LABORATORY and RECITATION	
BYS 120 & 120L & 120R	ORGANISMAL BIOLOGY and ORGANISMAL BIOLOGY LAB and RECITATION	
Physics		8
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
Calculus		12
MA 171	CALCULUS A	
MA 172	CALCULUS B	
MA 201	CALCULUS C	
Computer Science: Choose one		3
CS 100 or CS 102	INTRO COMPUTERS & PROGRAM INTRO TO C PROGRAMMING	

or CS 103	INTRO PROGRAMMING USING JAVA	
or CS 104	INTRO TO CS USING PYTHON	
Technical Writing		3
EH 301	TECHNICAL WRITING	

Major Requirements

Code	Title	Semester Hours
Chemistry Core		25
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	
CH 223 & CH 224	QUANTITATIVE ANALYSIS and QUANTITATIVE ANALYSIS LAB	
CH 331 & CH 335	ORGANIC CHEMISTRY I and ORGANIC CHEMISTRY LAB I ⁵	
CH 332	ORGANIC CHEMISTRY II ⁵	
CH 361	GENERAL BIOCHEMISTRY	
CH 401	INORGANIC CHEMISTRY	
Pure Chemistry Concentration Requirements		18-20
CH 336	ORGANIC CHEMISTRY LAB II ⁵	
CH 337	ORGANIC CHEMISTRY LAB III	
CH 341 & CH 345	PHYSICAL CHEMISTRY I and EXPERIMENTAL PHYSICAL CHEM I	
CH 342 & CH 346	PHYSICAL CHEMISTRY II and EXPERIMENTAL PHYSICAL CHEM II	
CH 362	GENERAL BIOCHEMISTRY LAB	
CH 402	INORGANIC CHEMISTRY LAB	
CH 421	INSTRUMENTAL ANALYSIS	
CH 491	INTRO TO CHEMICAL RESEARCH	
or CH 492	INTRO TO CHEMICAL RESEARCH	
or CH 493	INTRO TO CHEMICAL RESEARCH	

Elective Requirements

Code	Title	Semester Hours
Elective Courses		19-21
Additional elective courses, 100+ level, to reach 128 credits. Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credits of 100 level HPE courses can count toward degree requirements.		

Overall Requirements

Code	Title	Semester Hours
All College of Science degrees must have at least 128 credits.		
At least 39 of the 128 credits must be at the 300+ level. These may be taken in any area including electives.		
Total Semester Hours		128

- Students must take one literature and one history course. Students must also take either a second literature or history course to complete a sequence. Acceptable Literature sequences must include one early literature (EH 207 or EH 242 or EH 209) and one later literature (EH 208 or EH 210). Acceptable history sequences are (HY 103 + HY 104), or (HY 221 + HY 222)
- Based on Math placement (<http://www.uah.edu/science/departments/math/undergraduate-students/placement/>), prerequisite (MA 112 and/or MA 113) Mathematics courses may be required.
- No more than 6 hours can be taken in a single discipline.

- ⁴ For choices see the World Languages and Cultures (p. 205) department.
- ⁵ Courses in organic chemistry completed at the 2-year college level may be used to satisfy semester hour and prerequisite requirements for upper level chemistry courses at UAH but do not count toward the 300-level requirements of the major.

Sample four year plan for Chemistry, Pure Chemistry Concentration BS degree:

Note: This is only an example and variations are possible.

Year 1

Fall		Semester Hours
FYE 101S	CHARGER SUCCESS - SCIENCE	1
EH 101	COLLEGE WRITING I	3
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	4
MA 171	CALCULUS A	4
BYS 119 & 119L & 119R	PRINCIPLES OF BIOLOGY and LABORATORY and RECITATION	4
Term Semester Hours:		16
Spring		
EH 102	COLLEGE WRITING II	3
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	4
MA 172	CALCULUS B	4
BYS 120 & 120L & 120R	ORGANISMAL BIOLOGY and ORGANISMAL BIOLOGY LAB and RECITATION	4
Elective		1
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		16

Year 2

Fall		
CH 331 & CH 335	ORGANIC CHEMISTRY I and ORGANIC CHEMISTRY LAB I	4
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	4
MA 201	CALCULUS C	4
Fine Art		3
See Requirements tab for approved list		
Elective		1
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 HPE 100 level courses can count toward degree requirements.		
Term Semester Hours:		16
Spring		
CH 332 & CH 336	ORGANIC CHEMISTRY II and ORGANIC CHEMISTRY LAB II	4
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	4
CH 223 & CH 224	QUANTITATIVE ANALYSIS and QUANTITATIVE ANALYSIS LAB	4
Literature		3
See Requirements tab for approved list.		
Elective		1

Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 HPE 100 level courses can count toward degree requirements.

Term Semester Hours:		16
Year 3		
Fall		
CH 341 & CH 345	PHYSICAL CHEMISTRY I and EXPERIMENTAL PHYSICAL CHEM I	4
CH 337	ORGANIC CHEMISTRY LAB III	2
Humanities, 2nd Fine art or 2nd Literature		3
See Requirements tab for approved list.		
Social and Behavioral science		3
See Requirements tab for approved list.		
Elective		3
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		15
Spring		
CH 342 & CH 346	PHYSICAL CHEMISTRY II and EXPERIMENTAL PHYSICAL CHEM II	4
CH 361 & CH 362	GENERAL BIOCHEMISTRY and GENERAL BIOCHEMISTRY LAB	4
CM 113	Intro to Rhetorical Communication	3
Social and Behavioral science		3
See Requirements tab for approved list.		
History		3
See Requirements tab for approved list.		
Term Semester Hours:		17
Year 4		
Fall		
CH 401	INORGANIC CHEMISTRY	3
CH 421	INSTRUMENTAL ANALYSIS	4
EH 301	TECHNICAL WRITING	3
2nd History or 3rd Social and Behavioral science		3
See Requirements tab for approved list.		
CS 100 or CS 102 or CS 103 or CS 104	INTRO COMPUTERS PROGRAM or INTRO TO C PROGRAMMING or INTRO PROGRAMMING USING JAVA or INTRO TO CS USING PYTHON	3
Term Semester Hours:		16
Spring		
CH 402	INORGANIC CHEMISTRY LAB	1
CH 493 or CH 491 or CH 492	INTRO TO CHEMICAL RESEARCH or INTRO TO CHEMICAL RESEARCH or INTRO TO CHEMICAL RESEARCH	3

Elective 300+ level or higher course.	3
Elective	3
Elective	3
Elective	3

Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 HPE 100 level courses can count toward degree requirements.

Term Semester Hours:	16
Total Semester Hours:	128

Chemistry Minor for Biology Majors Taking BYS 361 and BYS 362

Course sequences for students wishing to minor in chemistry require at least 21 semester hours of chemistry including 6 or more semester hours numbered 300 or above. Courses in organic chemistry completed at the junior college level may be used to satisfy semester hour and prerequisite requirements for upper level chemistry courses at UAH but do not count toward the 300-level requirements of the minor.

Code	Title	Semester Hours
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	4
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	4
CH 223 & CH 224	QUANTITATIVE ANALYSIS and QUANTITATIVE ANALYSIS LAB	4
CH 331 & CH 335	ORGANIC CHEMISTRY I and ORGANIC CHEMISTRY LAB I	4
CH 332	ORGANIC CHEMISTRY II	3
CH 347	BIOPHYSICAL CHEMISTRY I	3
Total Semester Hours		22

Chemistry Minor for Physics and Mathematics Majors

Course sequences for students wishing to minor in chemistry require at least 21 semester hours of chemistry including 6 or more semester hours numbered 300 or above. Courses in organic chemistry completed at the junior college level may be used to satisfy semester hour and prerequisite requirements for upper level chemistry courses at UAH but do not count toward the 300-level requirements of the minor.

Code	Title	Semester Hours
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	4
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	4
CH 331 & CH 335	ORGANIC CHEMISTRY I and ORGANIC CHEMISTRY LAB I	4
CH 332	ORGANIC CHEMISTRY II	3
CH 341	PHYSICAL CHEMISTRY I	3
CH 342	PHYSICAL CHEMISTRY II	3
Total Semester Hours		21

Chemistry Minor

Course sequences for students wishing to minor in chemistry require at least 21 semester hours of chemistry including 6 or more semester hours numbered 300 or above. Courses in organic chemistry completed at the junior college level may be used to satisfy semester hour and prerequisite requirements for upper level chemistry courses at UAH but do not count toward the 300-level requirements of the minor.

Code	Title	Semester Hours
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	4
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	4
CH 223 & CH 224	QUANTITATIVE ANALYSIS and QUANTITATIVE ANALYSIS LAB	4
CH 331 & CH 335	ORGANIC CHEMISTRY I and ORGANIC CHEMISTRY LAB I	4
CH 332	ORGANIC CHEMISTRY II	3
CH 361	GENERAL BIOCHEMISTRY ¹	1-3
or CH 341	PHYSICAL CHEMISTRY I	
or CH 347	BIOPHYSICAL CHEMISTRY I	
or CH 362	GENERAL BIOCHEMISTRY LAB	
or CH 440	POLYMER SYNTHESIS & CHARACTERI	
Additional credits to reach 21 ¹		0-1
Total Credits		21-22

¹ Additional prerequisites may exist for courses numbered higher than CH 332.

Chemistry Minor for Some Biology Majors

Course sequences for students wishing to minor in chemistry require at least 21 semester hours of chemistry including 6 or more semester hours numbered 300 or above. Courses in organic chemistry completed at the junior college level may be used to satisfy semester hour and prerequisite requirements for upper level chemistry courses at UAH but do not count toward the 300-level requirements of the minor.

Code	Title	Semester Hours
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	4
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	4
CH 223 & CH 224	QUANTITATIVE ANALYSIS and QUANTITATIVE ANALYSIS LAB	4
CH 331 & CH 335	ORGANIC CHEMISTRY I and ORGANIC CHEMISTRY LAB I	4
CH 332	ORGANIC CHEMISTRY II	3
CH 361 & CH 362	GENERAL BIOCHEMISTRY and GENERAL BIOCHEMISTRY LAB	4
Total Semester Hours		23

Computer Science

N300 Olin B King Technology Hall
Telephone: 256.824.6088
Email: info@cs.uah.edu

Chair: Dr. Heggere S. Ranganath, Professor (<https://www.uah.edu/science/departments/computer-science/faculty-staff/heggere-ranganath/>)

The Computer Science department offers the following undergraduate degrees:

- Computer Science, BS (p. 544)
- Computer Science, BS - Entertainment Computing Concentration (<http://catalog.uah.edu/undergrad/colleges-departments/science/computer-science/computer-science-computing/>)

Program Objectives

The Computer Science Department, with commitment to excellence in teaching, research, service, and overall development of students, has two primary objectives: first, to be nationally and internationally recognized as an institution to which government, industry, and academic leaders turn for opinions on societal issues, especially those involving technology; second, to ensure an environment where curiosity, discovery, innovation, and entrepreneurship are valued.

Learning Outcomes

Computer Science graduates will be

- Proficient in developing software using modern programming languages
- Proficient in applying mathematical and algorithmic foundations to computing problems
- Effective in team environments to accomplish common goals

Majors in Computer Science

- Computer Science, BS (p. 544)
- Computer Science, BS - Entertainment Computing Concentration (<http://catalog.uah.edu/undergrad/colleges-departments/science/computer-science/computer-science-computing/>)

For more information about the Computer Science department, please visit cs.uah.edu (<http://www.uah.edu/science/departments/computer-science/>).

Minors in Computer Science

- Computer Science (p. 551)
- Computer Languages and Systems (p. 551)
- Entertainment Computing (<http://catalog.uah.edu/undergrad/colleges-departments/science/computer-science/entertainment-computing/>)

UAH's Joint Undergraduate Master's Program (JUMP) allows undergraduate students to study at the graduate level. By completing graduate courses in your senior year you may reduce the time taken to earn a graduate (MS) degree. Please visit the JUMP (p. 18) page for general information.

Requirements For Admission

1. Cumulative overall 3.25 GPA
2. Major GPA of 3.5
3. Must complete CS 317 and CS 321 before applying to program

Additional Information

1. Maximum of 12 credit hours count toward both degrees
2. Many students will take CS 524 instead of CS 424 and up to three additional graduate courses to be chosen in conjunction with the JUMP advisor

Designated Faculty Contact/Advisor

Dr. Weisskopf
weisskop@cs.uah.edu

256.824.6306

CS 100 - INTRO COMPUTERS & PROGRAM

Semester Hours: 3

Introduction to program design and implementation in the Visual Basic programming language, using hands-on programming assignments, class demonstrations and lectures. Problem analysis and some testing techniques. Basic program structure, data types, control structures, and file organization.

CS 102 - INTRO TO C PROGRAMMING

Semester Hours: 3

Introduction to program design and implementation in the C programming language, using hands-on programming assignments, class demonstrations and lectures. Problem analysis and some testing techniques. Basic program structure, and file organization.

CS 103 - INTRO PROGRAMMING USING JAVA

Semester Hours: 3

Introduction to program design and implementation in the Java programming language, using hands-on programming assignments, class demonstrations and lectures. Problem analysis and some testing techniques. Basic program structure, data types, control structures, methods and file organization.

CS 104 - INTRO TO CS USING PYTHON

Semester Hours: 3

Introduction to program design and implementation in the Python programming language, using hands-on programming assignments, class demonstrations and lectures. Problem analysis and some testing techniques. Basic program structure, and file organization.

CS 105 - COMP SCI SEM:ETH/PROFESS

Semester Hour: 1

Issues associated with the ethical use of computers in the information age. Ethics, professionalism, software piracy, copyrighting software, ethical standards and the impact of computers on society will be covered. Familiarization with the local computing environment will also be covered.

CS 121 - COMPUTER SCIENCE I

Semester Hours: 3

Review of problem solving techniques, algorithm development, and fundamental language features; e.g., loops, decisions. In depth coverage of functions, arrays, I/O. Principles of software design, implementation, and testing. Introduction to object oriented design and the C++ programming language. Prerequisites: CS 102 or 103 or 104, and either MA 113, 115, 120, 171, 172, 201, 238, or 244 (with concurrency).

CS 143 - INTRO TECH MULTIMEDIA & GAMING

Semester Hours: 3

Introduction to terminology, technologies and tools for multimedia and gaming. Elements such as text, sound, images, animation, video, and how they are represented, captured, edited, stored, and published. Overview of multimedia and gaming technologies, multimedia authoring, publishing on the web.

CS 214 - INTRO DISCRETE STRUCTURE

Semester Hours: 3

Review of set algebra including mappings and relations. Algebraic structures including semigroups and groups. Elements of theory of directed and undirected graphs; Boolean algebra and propositional logic and applications of these structures to various areas of computer science. Prerequisites: MA 171 and either CS 121 or CPE 211.

CS 217 - ANALYTIC TECH GAMING

Semester Hours: 3

Mathematics for understanding & implementing 3-dimensional graphics & interactive physical modeling in computer games. Topics: coordinate systems, vectors, matrices, transformations, kinematics, dynamics, automata, and probability. Focused on practical mathematics rather than theoretical derivations. Prerequisites: MA 120 or MA 171.

CS 221 - COMP SCI II: DATA STRUCTURES

Semester Hours: 3

Advanced features of the C++ programming language, including pointers, recursion, classes, and inheritance. Fundamental data structures including linked lists, stacks, queues, binary search trees. Basic sort and search algorithms. Design, development, and documentation of object-oriented programs. Prerequisites: CS 121 and either MA 113, or 115. Prerequisites with concurrency: MA 171 or CS 217.

CS 307 - OBJECT ORIENT/PROG C++

Semester Hours: 3

Emphasis on principles of software engineering and object-oriented design. Practical experience using the standard C++ library, the standard template library, and design patterns. Introduction to and experience with graphical user interface applications. Prerequisite: CS 221.

CS 308 - ASSEMBLY LANGUAGE PROGRAMMING

Semester Hours: 3

Programming in a representative assembly language, including floating point programming. Overview of software systems: loaders, assemblers, compiler, interpreters, operating systems. Prerequisite: CS 309.

CS 309 - COMPUTER ORG & SWITCHNG THRY

Semester Hours: 3

Boolean algebra, Boolean function minimization techniques, design and analysis of combinational circuits, design and analysis of sequential circuits. Computer hardware organization, including CPU, instruction representation and executive. Programing in a representative assembly language, including floating point programming. Overview of software systems: loaders, assembler, compiler, interpreters, operating systems. A lab section must be scheduled for this course. Prerequisite: CS 214.

CS 309L - LABORATORY

Semester Hours: 0

Lecture/Lab 3. Students enrolling in CS 309L must enroll concurrently in CS 309.

CS 317 - INTRO DESIGN/ANALYSIS OF ALG

Semester Hours: 3

Introduction to complexity analysis of algorithms; emphasis on searching, sorting, finding spanning trees and shortest paths in graphs. Design techniques such as divide & conquer, dynamic programming, and backtracking. Introduction to problem classification; i.e. NP, intractable, and unsolvable. Prerequisites: MA 244 and CS 214, and either CS 221 or CPE 212.

CS 321 - INTRO OBJECT-ORIENTED PROG JAV

Semester Hours: 3

Writing substantial object-oriented programs in Java, including design, documentation and testing. Advanced data structures (e.g., balanced trees, hash tables). Graphical interface programming using the Java abstract windowing toolkit. Comparison with other object-oriented languages, notably C++. Prerequisite: CS 221.

CS 325 - PROFESSIONAL & COMPUTG ETHICS

Semester Hours: 3

The course focuses on two major aspects of professionalism and computer ethics. The first concerns the role of values and normative principles in the practice of computing or more specifically software development. The second concerns the impacts of computer technologies on society. Prerequisite with concurrency: CS 321.

CS 330 - ARTFCL INTEL & GAME DEV

Semester Hours: 3

Techniques and concepts of artificial intelligence applied game development and production. Topics: path planning, decision making, tactics, and non-rational behaviors. Prerequisite: CS 221.

CS 347 - INTRO VIDEO GAME DESGN & PROGM

Semester Hours: 3

Provides students with an overview of the video game production process. Covers both theory and practice of game design and programming. Students produce 2D and 3D games from beginning to end using existing game engines. Hands-on focus and project-oriented. CS 143 is highly recommended. Prerequisite: CS 221.

CS 370 - INTRO COMPUTER NETWORKS

Semester Hours: 3

Introduction to the organization and operation of computer networks. Physical, Data Link, Network, Transport, and Application-layer protocols and algorithms; LAN and WAN systems; TCP/IP; wired and wireless organizations; security approaches. Prerequisite: CS 309.

CS 371 - MOBILE COMPUTING APP INCT & D

Semester Hours: 3

Considers application design for the mobile space with emphasis on mobile computer interfaces, including GUI for mobile environments, entertainment computing, and cross-platform development. This course is also a component of the Entertainment Computing Track. Prerequisites: CS 221 or CPE 212.

CS 390 - UNIX/LINUX PROGRAMMING

Semester Hours: 3

Design and development of systems and programs in the UNIX environment. File and terminal I/O, processes, inter-process communication, signals. Pattern searching, filters, pipes. Shell programming. Program and system development tools such as awk, C, make, sed, and yacc. Prerequisite: CS 221.

CS 391 - INT NETWORK ADMIN PRINC WINDOW

Semester Hours: 3

Network administration principles for installing and administrating Windows networks. OS installation, general network topologies and protocols, and Windows client-server architecture. User management, network file and security systems, and disaster-recovery are also covered. Prerequisite: CS 221.

CS 392 - INT NETWORK ADMIN PRINC FOR UN

Semester Hours: 3

Linux OS installation, network topologies and protocols, and UNIX client-server architecture. User management, network file and security systems, kernel configuration, print servers, domain name service, mail servers, Web and ftp servers are included. Design and implementation of a UNIX domain. Prerequisite: CS 390.

CS 396 - SPECIAL TOPICS

Semester Hours: 3

Course offered by an instructor in a specialized area of computer science. Must have approval of instructor.

CS 397 - SPECIAL TOPICS

Semester Hours: 3

Course offered by an instructor in a specialized area of computer science. Must have approval of instructor.

CS 398 - SPECIAL TOPICS

Semester Hours: 3

Course offered by an instructor in a specialized area of computer science. Must have approval of instructor.

CS 403 - INT FORML LANG AUTO THRY

Semester Hours: 3

Introduction to concepts and formalisms of formal languages and automata theory. Includes fundamental mathematical concepts, grammars and corresponding automata, and deterministic parsing of programming languages. Prerequisite: CS 317.

CS 413 - INTRO DIGITAL COMP ARCHITECTUR

Semester Hours: 3

Design of computer systems and subsystems, including register transfer, bus structure, timing and control. Pipelining, memory systems including cache and cache coherence, arithmetic, and I/O units. Interrupt handling. A lab section must be scheduled for this course. Prerequisite: CS 309.

CS 413L - LABORATORY

Semester Hours: 0

Lecture/Lab 3. Students enrolling in CS 413L must enroll concurrently in CS 413.

CS 424 - PRINCIPLES PROGRAMMING LANG

Semester Hours: 3

Comparison of principles and paradigms of modern programming languages. How different programming languages implement lexical, syntax, and semantic analysis, including the design of compilers. Formal grammars, BNF notation, parse trees, abstract data types. Prerequisite: CS 317.

CS 430 - SURVEY ARTIFICIAL INTELLIGENCE

Semester Hours: 3

Survey of Artificial Intelligence (AI). AI crosses many disciplines, to make computational systems behave intelligently. This course provides a broad intro of AI sub-domains, including search, knowledge representation, reasoning, and machine learning. Prerequisite: CS 317.

CS 443 - INTRO TO MULTIMEDIA SYSTEMS

Semester Hours: 3

Multimedia authoring, color models for image and video, introduction to image and video compression, digital audio, multimedia networks, multimedia synchronization, multimedia retrieval. Taught as CS 443, 543. Prerequisite: CS 317.

CS 445 - INTRO COMPUTER GRAPHICS

Semester Hours: 3

Introduces underlying theory and mechanics of interactive computer graphics. Basic modeling, rasterization, 2D/3D transformations, and viewing. 3D graphics rudiments. Some hardware and historical perspectives. Many programs. Same as CS 545; take only one! Prerequisites: CS 221 and MA 244 or CS 217.

CS 446 - ADVANCED COMPUTER GRAPHICS

Semester Hours: 3

High resolution 3D graphics. Advanced topics in viewing, vertex &, fragment processing, illumination & shading, 3D modeling (curve & surface representation, texture mapping. Some coverage of solid modeling and color theory. Game production pipeline. Many programming projects. Taught as CS 446, 546. Prerequisites: CS 445 and at least junior standing.

CS 447 - GAME ENGINES & LEVEL DEVELOPMENT

Semester Hours: 3

Students produce fully functional games from beginning to end with team members. Focused on engineering development and art asset generation and management. Examines the design, development, and distribution of computer games using game engines for cross-platform implementation. Taught as CS 447/547. Prerequisites: CS 330 and CS 445.

CS 453 - CLIENT/SERVER ARCHITECTURES

Semester Hours: 3

Client/server distributed computing. Web based applications. Students will practice concepts in programs involving leading edge technologies such as AJAX, RESTful and WS-* web services. Enterprise Java Beans, .Net. Prerequisites: CS 307 or CS 321. CS 470 is recommended.

CS 454 - INTRO TO CLOUD COMPUTING

Semester Hours: 3

Different cloud computing paradigms: IaaS, SaaS, PaaS. Open Source cloud software (for ex., OpenStack, CloudStack). RESTful interfaces, AWS interface. Cloud Security. Taught as CS 454, 554. Prerequisites: CS 307 or CS 321 AND CS 370 or CPE 348.

CS 465 - NETWORK SECURITY

Semester Hours: 3

Introduction to Network Security: Fundamentals of network security and cryptography. Examines security at different network layers. Wireless security. Firewalls. Intrusion detection and penetration analysis. Prerequisites: CS 121, and (CS 221 or CPE 221), and (CS 370 or CPE 348).

CS 480 - MOBILE DIGITAL FORENSICS

Semester Hours: 3

This course examines digital forensics of mobile devices such as smart phones and tablets in a law enforcement context. Mobile device characteristics that make forensics examinations difficult are discussed. Various forensic tools are critically examined with an eye toward improved tool development. Prerequisites: CS 413 or CPE 323.

CS 481 - MODELING & SIMULATION I

Semester Hours: 3

Discrete event simulation from a computer science perspective. Mathematics of probability distributions applied to simulation. Design, implementation, and application of discrete event simulation software. Application to computer and network system design. Prerequisites: CS 221 and (MA 385 or ISE 390).

CS 482 - MODELING & SIMULATION II

Semester Hours: 3

Advanced modeling methods, including Monte Carlo simulation, agent-based modeling, and mathematical modeling, from a Computer Science perspective. Emphasis on implementation, execution, and validation of working computer models using different modeling methods. Prerequisite: CS 481.

CS 485 - COMPUTER & SOFTWARE SECURITY

Semester Hours: 3

This course examines the issues related to security policies, models and mechanisms applicable to providing security for computer-based systems including operating systems, database management systems, and networks. Corequisite: CS 490.

CS 487 - DATABASE SYSTEMS

Semester Hours: 3

Basic concepts of database management systems with a focus on relational and object-oriented systems. Database design including semantic models and normalization. Design issues including query languages, internal storage, recovery, concurrency, security, integrity, and query optimization. Senior standing required.

CS 488 - INTRO TO BIG DATA COMPUTING

Semester Hours: 3

Provides big data concepts and characteristics; big data architectural concepts; big data ecosystem. Includes MapReduce framework and programming and coverage of big data applications. Prerequisite: CS 317.

CS 490 - INTRO TO OPERATING SYSTEMS

Semester Hours: 3

Principles of operating systems. Process management, memory management, I/O management, and file systems. Specific topics include process states, threads, CPU scheduling, concurrent processing, virtual memory. Contemporary operating systems will be used as examples. Prerequisite: CS 413.

CS 495 - SEL TOPICS:UNDERGRAD CS

Semester Hours: 3

Individual directed study under the supervision of an instructor. Instructor approval required.

CS 496 - SPECIAL TOPICS

Semester Hours: 3

Course offered by an instructor in a specialized area of computer science. Instructor approval required.

CS 497 - SPECIAL TOPICS

Semester Hours: 3

Course offered by an instructor in a specialized area of computer science. Instructor approval required.

CS 498 - SPECIAL TOPICS

Semester Hours: 3

Course offered by an instructor in a specialized area of computer science. Instructor approval required.

CS 499 - SR PROJ:TEAM SOFTWARE DESIGN

Semester Hours: 3

A combination of lectures on proven software engineering approaches, and team working sessions. Each student will participate in a sizable, complex, software development project based on a team approach. Each team will be required to provide oral and written documentation of their work. Prerequisite: CS 317.

Computer Science, BS

Computer Science, BS Requirements:

- All students are encouraged to see an advisor after completion of 24 credits.
- Computer Science, BS degree requires 128 credit hours.
- 39 of 128 credit hours must be taken at 300 level or higher (39 credits includes courses taken at the 300+ level in major, minor (if chosen), Pre professional area and electives).
- A transfer student must complete a minimum of 18 hours of CS courses at UAH in order to obtain a degree in Computer Science.
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- Unless otherwise noted a C- or better is required for all College of Science prerequisite courses.
- No more than 64 credit hours from a two-year college can be applied toward a UAH degree.
- For graduation application instructions, see here (p. 812).

Degree Requirements

Charger Foundations Requirements

*Please see Area V for CoS requirements that can also be used to fulfill Charger Foundations Requirements.

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	

ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S	INTRO FOREIGN LANG I: SPANISH	
or WLC 101A	INTRO FOREIGN LANG I: ARABIC	
or WLC 101F	INTRO FOREIGN LANG I:FRENCH	
or WLC 101G	INTRO FOREIGN LANG I:GERMAN	
or WLC 101J	INTRO FOREIGN LANG I:JAPANESE	
or WLC 101R	INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S	INTRO FOREIGN LANG II:SPANISH	
or WLC 102A	INTRO FOREIGN LANG II: ARABIC	
or WLC 102F	INTRO FOREIGN LANG II:FRENCH	
or WLC 102G	INTRO FOREIGN LANG II:GERMAN	
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE	
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN	
WLC 201S	INTERM FOREIGN LANG:SPANISH	
or WLC 201A	INTERM FOREIGN LANG I: ARABIC	
or WLC 201F	INTERM FOREIGN LANG:FRENCH	
or WLC 201G	INTERM FOREIGN LANG:GERMAN	
or WLC 201J	INTERM FOREIGN LANG: JAPANESE	
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN	
WLC 202S	INTERM FOREIGN LANG II:SPANISH	
or WLC 202A	INTERM FOREIGN LANG II: ARABIC	
or WLC 202F	INTERM FOREIGN LANG II:FRENCH	
or WLC 202G	INTERM FOREIGN LANG II:GERMAN	
or WLC 202J	INTERM FORGN LANG II:JAPANESE	
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN	
WLC 204	INTERNATIONAL CINEMA	
PHL 101	INTRODUCTION TO PHILOSOPHY	
PHL 102	INTRO TO ETHICS	
PHL 103	INTRODUCTION TO LOGIC	
PHL 150	TECH, SCIENCE & HUMAN VALUES	
WGS 200	INTRO WOMEN'S & GENDER STUDIES	
AMS 229	ANCIENT & MEDIEVAL WORLDS	
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	

Mathematics		3-4
MA 105	NATURE OF MATHEMATICS	
MA 107	ALGEBRA WITH APPLICATIONS	
MA 110	FINITE MATHEMATICS	
MA 112	PRECALCULUS ALGEBRA	
MA 113	PRECALCULUS TRIGONOMETRY	
MA 115	PRECALCULUS ALGEBRA & TRIG	
MA 120	MATH PROFESSIONAL APPLICATIONS	
MA 171	CALCULUS A	
Natural Sciences (Lab)		8
AST 100	SURVEY OF ASTRONOMY	
AST 106	EXPLORING THE COSMOS I	
AST 107	EXPLORING THE COSMOS II	
BYS 109	FUNDAMENTALS OF BIOLOGY	
BYS 119	PRINCIPLES OF BIOLOGY	
BYS 120	ORGANISMAL BIOLOGY	
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I	
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB	
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB	
ESS 103	ENVIRONMENTAL EARTH SCIENCE	
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG	
PH 100	CONCEPTUAL PHYSICS	
PH 101	GENERAL PHYSICS I	
PH 102	GENERAL PHYSICS II	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	
Area IV: History and Social and Behavioral Sciences*		12
History		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Sciences		6-9
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
ESS 105	WORLD REGIONAL GEOGRAPHY	
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS	
PY 101	GENERAL PSYCHOLOGY I	
PY 201	LIFE-SPAN DEVELOPMENT	

SOC 100	INTRO TO SOCIOLOGY
SOC 102	ANALYSIS OF SOCIAL PROBLEMS
SOC 103	INTRO TO CRIMINOLOGY
SOC 105	INTRO CULTURAL ANTHROPOLOGY

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Take no more than six hours in a single discipline in Area II or Area IV.

Area V: Pre Professional Requirements

Code	Title	Semester Hours
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Courses in this area may also be used to fulfill Charger Foundations requirements

Communications 3

CM 113	Intro to Rhetorical Communication
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Two course sequence in a Natural Science including labs: choose one sequence 8

BYS 119 & 119L & 119R	PRINCIPLES OF BIOLOGY and LABORATORY and RECITATION
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and

BYS 120 & 120L & 120R	ORGANISMAL BIOLOGY and ORGANISMAL BIOLOGY LAB and RECITATION
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OR

CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I
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and

CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II
--------------------	--

OR

PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I
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and

PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II
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Third Lab Science: choose any of the above not already taken or one of the following 4

AST 106 & 106L	EXPLORING THE COSMOS I and ASTRONOMY LABORATORY
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ESS 103 & 103L	ENVIRONMENTAL EARTH SCIENCE and LABORATORY
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ESS 111 & 111L	WEATHER, CLIMATE & GLOBAL CHNG and LABORATORY
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PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III
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Required Mathematics 17-18

MA 171	CALCULUS A
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MA 172	CALCULUS B
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MA 244	INTRO TO LINEAR ALGEBRA
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MA 385	INTRO TO PROBABILITY & STATIST
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MA 200+ level or higher course. (For a Math minor, choose MA 201 to fulfill this requirement.) ⁵

Computer Science: choose one 3

CS 102	INTRO TO C PROGRAMMING
or CS 103	INTRO PROGRAMMING USING JAVA
or CS 104	INTRO TO CS USING PYTHON

Technical Writing 3

EH 301	TECHNICAL WRITING
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Major Requirements

Code	Title	Semester Hours
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Computer Science Core: 31

CS 105	COMP SCI SEM:ETH/PROFESS
CS 121	COMPUTER SCIENCE I
CS 214	INTRO DISCRETE STRUCTURE
CS 221	COMP SCI II: DATA STRUCTURES
CS 309 & 309L	COMPUTER ORG & SWITCHNG THRY and LABORATORY
CS 317	INTRO DESIGN/ANALYSIS OF ALG
CS 321	INTRO OBJECT-ORIENTED PROG JAV
CS 413 & 413L	INTRO DIGITAL COMP ARCHITECTUR and LABORATORY
CS 424	PRINCIPLES PROGRAMMING LANG
CS 490	INTRO TO OPERATING SYSTEMS
CS 499	SR PROJ:TEAM SOFTWARE DESIGN

CS 300+ or 400+ elective courses. 9

CS 300+ or 400+ level course
CS 300+ or 400+ level course
CS 300+ or 400+ level course
Choose CS courses at the 300 or 400 level not listed in required courses above, Ex: CS 330, CS 347, CS 371, CS 390, CS 445

CS 400+ elective courses. 6

CS 400+ level course
CS 400+ level course
Choose CS courses at the 400 level not listed in required courses above, Ex: CS 403, CS 443, CS 445, CS 453, CS 454, CS 465, CS 487

Technical Elective: Choose one 3

Any College of Science Course 300+ or 400+ level. Example, MA 433 or an additional CS 300+ or 400+ course.

The final MA 300+ course for a math minor may fulfill the Technical Elective requirement. ⁵

CPE 412	INTRO TO PARALLEL PROGRAMMING
CPE 436	INTERNALS OF MODERN OPER SYS
PHL 317	PHILOSOPHY OF MIND
PHL 320	SYMBOLIC LOGIC
IS 422	SUPPLY CHAIN MANAGEMENT SYSTEM
IS 460	NETWORKING & IT INFRASTRUCTURE
IS 463	DIGITAL FORENSICS
IS 471	BUSINESS ANALYTICS & AI
IS 477	NETWORK DEFENSE & SECURITY

Elective Requirements

Code	Title	Semester Hours
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Elective Courses 13-14

Additional Elective courses 100+ level to reach 128 credit hours. Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credits of 100 level HPE courses can count toward degree requirements.

Overall Requirements

Code	Title	Semester Hours
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All College of Science degrees must have at least 128 credits.

At least 39 of the 128 credits must be at the 300+ level. These may be taken in any area including electives.

Total Semester Hours **128**

- 1 Students must take one literature and one history course. Students must also take either a second literature or history course to complete a sequence. Acceptable Literature sequences must include one early literature (EH 207 or EH 242 or EH 209) and one later literature (EH 208 or EH 210). Acceptable history sequences are (HY 103 + HY 104), or (HY 221 + HY 222)
- 2 Based on Math placement (<http://www.uah.edu/science/departments/math/undergraduate-students/placement/>), prerequisite (MA 112 and/or MA 113) Mathematics courses may be required.
- 3 No more than 6 hours can be taken in a single discipline.
- 4 For choices see the World Languages and Cultures (p. 205) department.
- 5 To complete Math minor, choose MA 201 and take one additional MA 300+ course. This course may fulfill the Technical Elective requirement in the major as well.

Sample four year plan for Computer Science, BS degree:

Note: This is only an example and variations are possible.

Year 1

Fall		Semester Hours
FYE 101S	CHARGER SUCCESS - SCIENCE	1
CS 102	INTRO TO C PROGRAMMING	3
or CS 103	or INTRO PROGRAMMING USING JAVA	
or CS 104	or INTRO TO CS USING PYTHON	
CS 105	COMP SCI SEM:ETH/PROFESS	1
MA 171	CALCULUS A	4
EH 101	COLLEGE WRITING I	3
Lab Science		4
See Requirements tab for approved list.		

Term Semester Hours: 16

Spring

CS 121	COMPUTER SCIENCE I	3
MA 172	CALCULUS B	4
EH 102	COLLEGE WRITING II	3
CM 113	Intro to Rhetorical Communication	3
Lab Science		4
See Requirements tab for approved list.		

Term Semester Hours: 17

Year 2

Fall		
CS 214	INTRO DISCRETE STRUCTURE	3
CS 221	COMP SCI II: DATA STRUCTURES	3
MA 201	CALCULUS C	4
Lab Science		4
See Requirements tab for approved list.		
Literature		3
See Requirements tab for approved list.		

Term Semester Hours: 17

Spring

CS 309 & 309L	COMPUTER ORG & SWTCHNG THRY and LABORATORY	3
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CS 321	INTRO OBJECT-ORIENTED PROG JAV	3
MA 244	INTRO TO LINEAR ALGEBRA	3
Social and Behavioral Science		3
See Requirements tab for approved list.		
Fine Art		3
See Requirements tab for approved list.		
Elective		1
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		16
Year 3		
Fall		
CS 317	INTRO DESIGN/ANALYSIS OF ALG	3
CS 300+ Elective Course		3
Choose CS courses at the 300 level not listed in required courses, Ex: CS 330, CS 347, CS 371, CS 390		
MA 385	INTRO TO PROBABILITY STATIST	3
History		3
See Requirements tab for approved list.		
Social and Behavioral Science		3
See Requirements tab for approved list.		
Elective		1
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		16
Spring		
CS 413 & 413L	INTRO DIGITAL COMP ARCHITECTUR and LABORATORY	3
CS 300+ Elective Course		3
Choose CS courses at the 300 level not listed in required courses, Ex: CS 330, CS 347, CS 371, CS 390		
MA 300+ level or higher course or Elective		3
For a Math minor take MA 300+ level course or choose an Elective.		
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Humanities, 2nd Fine Art or 2nd Literature		3
See Requirements tab for approved list.		
2nd History or 3rd Social and Behavioral Science		3
See Requirements tab for approved list.		
Term Semester Hours:		15
Year 4		
Fall		
CS 490	INTRO TO OPERATING SYSTEMS	3
CS 424	PRINCIPLES PROGRAMMING LANG	3
CS 300+ Elective course		3

Choose CS courses at the 300 level not listed in required courses. Ex:

CS 330, CS 347, CS 371, CS 390

EH 301	TECHNICAL WRITING	3
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Technical Elective		3
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Choose any 300+ level or higher course in the College of Science. Ex:

IS 400+ course, CPE 412, CPE 436, or PHL 320

Elective		1
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Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.

Term Semester Hours:	16
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Spring

CS 499	SR PROJ:TEAM SOFTWARE DESIGN	3
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CS 400+ Elective course		3
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CS 400+ Elective course		3
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Choose CS courses at the 400+ level not listed in required courses.

Ex: CS 403, CS 443, CS 445, CS 453, CS 454, CS 465, CS 487

Elective		3
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Elective		3
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Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.

Term Semester Hours:	15
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Total Semester Hours:	128
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Computer Languages and Systems Minor

Requirements for a Computer Languages and Systems minor. This minor is suitable for non-technical majors and minimal mathematics background.

Code	Title	Semester Hours
CS 102	INTRO TO C PROGRAMMING	3
CS 105	COMP SCI SEM:ETH/PROFESS	1
CS 121	COMPUTER SCIENCE I	3
CS 221	COMP SCI II: DATA STRUCTURES	3
CS 321	INTRO OBJECT-ORIENTED PROG JAV	3
CS 300+ elective course		3
CS 300+ elective course		3
Choose CS courses at the 300 level not listed in required courses above, For Ex: CS 307, CS 347, CS 371, CS 390		
CS 400+ elective course		3
Choose CS courses at the 400 level not listed in required courses above, For Ex: CS 424, CS 454, CS 465, CS 487		
Total Semester Hours		22

MA 113, Precalculus Trigonometry or higher math is required. MA 171, Calculus A is strongly recommended. The combination of MA 120 Math Professional Applications and CS 217 Analytic Tech Gaming may be substituted for Calculus A.

Computer Science Minor

Requirements for a Computer Science minor. Useful for students with a major in a technical field.

Code	Title	Semester Hours
CS 105	COMP SCI SEM:ETH/PROFESS	1
CS 121	COMPUTER SCIENCE I	3
CS 214	INTRO DISCRETE STRUCTURE	3

CS 221	COMP SCI II: DATA STRUCTURES	3
CS 317	INTRO DESIGN/ANALYSIS OF ALG	3
CS 321	INTRO OBJECT-ORIENTED PROG JAV	3
CS 300+ level elective		3
CS 309 is recommended if considering a MS in Computer Science		
CS 400+ level elective		3
CS 413 and CS 490 are recommended if considering a MS in Computer Science		
Total Semester Hours		22

Additional courses required for a CS minor are: MA 171 Calculus A, MA 172 Calculus B, and MA 244 Intro to Linear Algebra.

Earth System Science

NSSTC - Cramer Research Hall, Room 4044

Telephone: 256.961.7877

Email: aes@uah.edu

Chair: Dr. John Mecikalski, Professor (<https://www.uah.edu/science/departments/atmospheric-science/faculty-staff/john-mecikalski/>)

The Atmospheric and Earth System Science department offers the following undergraduate degrees:

- Earth System Science, BS - Atmospheric Science/Meteorology Concentration (p. 558)
- Earth System Science, BS - Geographic Information Systems (GIS) & Remote Sensing Concentration (p. 565)
- Earth System Science, BS - Human Dimensions - Societal Impacts (HDSI) Concentration (p. 571)

Program Objectives

The two primary objectives of the AES program are to meet important national, regional and statewide needs for highly technically-educated professionals who understand the Earth as a system, and to produce graduates who will be able to perform a variety of functions in research centers and industry centered in our impact on the Earth system.

Learning Outcomes

Atmospheric and Earth System Science BS Graduates will:

- Demonstrate the ability to deal quantitatively with real-world problems
- Integrate knowledge from multiple disciplines to scientifically address Earth system issues quantitatively
- Work collaboratively in interdisciplinary teams
- Successfully carry out research projects to completion

Majors in Atmospheric and Earth System Science

- Earth System Science, BS - Atmospheric Science/Meteorology Concentration (p. 558)
- Earth System Science, BS - Geographic Information Systems (GIS) & Remote Sensing Concentration (p. 565)
- Earth System Science, BS - Human Dimensions - Societal Impacts (HDSI) Concentration (p. 571)

Minors in Earth System Science:

- Atmospheric Science
- Earth Ecosystems (p. 558)
- Geographic Information Systems/Remote Sensing (p. 578)

- Natural Disaster Impacts and Policy (p. 578)

UAH's Joint Undergraduate Master's Program (JUMP) allows undergraduate students to study at the graduate level. By completing graduate courses in your senior year you may reduce the time taken to earn a graduate (MS) degree. Please visit the JUMP (p. 18) page for general information.

ESS Track JUMPs to MS in Earth System Science

Requirements For Admissions

1. Cumulative Overall 3.5 GPA
2. Major GPA of 3.5
3. ESS 301, PH 112/ PH 115, MA 172, and (CS 102 or CS 103or CS 104) must be taken in Sophomore and Junior years

Additional Information

1. Maximum of 12 credit hours count toward both degrees
2. JUMP students may take ESS 502, ESS 507, ESS 508, ESS 509, ESS 514, ESS 515 in place of the undergraduate versions of these courses (ESS 402, ESS 407, ESS 408, ESS 409, ESS 414, ESS 415)

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- * HDSI Track can JUMP into MS in Earth System Science if Physics with Calculus courses through PH 112 are taken as an option and an extra calculus course, MA 172 is added.

ATS Track JUMPs to MS in Atmospheric Science

Requirements For Admissions

1. Cumulative Overall 3.5 GPA
2. Major GPA of 3.5
3. ESS 301, PH 112/PH 115, MA 238, and (CS 102 or CS 103or CS 104) must be taken in Sophomore and Junior years

Additional Information

1. Maximum of 12 credit hours count toward both degrees
2. JUMP students may take ATS 509, ATS 510, ATS 520, ATS 541, ATS 551, ATS 554, ATS 561, ATS 571, ATS 572 in place of the undergraduate versions of these courses (ESS 409, ESS 410, ESS 420, ESS 441, ESS 451, ESS 454, ESS 461, ESS 471, ESS 472)

Designated Faculty Contact/Advisor

Dr. Lawrence Carey
lawrence.carey@uah.edu
256.824.4030

ESS 100 - INTRODUCTION TO SPACE SCIENCE

Semester Hour: 1

Covers physiology in space, computer systems, and materials in space, robotics, thermodynamics, astrophysics, and solar physics. Laboratory experiments and simulated missions. Offered in cooperation with the U.S. Space & Rocket Center. Prerequisite: Available only to high school students with U.S. citizenship enrolled in Advanced Space Academy®.

ESS 101 - EXPLORING SPACE SC & ENGR

Semester Hour: 1

Exploring Space Science and Engineering courses 1-9. Each course examines an aspect of space exploration including but not limited to space science, human factors, medicine and engineering. Each course focuses on a single aspect. No more than three of the courses in the ESS 101 group may be taken for credit. The courses are offered through distance learning.

ESS 103 - ENVIRONMENTAL EARTH SCIENCE

Semester Hours: 4

Principles and foundations of Earth and environmental science with lectures and labs on concepts in Earth system science. Applied science labs use applications and real-world examples from ecosystems, geology, soil science, water, pollution, agriculture, population, natural disasters and energy.

ESS 103L - LABORATORY

Semester Hours: 0

ESS 104 - WEATHER & CLIMATE CHANGE

Semester Hours: 4

Intro to the atmosphere and climate system, including weather systems, climate extremes, and natural / human-induced changes in the atmosphere - climate systems. Major topics discussed include greenhouse effect, solar impacts on climate, El-Nino, climate change, atmospheric and ocean circulations, cyclones, hurricanes, thunderstorms and tornadoes.

ESS 104L - LABORATORY

Semester Hours: 0

ESS 105 - WORLD REGIONAL GEOGRAPHY

Semester Hours: 3

This course introduces the study of not only the location of places, but more importantly the physical and cultural features, economies, and population of the world's geographic regions. By exploring the interactions between people and their environment.

ESS 110 - PRINCIPLES OF HUMAN GEOGRAPHY

Semester Hours: 3

This course serves as an introduction to geography as the science of location, emphasis on spatial patterns of human activities. Location of economic activities, location of cities as market and production centers, movement networks, and images and perceptions of landscapes form the core of the course.

ESS 111 - WEATHER, CLIMATE & GLOBAL CHNG

Semester Hours: 4

Intro to the atmosphere and climate system, including weather systems, climate extremes, and natural / human-induced changes in the atmosphere - climate system. Major topics discussed include greenhouse effect, solar impacts on climate, El-Nino, climate change, atmospheric and ocean circulations, cyclones, hurricanes, thunderstorms, and tornadoes. Course changed to ESS 104 effective Fall 2020.

ESS 111L - LABORATORY

Semester Hours: 0

Course changed to ESS 104L effective Fall 2020.

ESS 209 - DATA ANALYSIS TOOLS

Semester Hours: 2

Introduction to methods and techniques in data analysis for atmospheric and Earth system sciences. Using case studies and experts from multiple disciplines, students are exposed to GIS, scientific programming principles, satellite image processing, radar data and meteorological software. Course is lab-based, focused on computer software.

ESS 210 - COLLAPSE OF CIVILIZATIONS

Semester Hours: 3

This course will investigate why some cultures succeed and others fail. From archeological and historical records of past civilizations we will examine the factors which lead to collapse in an attempt to determine the future of current societies.

ESS 212 - SEVERE WEATHER ANALYSIS

Semester Hours: 4

Meteorological analysis and beginning forecasting of weather systems, severe weather, snowstorms, hurricanes, and tornadoes through the interpretation of surface, upper air, satellite, and radar weather observations. Strong emphasis placed on unique observations of severe weather from UAH radar and profiling systems. Prerequisite: ESS 104 or ESS 111.

ESS 212L - LABORATORY

Semester Hours: 0

Laboratory. Prerequisite: ESS 104 or ESS 111.

ESS 301 - INTRO TO EARTH & ATMOSPHERIC PHYS

Semester Hours: 3

This course will provide a survey of earth and atmospheric science for undergraduate students. Topics that will be covered will focus on how the earth-atmosphere system works in an integrated fashion. Prerequisites: ESS 103, (ESS 104 or ESS 111), (MA 120 or MA 171), and (PH 101 or PH 111).

ESS 302 - PEOPLE, PLANTS, & ENVIRONMENT

Semester Hours: 3

This course is designed to introduce students from multiple departments to the vital roles that plants have in our ecosystems through the study of basic plant and soil science. Special attention is placed on the impact plants have on our technology-based society. Sophomore standing or above.

ESS 303 - CLASSI & PHYSICAL CAUSES CLIM

Semester Hours: 3

Basic atmospheric structure and physical processes, surface processes, climate history and climate change, land use and land change, microclimates, topoclimates, Ecoclimatology. Prerequisites: ESS 103, (ESS 104 or ESS 111), (MA 120 or MA 171), and (PH 101 or PH 111).

ESS 305 - HYDROLOGY

Semester Hours: 3

Introduction to hydrologic cycles and concepts of how water interacts with the environment. Covers water properties, precipitation, groundwater and runoff, currents, waves, sediment processes, and conservation strategies. Prerequisites: ESS 103, (ESS 104 or ESS 111), (MA 120 or MA 171), and (PH 101 or PH 111).

ESS 307 - ENVIRONMENTAL ARCHEOLOGY

Semester Hours: 3

Archeologists today need a wide range of scientific approaches in order to delineate and interpret the ecology of their sites. This approach is revolutionizing archeology making it relevant to the modern-day world. Investigated in this course includes climate modeling, remote sensing, and GIS. Prerequisite: ESS 103.

ESS 312 - PRINCIPLES OF ECOLOGY

Semester Hours: 4

Lecture/Lab One 3 hour lab a week. Ecological principles controlling plant and animal populations. Development of ecosystems, communities and habitats. Field trips required. Strongly recommend CH 101 or 121. Prerequisite: BYS 120.

ESS 313 - GEOGRAPHIC INFORMATION SYSTEMS

Semester Hours: 3

Introduction to scientific spatial analysis concepts and spatial data processing with focus on ESRI ArcGIS software. Basic concepts in GIS data management and creation, with topics including raster and vector data, projections, data query, data acquisition, and cartography. Prerequisites: ESS 103. Choose 1: CS 102, CS 103, or CS 104.

ESS 321 - POLLUTION PROBLEMS

Semester Hours: 3

Quantitative study of environmental conditions, processes, and problem-solving techniques related to specific pollution problems in air, water, and land. Prerequisites: ESS 103, (ESS 104 or ESS 111), (MA 120 or MA 171), (CH 101 or CH 121), and (PH 101 or PH 111).

ESS 341 - THERMODYNAMIC METEOROLOGY

Semester Hours: 3

Introduction to atmospheric thermodynamics with an emphasis on applications in meteorology, including the equation of state, Zeroth, First and Second Laws of Thermodynamics, adiabatic processes, moist processes, static stability, stability of moist air and severe weather applications. Prerequisites: ESS 301 and Choose 1: CS 102, CS 103, or CS 104. Prerequisites with concurrency: MA 201, PH 112.

ESS 351 - DYNAMIC METEOROLOGY

Semester Hours: 3

Dynamics and kinematics of atmospheric flow. Meteorological coordinate systems. Fundamental governing equations of atmospheric motion, circulation, and vorticity. Prerequisites: PH 111, ESS 301, (CS 102 or CS 103 or CS 104), and MA 201 (with concurrency).

ESS 352 - SYNOPTIC METEOROLOGY

Semester Hours: 3

Analysis, interpretation and forecasting synoptic-scale and mesoscale phenomena, including air masses, frontal systems, cyclones, anti-cyclones, tropical cyclones, and associated mesoscale phenomena. Emphasis is placed on the use of remote sensing data from satellites, radars, and profilers using state-of-the-art workstations. Prerequisite: ESS 212, ESS 341, ESS 351.

ESS 370 - INTRODUCTION TO REMOTE SENSING

Semester Hours: 3

This course introduces the fundamental physics of remote sensing systems and incorporates hands-on exercises of image processing, information extraction and interpretation, and basic applications of airborne and satellite data in Earth System Science and Atmospheric Science. Prerequisites: ESS 103, (ESS 104 or ESS 111), (MA 120 or MA 171), (PH 101 or PH 111), and (CS 102 or CS 103 or CS 104).

ESS 402 - SCI & SOC ASPTS NATRL DISASTER

Semester Hours: 3

Students will understand causes of major natural events and evaluate effects of disasters on populations and possible mitigation measures. GIS software will be used to show progression of events and/or their impacts, with course case studies. Prerequisites: ESS 103 and (ESS 104 or ESS 111).

ESS 407 - ENV THRSTS, PUB POLY, & DEC MKG

Semester Hours: 3

Researchers, policymakers and environmental campaigners have identified 25 potential future threats to the global environment. This course examines the nature and consequences of these threats and their potential impacts for the survival of the human race. Prerequisite: ESS 103.

ESS 408 - PYTHON FOR GIS

Semester Hours: 3

Introduction to GIS model building, Python programming, and automation of scripts for ArcGIS. Techniques in Model Builder, Python, and the methods for automation will be taught using data from numerous available data sources across the internet with heavy emphasis on the Earth Sciences.

Prerequisite: ESS 313.

ESS 409 - SCI PROGRMNG FOR EARTH & ATMOS

Semester Hours: 3

Survey of data types and languages commonly used in the meteorological community along with practical applications to meteorology. Course is designed to prepare students for graduate work and research in atmospheric science. Prerequisite: (CS 102 or CS 103 or CS 104); ESS 301; MA 172; (PH 112 and PH 115).

ESS 410 - OPERATIONAL WEATHER FORECAST'G

Semester Hours: 3

Subjective and objective methods of atmospheric prognosis. Techniques for forecasting critical weather elements. Interpretation, use and systematic errors of computer-generated products, human factors with forecasting, and application of meteorological theory in an operational setting. Prerequisites: ESS 341, ESS 351, ESS 352.

ESS 414 - GEOSPATIAL APPLICATIONS

Semester Hours: 3

An introductory look at the ways in which GIS can be put to use in different fields of study, drawing examples from Demography, Sociology, Archaeology, History, and Ecology. Focus on cartography and map creation principles and public geospatial data acquisition. Prerequisite: ESS 313.

ESS 415 - ADVANCED TOPICS IN GIS

Semester Hours: 3

Advanced continuation of concepts applied in Geospatial Applications. Students will learn through modules of real world scientific research how to use further tools in ArcGIS including: 3D Analyst, Spatial Analyst, Network Analyst. Topics include web data dissemination, spatiotemporal analysis and some basic spatial statistics measures. Prerequisite: ESS 414.

ESS 420 - INTRO ATMOSP CHEM & AIR POLLU

Semester Hours: 3

This self-contained introductory course in atmospheric chemistry and air pollution is designed to provide students the basics of atmospheric chemistry and air pollution concepts. Topics include air pollutants, air-pollution meteorology, atmospheric gases and aerosols, and atmospheric processes.

Prerequisites: PH 112, PH 115, CH 121, ESS 301 and ESS 321.

ESS 441 - ATMOSP THERMODY & CLOUD PHYSIC

Semester Hours: 3

General aspects of thermodynamics and cloud physical processes occurring within the atmosphere; atmospheric statics and stability, saturation point analysis, aerosols, nucleation, and the behavior/growth of cloud particles and hydrometeors. Prerequisites: ESS 341, MA 238, PH 112 and PH 115.

ESS 451 - ATMOSPHERIC FLUID DYNAMICS I

Semester Hours: 3

Fluid dynamics in the atmosphere. Coriolis acceleration, scale analysis and appropriate approximations of the complete governing equations. Numerical analysis and interpretation of weather phenomena. Same as ATS 451. Prerequisites: ESS 351, MA 238, PH 112 and PH 115.

ESS 454 - FORECASTING MESOSCALE PROC

Semester Hours: 3

Detection and forecasting of atmospheric mesoscale phenomena including the structure and evolution of clouds, precipitation (including floods) thunderstorms and severe weather. Includes basics of instruments used to detect mesoscale phenomena, most notably satellite and radar. Prerequisite: ESS 352.

ESS 461 - ATMOSPHERIC RADIATION I

Semester Hours: 3

Fundamentals of terrestrial atmospheric radiation. Topics include: basic concepts, radiative transfer equation, gaseous absorption, scattering by molecules and particles, band models, transmittance along an inhomogeneous path. Prerequisite: ESS 301, MA 238, PH 112 and PH 115.

ESS 471 - RADAR METEOROLOGY

Semester Hours: 3

Introduction to principles of radar meteorology, including radar operations, hardware, interpretation and analysis. Doppler, dual-polarization and dual-wavelength radar theory, methods and applications are covered. Prerequisite: ESS 341, ESS 409.

ESS 472 - SATELLITE METEOROLOGY

Semester Hours: 3

The goal for this course is to provide students in undergraduate and graduate-level Earth and Atmospheric Science a background in satellite meteorology. During all components of the course there will be a heavy emphasis on practical meteorological satellite interpretation with respect to land surface and especially atmospheric features. Prerequisites: ESS 212 and ESS 370. Prerequisites with Concurrency: ESS 408 or ESS 409.

ESS 490 - SPEC TOPICS EARTH & ATMOSPHERIC SCIENCE

Semester Hours: 1-3

Special offerings to students in areas of interest not covered in the present curriculum. Prerequisite: permission of instructor.

ESS 495 - DIRECTED STUDY

Semester Hours: 2-4

Supervised special study topics for undergraduates; often is offered to undergraduates who have senior standing. Individual students identify and obtain consent from a faculty mentor.

ESS 497 - UNDERGRADUATE INTERNSHIP

Semester Hours: 3

Individual internships in fields directly related to atmospheric or Earth system science. Student must show acceptance into a formal internship program, and the course requires approval by department chair and consent by the internship supervisor.

ESS 498 - RESEARCH & PROFESSIONAL DEVELOPMENT CAPSTONE

Semester Hour: 1

Applied concepts for professional and research development. Includes evaluation and discussion of published literature and department seminars, with focus on research synthesis and critique. Also includes development of professional and career skills focused on the Earth and Atmospheric Sciences. Junior or Senior Standing required.

ESS 499 - UNDERGRADUATE RESEARCH

Semester Hours: 2-4

For advanced Earth System Science students. Individual investigations into Earth systems science problems under direct supervision of a research mentor. Research is conducted and thesis-style paper is written and orally presented. Students identify and obtain consent from a faculty research mentor.

Atmospheric Science Minor

A minor in Atmospheric science consists of:

Code	Title	Semester Hours
Required courses:		
ESS 103 & 103L	ENVIRONMENTAL EARTH SCIENCE and LABORATORY	4
ESS 111 & 111L	WEATHER, CLIMATE & GLOBAL CHNG and LABORATORY	4
ESS 212 & 212L	SEVERE WEATHER ANALYSIS and LABORATORY	4
ESS 301	INTRO TO EARTH & ATMOSPHERIC PHYS	3
Elective courses: Choose at least 2 courses, minimum of 6 credit hours from these courses:		6
ESS 303	CLASSICAL & PHYSICAL CAUSES CLIMATE	
ESS 321	POLLUTION PROBLEMS	

ESS 351	DYNAMIC METEOROLOGY	
ESS 352	SYNOPTIC METEOROLOGY	
ESS 409	SCI PROGRMNG FOR EARTH & ATMOS	
ESS 410	OPERATIONAL WEATHER FORECAST'G	
ESS 420	INTRO ATMOSP CHEM & AIR POLLU	
ESS 441	ATMOSP THERMODY & CLOUD PHYSIC	
ESS 451	ATMOSPHERIC FLUID DYNAMICS I	
ESS 454	FORECASTING MESOSCALE PROC	
ESS 461	ATMOSPHERIC RADIATION I	
ESS 471	RADAR METEOROLOGY	
Total credit hours		21

Earth Ecosystems Minor

A minor in Earth Ecosystems consists of:

Code	Title	Semester Hours
Required courses:		
ESS 103 & 103L	ENVIRONMENTAL EARTH SCIENCE and LABORATORY	
ESS 111 & 111L	WEATHER, CLIMATE & GLOBAL CHNG and LABORATORY	
ESS 302	PEOPLE, PLANTS, & ENVIRONMENT	
ESS 312	PRINCIPLES OF ECOLOGY	
Elective courses: Choose at least 2 courses, minimum of 6 credit hours from these courses:		6
ESS 210	COLLAPSE OF CIVILIZATIONS	
ESS 303	CLASSI & PHYSICAL CAUSES CLIM	
ESS 307	ENVIRONMENTAL ARCHEOLOGY	
ESS 313	GEOGRAPHIC INFORMATION SYSTEMS	
ESS 321	POLLUTION PROBLEMS	
ESS 370	INTRODUCTION TO REMOTE SENSING	
ESS 407	ENV THRTS, PUB POLY, & DEC MKG	
ESS 408	PYTHON FOR GIS	
ESS 414	GEOSPATIAL APPLICATIONS	
ESS 415	ADVANCED TOPICS IN GIS	
Total credit hours		21

Earth System Sciences, B.S. - Atmospheric Science/Meteorology Concentration

Earth System Science, Atmospheric Science/Meteorology Concentration, BS Requirements:

- All students are encouraged to see an advisor after completion of 24 credits.
- Earth System Science, concentration in Atmospheric Science/Meteorology, BS degree requires 128 credit hours.
- 39 of 128 credit hours must be taken at 300 level or higher (39 credits includes courses taken at the 300+ level in major, minor (if chosen), Pre professional area and electives).
- 12 credit hours of 300 level and above must be taken in the major or 6 credit hours in the major and 6 credit hours in the minor (if chosen).
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- Unless otherwise noted a C- or better is required for all College of Science prerequisite courses.
- No more than 64 credit hours from a two-year college can be applied toward a UAH degree.

- For graduation application instructions, see here (p. 812).

Degree Requirements

Charger Foundations Requirements

*Please see Area V for CoS requirements that can also be used to fulfill Charger Foundations Requirements.

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S or WLC 101A or WLC 101F or WLC 101G or WLC 101J or WLC 101R	INTRO FOREIGN LANG I: SPANISH INTRO FOREIGN LANG I: ARABIC INTRO FOREIGN LANG I:FRENCH INTRO FOREIGN LANG I:GERMAN INTRO FOREIGN LANG I:JAPANESE INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S or WLC 102A or WLC 102F or WLC 102G or WLC 102J or WLC 102R	INTRO FOREIGN LANG II:SPANISH INTRO FOREIGN LANG II: ARABIC INTRO FOREIGN LANG II:FRENCH INTRO FOREIGN LANG II:GERMAN INTRO FOREIGN LANG II:JAPANESE INTRO FOREIGN LANG II:RUSSIAN	
WLC 201S or WLC 201A or WLC 201F or WLC 201G or WLC 201J or WLC 201R	INTERM FOREIGN LANG:SPANISH INTERM FOREIGN LANG I: ARABIC INTERM FOREIGN LANG:FRENCH INTERM FOREIGN LANG:GERMAN INTERM FOREIGN LANG: JAPANESE INTERM FOREIGN LANG:RUSSIAN	
WLC 202S or WLC 202A or WLC 202F or WLC 202G	INTERM FOREIGN LANG II:SPANISH INTERM FOREIGN LANG II: ARABIC INTERM FOREIGN LANG II:FRENCH INTERM FOREIGN LANG II:GERMAN	

or WLC 202J	INTERM FORGN LANG II:JAPANESE
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN
WLC 204	INTERNATIONAL CINEMA
PHL 101	INTRODUCTION TO PHILOSOPHY
PHL 102	INTRO TO ETHICS
PHL 103	INTRODUCTION TO LOGIC
PHL 150	TECH, SCIENCE & HUMAN VALUES
WGS 200	INTRO WOMEN'S & GENDER STUDIES
AMS 229	ANCIENT & MEDIEVAL WORLDS
ARH 100	ARH SURV:ANCIENT-MEDIEVAL
ARH 101	ARH SURV:RENAISSANCE-MODERN
ARH 103	ARH SUR:NON-WESTERN TRADITIONS
ARS 160	DRAWING: FOUNDATIONS
TH 122	THEATRE APPRECIATION
TH 123	INTRO TO FILM STUDIES
MU 100	INTRO TO MUSIC LITERATURE

Area III: Mathematics and Sciences**11-12****Mathematics****3-4**

MA 105	NATURE OF MATHEMATICS
MA 107	ALGEBRA WITH APPLICATIONS
MA 110	FINITE MATHEMATICS
MA 112	PRECALCULUS ALGEBRA
MA 113	PRECALCULUS TRIGONOMETRY
MA 115	PRECALCULUS ALGEBRA & TRIG
MA 120	MATH PROFESSIONAL APPLICATIONS
MA 171	CALCULUS A

Natural Sciences (Lab)**8**

AST 100	SURVEY OF ASTRONOMY
AST 106	EXPLORING THE COSMOS I
AST 107	EXPLORING THE COSMOS II
BYS 109	FUNDAMENTALS OF BIOLOGY
BYS 119	PRINCIPLES OF BIOLOGY
BYS 120	ORGANISMAL BIOLOGY
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB
ESS 103	ENVIRONMENTAL EARTH SCIENCE
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG
PH 100	CONCEPTUAL PHYSICS
PH 101	GENERAL PHYSICS I
PH 102	GENERAL PHYSICS II
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III

Area IV: History and Social and Behavioral Sciences* **12**
History **3-6**

HY 103	WORLD HISTORY TO 1500
HY 104	WORLD HISTORY SINCE 1500
HY 221	UNITED STATES TO 1877
HY 222	UNITED STATES SINCE 1877

Social and Behavioral Sciences **6-9**

ECN 142	PRINC OF MACROECONOMICS
ECN 143	PRINC OF MICROECONOMICS
GS 200	GLOBAL SYSTEMS AND CULTURES
ESS 105	WORLD REGIONAL GEOGRAPHY
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY
PSC 101	INTRO TO AMERICAN GOVERNMENT
PSC 102	INTRO TO COMPARATIVE POLITICS
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS
PY 101	GENERAL PSYCHOLOGY I
PY 201	LIFE-SPAN DEVELOPMENT
SOC 100	INTRO TO SOCIOLOGY
SOC 102	ANALYSIS OF SOCIAL PROBLEMS
SOC 103	INTRO TO CRIMINOLOGY
SOC 105	INTRO CULTURAL ANTHROPOLOGY

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Take no more than six hours in a single discipline in Area II or Area IV.

Area V: Pre Professional Requirements

Code	Title	Semester Hours
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Courses in this area may also be used to fulfill Charger Foundations requirements

Communications **3**

CM 113	Intro to Rhetorical Communication
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Mathematics² **18**

MA 171	CALCULUS A
MA 172	CALCULUS B
MA 201	CALCULUS C
MA 238	APPL DIFFERENTIAL EQUATIONS ⁵
MA 385	INTRO TO PROBABILITY & STATIST ⁵

Chemistry **4**

CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I ⁵
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Physics **8**

PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I ⁵
and	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II ⁵

Computer Science choose one: **3**

CS 102	INTRO TO C PROGRAMMING
or CS 103	INTRO PROGRAMMING USING JAVA
or CS 104	INTRO TO CS USING PYTHON

*CS 104 strongly recommended

Technical Writing **3**

EH 301	TECHNICAL WRITING
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Major Requirements

Code	Title	Semester Hours
Earth System Science Core		20
ESS 103 & 103L	ENVIRONMENTAL EARTH SCIENCE and LABORATORY	
ESS 111 & 111L	WEATHER, CLIMATE & GLOBAL CHNG and LABORATORY	
ESS 209	DATA ANALYSIS TOOLS	
ESS 301	INTRO TO EARTH & ATMOSPHERIC PHYS ⁵	
ESS 303	CLIMATE & PHYSICAL CAUSES CLIM ⁵	
ESS 370	INTRODUCTION TO REMOTE SENSING ⁵	
ESS 498	RESEARCH & PROF DEV CAPSTONE	
Atmospheric Science Concentration Requirements		19
ESS 212 & 212L	SEVERE WEATHER ANALYSIS and LABORATORY	
ESS 305	HYDROLOGY ⁵	
ESS 321	POLLUTION PROBLEMS	
ESS 341	THERMODYNAMIC METEOROLOGY	
ESS 351	DYNAMIC METEOROLOGY	
ESS 409 or ESS 408	SCI PROGRAMMING FOR EARTH & ATMOS ⁵ PYTHON FOR GIS	
Atmospheric Science Concentration elective courses: Choose at least 11 credit hours		14-16
ESS 313	GEOGRAPHIC INFORMATION SYSTEMS (GEOGRAPHIC INFORMATION SYSTEMS) ⁷	
ESS 352	SYNOPTIC METEOROLOGY ⁶	
ESS 408 or ESS 409	PYTHON FOR GIS ⁷ SCI PROGRAMMING FOR EARTH & ATMOS	
ESS 410	OPERATIONAL WEATHER FORECASTING ⁶	
ESS 414	GEOSPATIAL APPLICATIONS ⁷	
ESS 420	INTRO ATMOSPHERIC CHEM & AIR POLLU	
ESS 441	ATMOSPHERIC THERMODYNAMICS & CLOUD PHYSICS ⁵	
ESS 451	ATMOSPHERIC FLUID DYNAMICS I	
ESS 454	FORECASTING MESOSCALE PROC ⁶	
ESS 461	ATMOSPHERIC RADIATION I	
ESS 471	RADAR METEOROLOGY	
ESS 472	SATELLITE METEOROLOGY	
ESS 495	DIRECTED STUDY ⁸	
ESS 497	UNDERGRADUATE INTERNSHIP	
ESS 499	UNDERGRADUATE RESEARCH ⁸	

Elective Requirements

Code	Title	Semester Hours
Elective Courses		9-11
Additional Elective courses 100+ level to reach 128 credit hours. Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credits of 100 level HPE courses can count toward degree requirements.		

Overall Requirements

Code	Title	Semester Hours
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All College of Science degrees must have at least 128 credits.

At least 39 of the 128 credits must be at the 300+ level. These may be taken in any area including electives.

Total Semester Hours **128**

- 1 Students must take one literature and one history course. Students must also take either a second literature or history course to complete a sequence. Acceptable Literature sequences must include one early literature (EH 207 or EH 242 or EH 209) and one later literature (EH 208 or EH 210). Acceptable history sequences are (HY 103 + HY 104), or (HY 221 + HY 222)
- 2 Based on Math placement, (<http://www.uah.edu/science/departments/math/undergraduate-students/placement/>) prerequisite MA 112 and/or MA 113 Mathematics courses may be required.
- 3 No more than 6 credit hours can be taken in a single discipline.
- 4 For choices see the World Languages and Cultures (p. 205) department.
- 5 PH 111 + PH 114, PH 112 + PH 115, MA 238, MA 385, CH 121+ CH 125, ESS 301, ESS 303, ESS 305, ESS 351, ESS 370, ESS 409, ESS 441, ESS 471. These courses partially satisfy the National Weather Service GS-1340 Federal Civil Service Requirements.
- 6 ESS 410, ESS 352, ESS 454. Choose at least two of these elective courses to complete the National Weather Service GS-1340 Federal Civil Service Requirements.
- 7 ESS 313, ESS 408 and ESS 414. Student may choose 2 of these 3 GIS tools courses to count in the 'choose 5 electives' section.
- 8 ESS 495 or ESS 497 or ESS 499. Students may choose one of these courses to count as an Atmospheric Science/Meteorology concentration elective.

Sample four year plan for Earth System Science, Atmospheric Science/Meteorology Concentration, BS degree:

Note: This is only an example and variations are possible.

Year 1

Fall		Semester Hours
FYE 101S	CHARGER SUCCESS - SCIENCE	1
ESS 103 & 103L	ENVIRONMENTAL EARTH SCIENCE and LABORATORY	4
ESS 111 & 111L	WEATHER, CLIMATE & GLOBAL CHNG and LABORATORY	4
MA 171	CALCULUS A	4
EH 101	COLLEGE WRITING I	3
Term Semester Hours:		16
Spring		
ESS 212 & 212L	SEVERE WEATHER ANALYSIS and LABORATORY	4
MA 172	CALCULUS B	4
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	4
EH 102	COLLEGE WRITING II	3
Elective		1
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		16

Year 2

Fall		
ESS 209	DATA ANALYSIS TOOLS	2
ESS 301	INTRO TO EARTH ATMOSPHERIC PHYS	3
CS 102 or CS 103	INTRO TO C PROGRAMMING or INTRO PROGRAMMING USING JAVA	3

or CS 104	or INTRO TO CS USING PYTHON	
*CS 104 strongly recommended		
MA 201	CALCULUS C	4
PH 112	GEN PHYSICS W/CALC II	4
& PH 115	and GENERAL PHYSICS LAB II	
Term Semester Hours:		16
Spring		
ESS 105	WORLD REGIONAL GEOGRAPHY	3
ESS 303	CLASSI PHYSICAL CAUSES CLIM	3
MA 238	APPL DIFFERENTIAL EQUATIONS	3
CH 121	GENERAL CHEMISTRY I	4
& CH 125	and GENERAL CHEMISTRY LAB I	
Fine Art		3
See Requirements tab for approved list.		
Term Semester Hours:		16
Year 3		
Fall		
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	3
ESS 321	POLLUTION PROBLEMS	3
ESS 341	THERMODYNAMIC METEOROLOGY	3
ESS 351	DYNAMIC METEOROLOGY	3
MA 385	INTRO TO PROBABILITY STATIST	3
Elective		1
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		16
Spring		
ESS 305	HYDROLOGY	3
ESS 352	SYNOPTIC METEOROLOGY	3
ESS 370	INTRODUCTION TO REMOTE SENSING	3
ESS 498	RESEARCH PROF DEV CAPSTONE	1
History		3
See Requirements tab for approved list.		
Literature		3
See Requirements tab for approved list.		
Term Semester Hours:		16
Year 4		
Fall		
ESS 409	SCI PROGRMNG FOR EARTH ATMOS	3
or ESS 408	or PYTHON FOR GIS	
ESS 410	OPERATIONAL WEATHER FORECAST'G	3
EH 301	TECHNICAL WRITING	3
CM 113	Intro to Rhetorical Communication	3
2nd History or 3rd Social and Behavioral Science		3
See Requirements tab for approved list.		
Elective		1

Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.

	Term Semester Hours:	16
Spring		
ESS 454	FORECASTING MESOSCALE PROC	3
ESS 471	RADAR METEOROLOGY	3
Humanities, 2nd Fine Art or 2nd Literature		3
See Requirements tab for approved list.		
Elective		3
Elective		3
Elective		1
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
	Term Semester Hours:	16
	Total Semester Hours:	128

Earth System Sciences, B.S. - Geographic Information Systems (GIS) & Remote Sensing Concentration

Earth System Science, Geographic Information Systems (GIS) and Remote Sensing Concentration, BS Requirements:

- All students are encouraged to see an advisor after completion of 24 credits.
- Earth System Science, GIS and Remote Sensing Concentration, BS degree requires 128 credit hours.
- 39 of 128 credit hours must be taken at 300 level or higher (39 credits includes courses taken at the 300+ level in major, minor (if chosen), Pre professional area and electives).
- 12 credit hours of 300 level and above must be taken in the major or 6 credit hours in the major and 6 credit hours in the minor (if chosen).
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- Unless otherwise noted a C- or better is required for all College of Science prerequisite courses.
- No more than 64 credit hours from a two-year college can be applied toward a UAH degree.
- For graduation application instructions, see here (p. 812).

Degree Requirements

Charger Foundations Requirements

*Please see Area V for CoS requirements that can also be used to fulfill Charger Foundations Requirements.

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	

ARH 103	ARH SUR:NON-WESTERN TRADITIONS
ARS 160	DRAWING: FOUNDATIONS
TH 122	THEATRE APPRECIATION
TH 123	INTRO TO FILM STUDIES
MU 100	INTRO TO MUSIC LITERATURE
Literature	
EH 207	READINGS LITERATURE/CULTURE I
EH 208	READINGS LITERATURE/CULTURE 2
EH 209	HONORS SEM READINGS LIT/CUL I
EH 210	HONORS SEM READINGS LIT/CUL 2
EH 242	MYTHOLOGY
Humanities and Fine Arts	
CM 113	Intro to Rhetorical Communication
WLC 101S	INTRO FOREIGN LANG I: SPANISH
or WLC 101A	INTRO FOREIGN LANG I: ARABIC
or WLC 101F	INTRO FOREIGN LANG I:FRENCH
or WLC 101G	INTRO FOREIGN LANG I:GERMAN
or WLC 101J	INTRO FOREIGN LANG I:JAPANESE
or WLC 101R	INTRO FOREIGN LANG I:RUSSIAN
WLC 102S	INTRO FOREIGN LANG II:SPANISH
or WLC 102A	INTRO FOREIGN LANG II: ARABIC
or WLC 102F	INTRO FOREIGN LANG II:FRENCH
or WLC 102G	INTRO FOREIGN LANG II:GERMAN
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN
WLC 201S	INTERM FOREIGN LANG:SPANISH
or WLC 201A	INTERM FOREIGN LANG I: ARABIC
or WLC 201F	INTERM FOREIGN LANG:FRENCH
or WLC 201G	INTERM FOREIGN LANG:GERMAN
or WLC 201J	INTERM FOREIGN LANG: JAPANESE
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN
WLC 202S	INTERM FOREIGN LANG II:SPANISH
or WLC 202A	INTERM FOREIGN LANG II: ARABIC
or WLC 202F	INTERM FOREIGN LANG II:FRENCH
or WLC 202G	INTERM FOREIGN LANG II:GERMAN
or WLC 202J	INTERM FORGN LANG II:JAPANESE
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN
WLC 204	INTERNATIONAL CINEMA
PHL 101	INTRODUCTION TO PHILOSOPHY
PHL 102	INTRO TO ETHICS
PHL 103	INTRODUCTION TO LOGIC
PHL 150	TECH, SCIENCE & HUMAN VALUES
WGS 200	INTRO WOMEN'S & GENDER STUDIES
AMS 229	ANCIENT & MEDIEVAL WORLDS
ARH 100	ARH SURV:ANCIENT-MEDIEVAL
ARH 101	ARH SURV:RENAISSANCE-MODERN
ARH 103	ARH SUR:NON-WESTERN TRADITIONS
ARS 160	DRAWING: FOUNDATIONS
TH 122	THEATRE APPRECIATION
TH 123	INTRO TO FILM STUDIES
MU 100	INTRO TO MUSIC LITERATURE

Mathematics		3-4
MA 105	NATURE OF MATHEMATICS	
MA 107	ALGEBRA WITH APPLICATIONS	
MA 110	FINITE MATHEMATICS	
MA 112	PRECALCULUS ALGEBRA	
MA 113	PRECALCULUS TRIGONOMETRY	
MA 115	PRECALCULUS ALGEBRA & TRIG	
MA 120	MATH PROFESSIONAL APPLICATIONS	
MA 171	CALCULUS A	
Natural Sciences (Lab)		8
AST 100	SURVEY OF ASTRONOMY	
AST 106	EXPLORING THE COSMOS I	
AST 107	EXPLORING THE COSMOS II	
BYS 109	FUNDAMENTALS OF BIOLOGY	
BYS 119	PRINCIPLES OF BIOLOGY	
BYS 120	ORGANISMAL BIOLOGY	
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I	
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB	
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB	
ESS 103	ENVIRONMENTAL EARTH SCIENCE	
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG	
PH 100	CONCEPTUAL PHYSICS	
PH 101	GENERAL PHYSICS I	
PH 102	GENERAL PHYSICS II	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	
Area IV: History and Social and Behavioral Sciences*		12
History		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Sciences		6-9
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
ESS 105	WORLD REGIONAL GEOGRAPHY	
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS	
PY 101	GENERAL PSYCHOLOGY I	
PY 201	LIFE-SPAN DEVELOPMENT	

SOC 100	INTRO TO SOCIOLOGY
SOC 102	ANALYSIS OF SOCIAL PROBLEMS
SOC 103	INTRO TO CRIMINOLOGY
SOC 105	INTRO CULTURAL ANTHROPOLOGY

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Take no more than six hours in a single discipline in Area II or Area IV.

Area V: Pre Professional Requirements

Code	Title	Semester Hours
Courses in this area may also be used to fulfill Charger Foundations requirements		
Communications		3
CM 113	Intro to Rhetorical Communication	
Mathematics ²		8
MA 171	CALCULUS A	
MA 172	CALCULUS B	
Statistics		6-7
MA 281	ELEMENTS OF STATISTICAL ANALYS	
and		
PSC 300	INTRO SOCIAL SCIENCE STATISTIC	
Chemistry		4
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I ⁵	
Physics		8
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I ⁵	
and		
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II ⁵	
Computer Science: choose one		3
CS 102	INTRO TO C PROGRAMMING	
or CS 103	INTRO PROGRAMMING USING JAVA	
or CS 104	INTRO TO CS USING PYTHON	
*CS 104 strongly recommended		
Technical Writing		3
EH 301	TECHNICAL WRITING	

Major Requirements

Code	Title	Semester Hours
Earth System Science Core		20
ESS 103 & 103L	ENVIRONMENTAL EARTH SCIENCE and LABORATORY	
ESS 111 & 111L	WEATHER, CLIMATE & GLOBAL CHNG and LABORATORY	
ESS 209	DATA ANALYSIS TOOLS	
ESS 301	INTRO TO EARTH & ATMOSPHERIC PHYS	
ESS 303	CLASSICAL & PHYSICAL CAUSES CLIM	
ESS 370	INTRODUCTION TO REMOTE SENSING	
ESS 498	RESEARCH & PROF DEV CAPSTONE	
GIS and Remote Sensing Concentration Requirements		18
ESS 305	HYDROLOGY	
ESS 313	GEOGRAPHIC INFORMATION SYSTEMS (Geographic Information Systems)	

ESS 321	POLLUTION PROBLEMS
ESS 408	PYTHON FOR GIS
ESS 414	GEOSPATIAL APPLICATIONS
GIS and Remote Sensing concentration elective courses: Choose at least 15 credit hours	
ESS 307	ENVIRONMENTAL ARCHEOLOGY
ESS 402	SCI & SOC ASPTS NATRL DISASTER
ESS 407	ENV THRTS, PUB POLY, & DEC MKG
ESS 409	SCI PROGRMNG FOR EARTH & ATMOS
ESS 415	ADVANCED TOPICS IN GIS
ESS 472	SATELLITE METEOROLOGY
ESS 495	DIRECTED STUDY ⁵
ESS 497	UNDERGRADUATE INTERNSHIP
ESS 499	UNDERGRADUATE RESEARCH ⁵

Elective Requirements

Code	Title	Semester Hours
Elective Courses		12-15
Additional Elective courses 100+ level to reach 128 credit hours. Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credits of 100 level HPE courses can count toward degree requirements.		

Overall Requirements

Code	Title	Semester Hours
All College of Science degrees must have at least 128 credits.		
At least 39 of the 128 credits must be at the 300+ level. These may be taken in any area including electives.		
Total Semester Hours		128

- ¹ Students must take one literature and one history course. Students must also take either a second literature or history course to complete a sequence. Acceptable Literature sequences must include one early literature (EH 207 or EH 242 or EH 209) and one later literature (EH 208 or EH 210). Acceptable history sequences are (HY 103 + HY 104), or (HY 221 + HY 222)
- ² Based on Math placement, (<http://www.uah.edu/science/departments/math/undergraduate-students/placement/>) prerequisite MA 112 and/or MA 113 Mathematics courses may be required.
- ³ No more than 6 credit hours can be taken in a single discipline.
- ⁴ For choices see the World Languages and Cultures (p. 205) department.
- ⁵ ESS 495 or ESS 497 or ESS 499. Students may choose one of these courses to count as a GIS and Remote Sensing concentration elective.

Sample four year plan for Earth System Science, GIS & Remote Sensing Concentration, BS degree:

Note: This is only an example and variations are possible.

Year 1

Fall		Semester Hours
FYE 101S	CHARGER SUCCESS - SCIENCE	1
EH 101	COLLEGE WRITING I	3
ESS 103 & 103L	ENVIRONMENTAL EARTH SCIENCE and LABORATORY	4
ESS 111 & 111L	WEATHER, CLIMATE & GLOBAL CHNG and LABORATORY	4
MA 171	CALCULUS A	4
Term Semester Hours:		16
Spring		
ESS 105	WORLD REGIONAL GEOGRAPHY	3
MA 172	CALCULUS B	4

PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	4
EH 102	COLLEGE WRITING II	3
Elective		1
Elective		1
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		16
Year 2		
Fall		
ESS 209	DATA ANALYSIS TOOLS	2
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	3
MA 281	ELEMENTS OF STATISTICAL ANALYS	3
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	4
CS 102	INTRO TO C PROGRAMMING	3
or CS 103	or INTRO PROGRAMMING USING JAVA	
or CS 104	or INTRO TO CS USING PYTHON	
*CS 104 strongly recommended		
Elective		1
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		16
Spring		
ESS 301	INTRO TO EARTH ATMOSPHC PHYS	3
ESS 303	CLASSI PHYSICAL CAUSES CLIM	3
ESS 313	GEOGRAPHIC INFORMATION SYSTEMS	3
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	4
CM 113	Intro to Rhetorical Communication	3
Term Semester Hours:		16
Year 3		
Fall		
ESS 321	POLLUTION PROBLEMS	3
ESS 370	INTRODUCTION TO REMOTE SENSING	3
ESS 414	GEOSPATIAL APPLICATIONS	3
History		3
See Requirements tab for approved list.		
Literature		3
See Requirements tab for approved list.		
Elective		1
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		16
Spring		

ESS 305	HYDROLOGY	3
ESS 408	PYTHON FOR GIS	3
ESS 415	ADVANCED TOPICS IN GIS	3
ESS 498	RESEARCH PROF DEV CAPSTONE	1
2nd History or 3rd Social and Behavioral science		3
See Requirements tab for approved list.		
Fine Art		3
See Requirements tab for approved list.		
Term Semester Hours:		16
Year 4		
Fall		
EH 301	TECHNICAL WRITING	3
ESS 402	SCI SOC ASPTS NATRL DISASTER	3
GIS and Remote Sensing Elective		3
See Requirements tab for approved list.		
Humanities, 2nd Fine art or 2nd Literature		3
See Requirements tab for approved list.		
Elective		3
Elective		1
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		16
Spring		
ESS 407	ENV THRSTS, PUB POLY, DEC MKG	3
ESS 409	SCI PROGRMNG FOR EARTH ATMOS	3
PSC 300	INTRO SOCIAL SCIENCE STATISTIC	3
GIS and Remote Sensing Elective		3
See Requirements tab for approved list.		
Elective		3
Elective		1
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		16
Total Semester Hours:		128

Earth System Sciences, B.S. - Human Dimensions - Societal Impacts Concentration

Earth System Science, Human Dimensions and Societal Impacts Concentration, BS Requirements:

- All students are encouraged to see an advisor after completion of 24 credits.
- Earth System Science, Human Dimensions and Societal Impacts Concentration, BS degree requires 128 credit hours.
- 39 of 128 credit hours must be taken at 300 level or higher (39 credits includes courses taken at the 300+ level in major, minor (if chosen), Pre professional area and electives).

- 12 credit hours of 300 level and above must be taken in the major or 6 credit hours in the major and 6 credit hours in the minor (if chosen).
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- Unless otherwise noted a C- or better is required for all College of Science prerequisite courses.
- No more than 64 credit hours from a two-year college can be applied toward a UAH degree.
- For graduation application instructions, see here (p. 812).

Degree Requirements

Charger Foundations Requirements

*Please see Area V for CoS requirements that can also be used to fulfill Charger Foundations Requirements.

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S or WLC 101A or WLC 101F or WLC 101G or WLC 101J or WLC 101R	INTRO FOREIGN LANG I: SPANISH INTRO FOREIGN LANG I: ARABIC INTRO FOREIGN LANG I:FRENCH INTRO FOREIGN LANG I:GERMAN INTRO FOREIGN LANG I:JAPANESE INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S or WLC 102A or WLC 102F or WLC 102G or WLC 102J or WLC 102R	INTRO FOREIGN LANG II:SPANISH INTRO FOREIGN LANG II: ARABIC INTRO FOREIGN LANG II:FRENCH INTRO FOREIGN LANG II:GERMAN INTRO FOREIGN LANG II:JAPANESE INTRO FOREIGN LANG II:RUSSIAN	
WLC 201S	INTERM FOREIGN LANG:SPANISH	

or WLC 201A	INTERM FOREIGN LANG I: ARABIC
or WLC 201F	INTERM FOREIGN LANG:FRENCH
or WLC 201G	INTERM FOREIGN LANG:GERMAN
or WLC 201J	INTERM FOREIGN LANG: JAPANESE
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN
WLC 202S	INTERM FOREIGN LANG II:SPANISH
or WLC 202A	INTERM FOREIGN LANG II: ARABIC
or WLC 202F	INTERM FOREIGN LANG II:FRENCH
or WLC 202G	INTERM FOREIGN LANG II:GERMAN
or WLC 202J	INTERM FORGN LANG II:JAPANESE
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN
WLC 204	INTERNATIONAL CINEMA
PHL 101	INTRODUCTION TO PHILOSOPHY
PHL 102	INTRO TO ETHICS
PHL 103	INTRODUCTION TO LOGIC
PHL 150	TECH, SCIENCE & HUMAN VALUES
WGS 200	INTRO WOMEN'S & GENDER STUDIES
AMS 229	ANCIENT & MEDIEVAL WORLDS
ARH 100	ARH SURV:ANCIENT-MEDIEVAL
ARH 101	ARH SURV:RENAISSANCE-MODERN
ARH 103	ARH SUR:NON-WESTERN TRADITIONS
ARS 160	DRAWING: FOUNDATIONS
TH 122	THEATRE APPRECIATION
TH 123	INTRO TO FILM STUDIES
MU 100	INTRO TO MUSIC LITERATURE

Area III: Mathematics and Sciences**11-12**

Mathematics	3-4
MA 105	NATURE OF MATHEMATICS
MA 107	ALGEBRA WITH APPLICATIONS
MA 110	FINITE MATHEMATICS
MA 112	PRECALCULUS ALGEBRA
MA 113	PRECALCULUS TRIGONOMETRY
MA 115	PRECALCULUS ALGEBRA & TRIG
MA 120	MATH PROFESSIONAL APPLICATIONS
MA 171	CALCULUS A
Natural Sciences (Lab)	8
AST 100	SURVEY OF ASTRONOMY
AST 106	EXPLORING THE COSMOS I
AST 107	EXPLORING THE COSMOS II
BYS 109	FUNDAMENTALS OF BIOLOGY
BYS 119	PRINCIPLES OF BIOLOGY
BYS 120	ORGANISMAL BIOLOGY
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB
ESS 103	ENVIRONMENTAL EARTH SCIENCE
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG

PH 100	CONCEPTUAL PHYSICS	
PH 101	GENERAL PHYSICS I	
PH 102	GENERAL PHYSICS II	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	
Area IV: History and Social and Behavioral Sciences*		12
History		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Sciences		6-9
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
ESS 105	WORLD REGIONAL GEOGRAPHY	
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS	
PY 101	GENERAL PSYCHOLOGY I	
PY 201	LIFE-SPAN DEVELOPMENT	
SOC 100	INTRO TO SOCIOLOGY	
SOC 102	ANALYSIS OF SOCIAL PROBLEMS	
SOC 103	INTRO TO CRIMINOLOGY	
SOC 105	INTRO CULTURAL ANTHROPOLOGY	

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Take no more than six hours in a single discipline in Area II or Area IV.

Area V: Pre Professional Requirements

Code	Title	Semester Hours
Courses in this area may also be used to fulfill Charger Foundations requirements		
Communications		3
CM 113	Intro to Rhetorical Communication	
Calculus: choose one ²		3-4
MA 120	MATH PROFESSIONAL APPLICATIONS	
or		
MA 171	CALCULUS A	
Statistics		6-7
MA 281	ELEMENTS OF STATISTICAL ANALYSIS	
and		
PSC 300	INTRO SOCIAL SCIENCE STATISTICS	
Chemistry: choose one		4
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I ⁵	
or		
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB	

Physics Sequence: choose one sequence 8

PH 101
& 101L GENERAL PHYSICS I
and GENERAL PHYSICS I LAB

and

PH 102
& 102L GENERAL PHYSICS II
and GENERAL PHYSICS LAB II

OR

PH 111
& PH 114 GEN PHYSICS W/CALCULUS I
and GENERAL PHYSICS LAB I ⁵

and

PH 112
& PH 115 GEN PHYSICS W/CALC II
and GENERAL PHYSICS LAB II ⁵

Computer Science: choose one 3

CS 102 INTRO TO C PROGRAMMING
or CS 103 INTRO PROGRAMMING USING JAVA
or CS 104 INTRO TO CS USING PYTHON

*CS 104 strongly recommended

Technical Writing 3

EH 301 TECHNICAL WRITING

Major Requirements

Code	Title	Semester Hours
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Earth System Science Core 20

ESS 103
& 103L ENVIRONMENTAL EARTH SCIENCE
and LABORATORY

ESS 111
& 111L WEATHER, CLIMATE & GLOBAL CHNG
and LABORATORY

ESS 209 DATA ANALYSIS TOOLS

ESS 301 INTRO TO EARTH & ATMOSPHERIC PHYS

ESS 303 CLASSICAL & PHYSICAL CAUSES CLIMATE

ESS 370 INTRODUCTION TO REMOTE SENSING

ESS 498 RESEARCH & PROFESSIONAL DEVELOPMENT CAPSTONE

Human Dimensions and Societal Impacts Concentration Requirements 18

ESS 210 COLLAPSE OF CIVILIZATIONS

ESS 305 HYDROLOGY

ESS 313 GEOGRAPHIC INFORMATION SYSTEMS (Geographic Information Systems)

ESS 321 POLLUTION PROBLEMS

ESS 402 SCIENCE & SOCIETY ASPECTS OF NATURAL DISASTER

ESS 407 ENVIRONMENTAL THREATS, PUBLIC POLICY, & DECISION MAKING

Human Dimensions concentration elective courses: choose at least 12 credit hours, 9 hours must be from ESS 18

ESS 300+ level or higher course ⁵

BYS 200+ level or higher course

CS 200+ level or higher course

HY 300+ level or higher course

PSC 300+ level or higher course

SOC 300+ level or higher course

Elective Courses 15-16

Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level
HPE courses can count toward degree requirements.

Total Semester Hours 128

Elective Requirements

Code	Title	Semester Hours
Elective Courses		15-16

Additional Elective courses 100+ level to reach 128 credit hours. Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credits of 100 level HPE courses can count toward degree requirements.

Overall Requirements

Code	Title	Semester Hours
All College of Science degrees must have at least 128 credits.		
At least 39 of the 128 credits must be at the 300+ level. These may be taken in any area including electives.		
Total Semester Hours		128

- 1 Students must take one literature and one history course. Students must also take either a second literature or history course to complete a sequence. Acceptable Literature sequences must include one early literature (EH 207 or EH 242 or EH 209) and one later literature (EH 208 or EH 210). Acceptable history sequences are (HY 103 + HY 104), or (HY 221 + HY 222)
- 2 Based on Math placement, (<http://www.uah.edu/science/departments/math/undergraduate-students/placement/>) prerequisite MA 112 and/or MA 113 Mathematics courses may be required. If the student intends to pursue a course of study requiring more advanced mathematics background, MA 171 is recommended. Otherwise, MA 120 may be used to meet this requirement.
- 3 No more than 6 credit hours can be taken in a single discipline.
- 4 For choices see the World Languages and Cultures (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/foreign-languages-literatures/>) department.
- 5 ESS 495 or ESS 497 or ESS 499. Students may choose one of these courses to count as Human Dimensions/Societal Impacts concentration elective.

Sample four year plan for Earth System Science, Human Dimensions and Societal Impacts Concentration, BS degree:

Note: This is only an example and variations are possible.

Year 1

Fall		Semester Hours
ESS 103 & 103L	ENVIRONMENTAL EARTH SCIENCE and LABORATORY	4
ESS 111 & 111L	WEATHER, CLIMATE & GLOBAL CHNG and LABORATORY	4
MA 171	CALCULUS A	4
EH 101	COLLEGE WRITING I	3
FYE 101S	CHARGER SUCCESS - SCIENCE	1
Term Semester Hours:		16
Spring		
ESS 105	WORLD REGIONAL GEOGRAPHY	3
EH 102	COLLEGE WRITING II	3
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	4
CM 113	Intro to Rhetorical Communication	3
SOC 100 or PSC 101	INTRO TO SOCIOLOGY or INTRO TO AMERICAN GOVERNMENT	3
Term Semester Hours:		16

Year 2

Fall		
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	3
ESS 209	DATA ANALYSIS TOOLS	2
ESS 210	COLLAPSE OF CIVILIZATIONS	3

CS 102	INTRO TO C PROGRAMMING	3
or CS 103	or INTRO PROGRAMMING USING JAVA	
or CS 104	or INTRO TO CS USING PYTHON	
PH 101 & 101L	GENERAL PHYSICS I and GENERAL PHYSICS I LAB	4
Elective		1
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		16
Spring		
ESS 301	INTRO TO EARTH ATMOSPHERIC PHYS	3
ESS 303	CLASSICAL PHYSICAL CAUSES CLIMATE	3
ESS 313	GEOGRAPHIC INFORMATION SYSTEMS	3
MA 281	ELEMENTS OF STATISTICAL ANALYSIS	3
PH 102 & 102L	GENERAL PHYSICS II and GENERAL PHYSICS LAB II	4
Term Semester Hours:		16
Year 3		
Fall		
ESS 321	POLLUTION PROBLEMS	3
ESS 402	SCIENCE SOCIETY ASPECTS NATURAL DISASTER	3
ESS 414	GEOSPATIAL APPLICATIONS	3
History		3
See Requirements tab for approved list.		
Literature		3
See Requirements tab for approved list.		
Elective		1
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		16
Spring		
ESS 305	HYDROLOGY	3
ESS 370	INTRODUCTION TO REMOTE SENSING	3
ESS 407	ENVIRONMENTAL THREATS, PUBLIC POLICY, DECISION MAKING	3
ESS 498	RESEARCH PROFESSIONAL DEVELOPMENT CAPSTONE	1
Fine Art		3
See Requirements tab for approved list.		
2nd Literature		3
See Requirements tab for approved list.		
Term Semester Hours:		16
Year 4		
Fall		
EH 301	TECHNICAL WRITING	3
Human Dimensions and Soc Impacts		3
Elective		

Human Dimensions and Soc Impacts		3
Elective		
See Requirements tab for approved list.		
Elective		3
Elective		4
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		16
Spring		
PSC 300	INTRO SOCIAL SCIENCE STATISTIC	3
Human Dimensions and Soc Impacts		3
Elective		
See Requirements tab for approved list.		
Elective		3
Elective		3
Elective		4
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		16
Total Semester Hours:		128

Geographic Information Systems/Remote Sensing Minor

A minor in Geographic Information Systems/Remote Sensing consists of:

Code	Title	Semester Hours
Required courses:		
ESS 103 & 103L	ENVIRONMENTAL EARTH SCIENCE and LABORATORY	
ESS 111 & 111L	WEATHER, CLIMATE & GLOBAL CHNG and LABORATORY	
ESS 370	INTRODUCTION TO REMOTE SENSING	
ESS 313	GEOGRAPHIC INFORMATION SYSTEMS	
ESS 414	GEOSPATIAL APPLICATIONS	
Elective courses: Choose at least 4 credit hours from these courses:		4-6
ESS 212 & 212L	SEVERE WEATHER ANALYSIS and LABORATORY	
ESS 301	INTRO TO EARTH & ATMOSPHC PHYS	
ESS 303	CLASSI & PHYSICAL CAUSES CLIM	
ESS 305	HYDROLOGY	
ESS 321	POLLUTION PROBLEMS	
ESS 402	SCI & SOC ASPTS NATRL DISASTER	
ESS 408	PYTHON FOR GIS	
ESS 409	SCI PROGRMNG FOR EARTH & ATMOS	
ESS 415	ADVANCED TOPICS IN GIS	
Total credit hours		21-23

Natural Disaster Impacts and Policy Minor

A minor in Natural Disasters Impacts & Policy consists of:

Code	Title	Semester Hours
Required courses:		
ESS 103 & 103L	ENVIRONMENTAL EARTH SCIENCE and LABORATORY	
ESS 111 & 111L	WEATHER, CLIMATE & GLOBAL CHNG and LABORATORY	
ESS 402	SCI & SOC ASPTS NATRL DISASTER	
ESS 407	ENV THRTS, PUB POLY, & DEC MKG	
Elective courses: Choose at least 7 credit hours from these courses:		7-9
ESS 210	COLLAPSE OF CIVILIZATIONS	
ESS 212 & 212L	SEVERE WEATHER ANALYSIS and LABORATORY	
ESS 305	HYDROLOGY	
ESS 307	ENVIRONMENTAL ARCHEOLOGY	
ESS 313	GEOGRAPHIC INFORMATION SYSTEMS	
ESS 321	POLLUTION PROBLEMS	
ESS 370	INTRODUCTION TO REMOTE SENSING	
ESS 414	GEOSPATIAL APPLICATIONS	
Total credit hours		21-23

Mathematical Sciences

258A Shelby Center for Science

Telephone: 256.824.6470

Email: mathchair@uah.edu

Chair: Dr. Toka Diagana, Professor (<https://www.uah.edu/science/departments/math/faculty-staff/toka-diagana/>)

The Mathematical Sciences department offers the following undergraduate degrees:

- Mathematical Sciences, Concentration I, BS (p. 584)
- Mathematical Sciences, Concentration II, BS - Secondary Education (p. 591)
- Mathematical Sciences, Concentration III, BS - Double Major or Dual Degree. Double major-Math degree with another major in the College of Science. Dual Degree-Math degree with an additional degree in another college such as the College of Engineering. (p. 597)

Program Objectives

Our objective is to provide excellent instruction and resources for the mathematics education through our courses and degree programs. Through our bachelor's, master's and doctoral degree programs, our goal is to help produce the new generations of well-educated mathematicians that are critical for the progress of mankind. Our second objective is to promote and communicate the importance of mathematics in society and to help maintain standards of excellence in mathematics through collaboration with other departments. Our third objective is to have graduates prepared for careers in government, industry, teaching at a secondary school level, or for graduate study in mathematics.

Learning Outcomes

Graduates in Mathematics will:

- Demonstrate critical thinking skills to construct clear, valid and succinct proofs
- Effectively apply mathematics to solve problems in applied fields
- Exhibit quantitative reasoning and data analysis

Majors in Mathematical Sciences

- Mathematical Sciences, Concentration I, BS (p. 584)
- Mathematical Sciences, Concentration II, BS - Secondary Education (p. 591)
- Mathematical Sciences, Concentration III, BS - (p. 597)Double Major or Dual Degree (p. 597)

Minor in Mathematical Sciences

- Mathematics (p. 603)

UAH's Joint Undergraduate Master's Program (JUMP) allows undergraduate students to study at the graduate level. By completing graduate courses in your senior year you may reduce the time taken to earn a graduate (MS) degree. Please visit the JUMP (p. 18) page for general information.

Requirements For Admission

1. Cumulative overall 3.5 GPA
2. Major GPA of 3.5
3. MA 238, MA 244, MA 330, MA 442, and MA 452 must be taken Sophomore and Junior years

Additional Information

1. Maximum of 12 credit hours count toward both degrees
2. With permission of JUMP advisor, a student may use any 500-level course or 500-600 level sequence of courses normally acceptable on Mathematics Master's POS for the 12 hours of double counted courses (Of these 12 hours, 9 credit hours replace undergraduate mathematics electives, and 3 credit hours replace a general undergraduate elective)

Designated Faculty Contact/Advisor

Dr. Dongsheng Wu
dongshengwu@uah.edu (dongsheng.wu@uah.edu)
256.824.6676

MA 105 - NATURE OF MATHEMATICS

Semester Hours: 3

The course explores mathematical ideas that historically led to the development of major branches of mathematics. Conceptual understanding and real-world problem solving will be emphasized. Topics may include world of numbers, infinity, chance, foundations of statistics, and mathematical aesthetics. MA 105 cannot be used to fulfill prerequisite requirements for any mathematics course.

MA 107 - ALGEBRA WITH APPLICATIONS

Semester Hours: 3

Algebra review, functions and graphs, linear models, exponential logarithmic functions, mathematics of finance, sets and probability. Prerequisites: Level 1 placement for MA 107 and Level 0 placement for MA 107L. No credit given to students who have received credit for another MA course.

MA 107S - ALGEBRA W/APPLICATIONS S-SECT

Semester Hours: 3

This course offers all of the Algebra with Applications curriculum with the addition of remedial material. This course is 3 credit hours, but meets 5 days per week. The S-section is intended for students with math placement 0. Prerequisite: math placement level 0.

MA 110 - FINITE MATHEMATICS

Semester Hours: 3

Algebra review, elementary functions, matrices, logic, sets, counting, and an introduction to probability and statistics. MA 110 is an AGSC core course. Prerequisites: Level 1 placement for MA 110 and Level 0 placement for MA 110L.

MA 110S - FINITE MATHEMATICS S-SECTION

Semester Hours: 3

This course offers all of the Finite Mathematics curriculum with the addition of remedial material. This course is 3 credit hours, but meets 5 days per week. The S-section is intended for students with math placement 0. Prerequisite: Math placement level 0.

MA 112 - PRECALCULUS ALGEBRA

Semester Hours: 3

Real number systems, exponents, radicals, factoring, absolute value, inequalities, function notation, functions, inverse functions, graphing techniques, polynomial and rational functions, operations with complex numbers, conic sections, and theory of equations. Prerequisites: Level 1 placement for MA 112 and Level 0 placement for MA 112L.

MA 112S - PRECALCULUS ALGEBRA S-SECTION

Semester Hours: 3

This course offers all of the Pre-Calculus Algebra curriculum with the addition of remedial material. This course is 3 credit hours, but meets 5 days per week. The S-section is intended for students with math placement 0. Prerequisite: math placement level 0.

MA 113 - PRECALCULUS TRIGONOMETRY

Semester Hours: 3

Exponential and logarithmic functions, trigonometric functions of angles and real numbers, graphing trigonometric functions, inverse trigonometric functions, solving trigonometric equations, verifying identities, laws of sines and cosines, vectors, trigonometric form of complex numbers, DeMoivre's theorem, summation notation, arithmetic and geometric sequences and series. Prerequisites: Level 2 placement or MA 112 with a grade of C or better. No credit given to students who have completed a MA course numbered above MA 113. MA 113 is an AGSC core course.

MA 115 - PRECALCULUS ALGEBRA & TRIG

Semester Hours: 4

The algebra of functions, including polynomial, rational, exponential, and logarithmic functions; systems of equations and inequalities; trigonometric and inverse trigonometric functions; trigonometric identities and equations; a brief introduction to DeMoivre's Theorem, vectors, polar coordinates, and the binomial theorem. This course is intended for students who plan to take at least MA 171 (Calculus A) but who do not need the full two-semester sequence in precalculus (MA 112, 113). MA 115 is an AGSC core course.

MA 120 - MATH PROFESSIONAL APPLICATIONS

Semester Hours: 3

Limits, continuity, differentiation, applications of the derivative, integration, the fundamental theorem of calculus, applications of the integral. Prerequisites: MA 107, MA 110, or MA 112 with a grade of C or better, or Level 2 placement. No credit given to students who have already received credit for a calculus course. MA 120 is an AGSC core course.

MA 171 - CALCULUS A

Semester Hours: 4

Limits, derivatives, applications of the derivative, definite and indefinite integrals, exponential and logarithmic functions, and inverse functions. Prerequisites: MA 113 or MA 115 with a grade of C or better, or Level 3 placement.

MA 171R - CALCULUS A RECITATION

Semester Hours: 0

Extension of MA 171. Review of previous math skills needed for success. Homework discussed; examination preparation, review of homework and examination tutoring and individual consultation.

MA 171S - CALCULUS A S-SECTION

Semester Hours: 4

This course offers all of the Calculus A curriculum with the addition of trigonometry review. The course is 4 credit hours but meets five days per week. The S-section of Calculus A is intended for students with math placement level 2 but who are willing to put in extra time and effort to study trigonometry along with all of the requirements for MA 171. Prerequisite: MA 113 or math placement level 2.

MA 172 - CALCULUS B

Semester Hours: 4

Techniques of integration, applications of the integral, polar coordinates, sequences, series, and conic sections. Prerequisites: MA 171 with a grade of C or better.

MA 201 - CALCULUS C

Semester Hours: 4

Vectors, vector-valued functions, partial derivatives, multiple integrals, vector fields, line and surface integrals. Prerequisites: MA 172 with a grade of C or better.

MA 230 - MATH FOR ELEMENTARY TEACHERS

Semester Hours: 3

The course emphasizes the use of logical thinking in mathematics and the development of students' understandings of algorithm design. Directed at providing the elementary education student the mathematical background necessary for an understanding of the mathematical principles that are introduced to children in the elementary grades. Emphasis on sets, logic, an understanding of the number systems (integers, fractions, decimals, percents) and number theory. Prerequisites: Two MA courses at the 100 level or above, each with a grade of C or better. Open only to students majoring in elementary education.

MA 231 - MATH FOR ELEM SCH TCHERS II

Semester Hours: 3

Rational numbers, real numbers, algebra, statistics, probability, geometric shapes, measurement, and geometry (using triangle congruence and similarity, coordinates, and transformations). Prerequisites: MA 230 with a grade of C or better.

MA 238 - APPL DIFFERENTIAL EQUATIONS

Semester Hours: 3

This course provides an elementary introduction to the techniques and necessary theory for solving the basic differential equations usually encountered by beginning science and engineering students. General topics include analytical and graphical methods for solving and analyzing first order differential equations; Euler's numerical method; the basic theory of higher-order, linear differential equations, with major emphasis on equations with constant coefficients; variation of parameters; the Laplace transform as a tool for solving differential equations. MA 238 is an AGSC core course. Prerequisites: MA 172 & MA 201 with concurrency.

MA 244 - INTRO TO LINEAR ALGEBRA

Semester Hours: 3

Systems of linear equations, matrices, matrix operations, determinants, vector spaces, bases, dimension of a vector space, inner product, Gram-Schmidt process, linear transformations, change of basis, similar matrices, eigenvalues and eigenvectors, diagonalization, symmetric matrices, and applications. Prerequisites: MA 120 or MA 172.

MA 281 - ELEMENTS OF STATISTICAL ANALYSIS

Semester Hours: 3

Descriptive statistics, fundamentals of probability theory, fundamentals of statistical inference, including estimation and hypothesis testing, and use of a typical statistical package such as MINITAB. Prerequisites: MA 113, or MA 115, or Level 2 Placement.

MA 299 - MATHEMATICS PROJECT

Semester Hour: 1

Individualized special projects in mathematics and its applications for inquisitive and well prepared sophomore-level undergraduate students. No credit allowed toward major or minor in mathematics. S/U grading. Approval of department chair and instructor required.

MA 301 - INTRO ELEMENTARY NUMBER THEORY

Semester Hours: 3

Fundamental properties of integers, divisibility, linear Diophantine equations, congruency, Euler function, Chinese Remainder Theorem, Fermat Theorems, Wilson Theorem, and applications to Cryptography. Prerequisite: MA 244.

MA 330 - FOUNDATIONS OF MATH

Semester Hours: 3

Symbolic logic and methods of proof, set theory, combinations and permutations, equivalence relations and functions, mathematical induction and recurrence relations, cardinality (finite, countably infinite, and uncountable sets), and decimal representation of the rational and real numbers. Prerequisites: MA 172 and (MA 201 or MA 244).

MA 385 - INTRO TO PROBABILITY & STATISTICS

Semester Hours: 3

This course is a calculus-based introduction to probability with special emphasis on the interplay between probability and statistics. Topics include descriptive statistics; probability spaces; discrete distributions (including the binomial, geometric, hypergeometric, and Poisson); continuous distributions (including the uniform, exponential, and normal); joint distributions; mean, variance, and general expected value; independence and correlation; the law of large numbers; and the central limit theorem. Prerequisites: MA 201 with grade of C- or better.

MA 399 - MATHEMATICS PROJECT

Semester Hour: 1

Individualized special projects in mathematics and its applications for inquisitive and well prepared junior-level undergraduate students. No credit allowed toward a major or minor in mathematics. S/U grading. Approval of department chair and instructor required.

MA 415 - INTRO NUMERICAL METHODS

Semester Hours: 3

Derivation and analysis of approximate methods for the solution of nonlinear equations, interpolation and integration of functions, and techniques for the solution of systems of linear equations and for approximating solutions of elementary differential equations. Emphasis is placed on obtaining an intuitive understanding of both the problem at hand and the numerical method used to solve it. Prerequisites: MA 201, MA 244, and CS 121.

MA 420 - INTERM DIFFERENTIAL EQUATIONS

Semester Hours: 3

This is a second course in differential equations. Course topics include series solutions for second order differential equations and the method of Frobenius; eigenvalue and eigenvector methods for solving systems of linear first order equations; the qualitative theory of nonlinear equations; boundary value problems and the Sturm-Liouville theory. Prerequisites: MA 201, MA 244 and MA 238.

MA 433 - INTRODUCTION TO GEOMETRY

Semester Hours: 3

Axiomatic development of geometry, introduction to non-Euclidean geometries with emphasis in elliptic and hyperbolic geometries, selected topics in Euclidean geometry. Prerequisites: MA 172 and Either MA 201 or MA 244.

MA 442 - ALGEBRAIC STRUCTURES W/APPLIC

Semester Hours: 3

Mappings, binary operations, equivalence relations, groups and subgroups, Lagrange's theorem, homomorphisms and isomorphisms, normal subgroups and quotient groups, rings, fields, ordered integral domains, fields of quotients, error correcting codes, linear codes, and decoding. Prerequisites: MA 244 and either MA 330 or 385.

MA 450 - COMBINATORIAL ENUMERATION

Semester Hours: 3

Counting, pigeonhole principle, permutations and combinations, generating functions, principle of inclusion and exclusion, Polya's theory of counting. Prerequisite: MA 385 or MA 442 (with concurrency).

MA 452 - INTRO TO REAL ANALYSIS

Semester Hours: 3

Sequences, limits, continuity, differentiation of functions of one real variable, Riemann integration, uniform convergence, sequences and series of functions, power series, and Taylor series. Prerequisites: MA 330.

MA 453 - INTRO TO COMPLEX ANALYSIS

Semester Hours: 3

Complex algebra, analytic functions, Cauchy-Riemann equations, exponential, trigonometric, and logarithmic functions, integration, Cauchy integral theorem, Morera's theorem, Liouville's theorem, maximum modulus theorem, residue theory, Taylor and Laurent series, and applications. Prerequisites: MA 201 and one MA course at 300 level or above.

MA 456 - METHODS OF PARTIAL DIFF EQUA

Semester Hours: 3

Survey of theory and methods for solving elementary partial differential equations. Topics include first-order equations and the method of characteristics, second-order equations, reduction to canonical form, the wave equation, the heat equation, Laplace's equation, separation of variables, and Fourier series. Prerequisites: MA 238 and MA 244.

MA 458 - APPLIED LINEAR ALGEBRA

Semester Hours: 3

Fundamental concepts of linear algebra are developed with emphasis on real and complex vector spaces, linear transformations, and matrices. Systems of equations, inverses of matrices, determinants, vector spaces, linear transformations, eigenvalues and eigenvectors, normal matrices, canonical forms of matrices, applications of systems of linear differential equations, and use of computer software such as MATLAB. Prerequisites: MA 238 and MA 244.

MA 460 - INTRO FOURIER ANALYSIS

Semester Hours: 3

Brief development of trigonometric and exponential Fourier series, derivation of the classical Fourier transform from series, classical properties of Fourier transforms, transforms of functions, convolution, elementary development of the delta function, transforms of periodic functions, use of transforms to solve systems, introduction to the discrete transform and/or multidimensional transforms, as time permits. Prerequisites: MA 238 and MA 244.

MA 465 - INTRO TO MATH MODELING

Semester Hours: 3

Applying mathematics by formulating, analyzing, and criticizing mathematical models of various phenomena. Examples will be chosen from the physical, biological, and social sciences. Emphasizes development and use of simple mathematical models by having student study general modeling principles and case studies (some open-ended) drawn from various sources. Prerequisites: MA 201, MA 238, and MA 244.

MA 487 - INTRO TO MATH STATISTICS

Semester Hours: 3

This is an introductory, calculus-based course in mathematical statistics. Topics include a review of basic probability, including probability spaces, independence, distributions and expected value; the fundamental theorems of probability, including the law of large numbers and the central limit theorem; estimation, including point estimation and interval estimates for means, variances, and proportions; hypothesis testing, including tests for means, variance, and goodness of fit; an introduction to correlation and regression; theory of inference, including sufficiency and power. Prerequisites: MA 201 and either MA 385 or ISE 390.

MA 490 - SEL TOP UNDERGRAD MATH

Semester Hours: 1-3

Requested undergraduate topics. Approval of instructor required.

MA 499 - MATHEMATICS PROJECT

Semester Hour: 1

Individualized special projects in mathematics and its applications for superior undergraduate students. No credit is allowed toward a major or minor in mathematics. S/U grading. Approval of department chair and instructor required.

Mathematical Sciences, BS - Concentration I

Mathematical Sciences, Concentration I, BS Requirements:

- All students are encouraged to see an advisor after completion of 24 credits.
- Mathematical Sciences, Concentration I, BS degree requires 128 credit hours.
- 39 of 128 credit hours must be taken at 300 level or higher (39 credits includes courses taken at the 300+ level in major, minor (if chosen), Pre-professional area and electives).
- 12 credit hours of 300 level and above must be taken in the major or 6 credit hours in the major and 6 credit hours in the minor (if chosen).
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- Unless otherwise noted a C- or better is required for all College of Science prerequisite courses.
- No more than 64 credit hours from a two-year college can be applied toward a UAH degree.
- For graduation application instructions, see here (p. 812).

Degree Requirements

Charger Foundation Requirements

*Please see Area V for CoS requirements that can also be used to fulfill Charger Foundations Requirements.

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S or WLC 101A or WLC 101F	INTRO FOREIGN LANG I: SPANISH INTRO FOREIGN LANG I: ARABIC INTRO FOREIGN LANG I:FRENCH	

or WLC 101G	INTRO FOREIGN LANG I:GERMAN
or WLC 101J	INTRO FOREIGN LANG I:JAPANESE
or WLC 101R	INTRO FOREIGN LANG I:RUSSIAN
WLC 102S	INTRO FOREIGN LANG II:SPANISH
or WLC 102A	INTRO FOREIGN LANG II: ARABIC
or WLC 102F	INTRO FOREIGN LANG II:FRENCH
or WLC 102G	INTRO FOREIGN LANG II:GERMAN
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN
WLC 201S	INTERM FOREIGN LANG:SPANISH
or WLC 201A	INTERM FOREIGN LANG I: ARABIC
or WLC 201F	INTERM FOREIGN LANG:FRENCH
or WLC 201G	INTERM FOREIGN LANG:GERMAN
or WLC 201J	INTERM FOREIGN LANG: JAPANESE
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN
WLC 202S	INTERM FOREIGN LANG II:SPANISH
or WLC 202A	INTERM FOREIGN LANG II: ARABIC
or WLC 202F	INTERM FOREIGN LANG II:FRENCH
or WLC 202G	INTERM FOREIGN LANG II:GERMAN
or WLC 202J	INTERM FORGN LANG II:JAPANESE
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN
WLC 204	INTERNATIONAL CINEMA
PHL 101	INTRODUCTION TO PHILOSOPHY
PHL 102	INTRO TO ETHICS
PHL 103	INTRODUCTION TO LOGIC
PHL 150	TECH, SCIENCE & HUMAN VALUES
WGS 200	INTRO WOMEN'S & GENDER STUDIES
AMS 229	ANCIENT & MEDIEVAL WORLDS
ARH 100	ARH SURV:ANCIENT-MEDIEVAL
ARH 101	ARH SURV:RENAISSANCE-MODERN
ARH 103	ARH SUR:NON-WESTERN TRADITIONS
ARS 160	DRAWING: FOUNDATIONS
TH 122	THEATRE APPRECIATION
TH 123	INTRO TO FILM STUDIES
MU 100	INTRO TO MUSIC LITERATURE

Area III: Mathematics and Sciences**11-12**

Mathematics	3-4
MA 105	NATURE OF MATHEMATICS
MA 107	ALGEBRA WITH APPLICATIONS
MA 110	FINITE MATHEMATICS
MA 112	PRECALCULUS ALGEBRA
MA 113	PRECALCULUS TRIGONOMETRY
MA 115	PRECALCULUS ALGEBRA & TRIG
MA 120	MATH PROFESSIONAL APPLICATIONS
MA 171	CALCULUS A
Natural Sciences (Lab)	8
AST 100	SURVEY OF ASTRONOMY
AST 106	EXPLORING THE COSMOS I
AST 107	EXPLORING THE COSMOS II
BYS 109	FUNDAMENTALS OF BIOLOGY
BYS 119	PRINCIPLES OF BIOLOGY
BYS 120	ORGANISMAL BIOLOGY

BYS 215	HUMAN ANATOMY & PHYSIOLOGY I
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB
ESS 103	ENVIRONMENTAL EARTH SCIENCE
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG
PH 100	CONCEPTUAL PHYSICS
PH 101	GENERAL PHYSICS I
PH 102	GENERAL PHYSICS II
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III

Area IV: History and Social and Behavioral Sciences* **12**

History 3-6

HY 103	WORLD HISTORY TO 1500
HY 104	WORLD HISTORY SINCE 1500
HY 221	UNITED STATES TO 1877
HY 222	UNITED STATES SINCE 1877

Social and Behavioral Sciences 6-9

ECN 142	PRINC OF MACROECONOMICS
ECN 143	PRINC OF MICROECONOMICS
GS 200	GLOBAL SYSTEMS AND CULTURES
ESS 105	WORLD REGIONAL GEOGRAPHY
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY
PSC 101	INTRO TO AMERICAN GOVERNMENT
PSC 102	INTRO TO COMPARATIVE POLITICS
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS
PY 101	GENERAL PSYCHOLOGY I
PY 201	LIFE-SPAN DEVELOPMENT
SOC 100	INTRO TO SOCIOLOGY
SOC 102	ANALYSIS OF SOCIAL PROBLEMS
SOC 103	INTRO TO CRIMINOLOGY
SOC 105	INTRO CULTURAL ANTHROPOLOGY

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Take no more than six hours in a single discipline in Area II or Area IV.

Area V: Pre Professional Requirements

Code	Title	Semester Hours
Courses in this area may also fulfill Charger Foundations requirements		
Communications		3
CM 113	Intro to Rhetorical Communication	
Physics sequence		8
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	

PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
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Additional Lab Science: choose one **4**

AST 106 & 106L	EXPLORING THE COSMOS I and ASTRONOMY LABORATORY	
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB	
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
ESS 103 & 103L	ENVIRONMENTAL EARTH SCIENCE and LABORATORY	
ESS 111 & 111L	WEATHER, CLIMATE & GLOBAL CHNG and LABORATORY	
BYS 119 & 119L	PRINCIPLES OF BIOLOGY and LABORATORY	
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	

Computer Science **6**

CS 102 or CS 104	INTRO TO C PROGRAMMING INTRO TO CS USING PYTHON	
CS 121	COMPUTER SCIENCE I	

Technical Writing **3**

EH 301	TECHNICAL WRITING	
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Major Requirements

Code	Title	Semester Hours
Mathematics Core		17

MA 171	CALCULUS A	
MA 172	CALCULUS B	
MA 201	CALCULUS C	
MA 244	INTRO TO LINEAR ALGEBRA	
MA 330	FOUNDATIONS OF MATH	
MA 385	INTRO TO PROBABILITY & STATIST	

Mathematics Concentration I Requirements **21**

MA 238	APPL DIFFERENTIAL EQUATIONS	
MA 442	ALGEBRAIC STRUCTURES W/APPLIC	
MA 452	INTRO TO REAL ANALYSIS	
MA 465	INTRO TO MATH MODELING	
MA 300+ level or higher course		
MA 300+ level or higher course		
MA 300+ level or higher course		

Elective Requirements

Code	Title	Semester Hours
Elective Courses		35

Additional Elective courses 100+ level to reach 128 credit hours. Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credits of 100 level HPE courses can count toward degree requirements.

Overall Requirements

Code	Title	Semester Hours
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All College of Science degrees must have at least 128 credits.

At least 39 of the 128 credits must be at the 300+ level. These may be taken in any area including electives.

Total Semester Hours	128
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- 1 Students must take one literature and one history course. Students must also take either a second literature or history course to complete a sequence. Acceptable Literature sequences must include one early literature (EH 207 or EH 242 or EH 209) and one later literature (EH 208 or EH 210). Acceptable history sequences are (HY 103 + HY 104), or (HY 221 + HY 222)
- 2 Based on Math placement, (<http://www.uah.edu/science/departments/math/undergraduate-students/placement/>) prerequisite MA 112 and/or MA 113 Mathematics courses may be required.
- 3 No more than 6 credit hours can be taken in a single discipline.
- 4 For choices see the World Languages and Cultures (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/foreign-languages-literatures/>) department.

Sample Four-Year Plan for Mathematical Sciences, BS degree:

Note: This is only an example and variations are possible.

Year 1

Fall		Semester Hours
FYE 101S	CHARGER SUCCESS - SCIENCE	1
MA 171	CALCULUS A	4
CS 102	INTRO TO C PROGRAMMING	3
or CS 104	or INTRO TO CS USING PYTHON	
EH 101	COLLEGE WRITING I	3
Lab Science		4
See Requirements tab for approved list.		
Term Semester Hours:		15
Spring		
MA 172	CALCULUS B	4
CS 121	COMPUTER SCIENCE I	3
PH 111	GEN PHYSICS W/CALCULUS I	4
& PH 114	and GENERAL PHYSICS LAB I	
EH 102	COLLEGE WRITING II	3
Elective		1
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		15

Year 2

Fall		
MA 201	CALCULUS C	4
PH 112	GEN PHYSICS W/CALC II	4
& PH 115	and GENERAL PHYSICS LAB II	
Literature		3
See Requirements tab for approved list.		
Social and Behavioral Science		3
See Requirements tab for approved list.		
Fine Art		3
See Requirements tab for approved list.		
Term Semester Hours:		17
Spring		
MA 238	APPL DIFFERENTIAL EQUATIONS	3
MA 244	INTRO TO LINEAR ALGEBRA	3

Humanities, 2nd Fine Art or 2nd Literature		3
See Requirements tab for approved list.		
Social and Behavioral Science		3
See Requirements tab for approved list.		
Elective		3
Elective		3
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		18
Year 3		
Fall		
MA 330	FOUNDATIONS OF MATH	3
MA 385	INTRO TO PROBABILITY STATIST	3
CM 113	Intro to Rhetorical Communication	3
History		3
See Requirements tab for approved list.		
Elective		1
Elective		3
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		16
Spring		
MA 442	ALGEBRAIC STRUCTURES W/ APPLIC	3
MA 465	INTRO TO MATH MODELING	3
History		3
See Requirements tab for approved list.		
Elective 300+ level or higher course		3
Elective		3
Elective		1
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		16
Year 4		
Fall		
MA 452	INTRO TO REAL ANALYSIS	3
MA 300+ level or higher course		3
EH 301	TECHNICAL WRITING	3
Elective 300+ level or higher course		3
Elective		3
Elective		1
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		16
Spring		
MA 300+ level or higher course		3
MA 300+ level or higher course		3
Elective 300+ level or higher course		3
Elective 300+ level or higher course		3

Elective

3

Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.

Term Semester Hours:	15
Total Semester Hours:	128

Mathematical Sciences, BS or BA - Concentration I

This concentration leads to a B.S. or B.A. degree with a major in mathematics, and is appropriate for students planning careers in industry or graduate study in mathematics.

The minimum requirement for a B.S. degree is 128 credit hours. See: Academic Policies and Procedures (p. 812).

Code	Title	Semester Hours
Charger Foundations		41
Major Core Courses ^{1,2}		
MA 171	CALCULUS A	4
MA 172	CALCULUS B	4
MA 201	CALCULUS C	4
MA 244	INTRO TO LINEAR ALGEBRA	3
MA 330	FOUNDATIONS OF MATH	3
MA 385	INTRO TO PROBABILITY & STATIST	3
Required Ancillary Courses for All Concentrations ³		
CM 113	Intro to Rhetorical Communication	3
EH 301	TECHNICAL WRITING	3
CS 102	INTRO TO C PROGRAMMING	3
CS 121	COMPUTER SCIENCE I	3
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	4
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	4
Required Courses ⁴		
MA 238	APPL DIFFERENTIAL EQUATIONS	3
MA 442	ALGEBRAIC STRUCTURES W/APPLIC	3
MA 452	INTRO TO REAL ANALYSIS	3
MA 465	INTRO TO MATH MODELING	3
Three mathematics courses at the 300 level or above		9
Total Semester Hours		103

¹ Courses required for all concentrations in the major.

² Only MA courses numbered 171 or above may be included in a mathematics major, and an overall average of C is required for all UAH MA or ST courses that are included in a mathematics major. Information on other MA course requirements is given in Concentrations I, II, and III below. Students who think that substitutions in those concentrations can produce a program better suited to their needs should consult their faculty advisor about the feasibility of such substitutions. All MA electives must be approved by the student's faculty advisor prior to registering for the courses. All majors in mathematics must satisfy the appropriate (B.S. or B.A.) Charger Foundation and degree requirements.

³ Students majoring in other academic areas who wish to obtain a more solid background in mathematics than is provided by a minor may pursue a second major in mathematics rather than a minor in mathematics. Concentration III is specifically designed for such students.

⁴ The MA electives must be pre-approved by the student's mathematics advisor. The Charger Foundations are outlined here (p. 35).

Mathematical Sciences, Secondary Education, BS

Mathematical Sciences, Secondary Education, Concentration II, BS Requirements:

- All students are encouraged to see an advisor after completion of 24 credits.
- Mathematical Sciences, Secondary Education, Concentration II, BS degree requires 131 credit hours.
- 39 credit hours must be taken at 300 level or higher (39 credits includes courses taken at the 300+ level in major, minor (if chosen), Pre professional area and electives).
- 12 credit hours of 300 level and above must be taken in the major or 6 credit hours in the major and 6 credit hours in the minor (if chosen).
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- Unless otherwise noted a C- or better is required for all College of Science prerequisite courses.
- No more than 64 credit hours from a two-year college can be applied toward a UAH degree.
- For graduation application instructions, see here (p. 812).

This concentration leads to a B.S. degree with a major in Mathematics, and meets the requirements for an Alabama Class B Middle/Junior High School Teacher's Certificate or an Alabama Class B High School Teacher's Certificate.

Degree Requirements

Charger Foundation Requirements

*Please see Area V for CoS requirements that can also be used to fulfill Charger Foundations Requirements.

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S or WLC 101A or WLC 101F or WLC 101G or WLC 101J or WLC 101R	INTRO FOREIGN LANG I: SPANISH INTRO FOREIGN LANG I: ARABIC INTRO FOREIGN LANG I:FRENCH INTRO FOREIGN LANG I:GERMAN INTRO FOREIGN LANG I:JAPANESE INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S or WLC 102A or WLC 102F	INTRO FOREIGN LANG II:SPANISH INTRO FOREIGN LANG II: ARABIC INTRO FOREIGN LANG II:FRENCH	

or WLC 102G	INTRO FOREIGN LANG II:GERMAN
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN
WLC 201S	INTERM FOREIGN LANG:SPANISH
or WLC 201A	INTERM FOREIGN LANG I: ARABIC
or WLC 201F	INTERM FOREIGN LANG:FRENCH
or WLC 201G	INTERM FOREIGN LANG:GERMAN
or WLC 201J	INTERM FOREIGN LANG: JAPANESE
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN
WLC 202S	INTERM FOREIGN LANG II:SPANISH
or WLC 202A	INTERM FOREIGN LANG II: ARABIC
or WLC 202F	INTERM FOREIGN LANG II:FRENCH
or WLC 202G	INTERM FOREIGN LANG II:GERMAN
or WLC 202J	INTERM FORGN LANG II:JAPANESE
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN
WLC 204	INTERNATIONAL CINEMA
PHL 101	INTRODUCTION TO PHILOSOPHY
PHL 102	INTRO TO ETHICS
PHL 103	INTRODUCTION TO LOGIC
PHL 150	TECH, SCIENCE & HUMAN VALUES
WGS 200	INTRO WOMEN'S & GENDER STUDIES
AMS 229	ANCIENT & MEDIEVAL WORLDS
ARH 100	ARH SURV:ANCIENT-MEDIEVAL
ARH 101	ARH SURV:RENAISSANCE-MODERN
ARH 103	ARH SUR:NON-WESTERN TRADITIONS
ARS 160	DRAWING: FOUNDATIONS
TH 122	THEATRE APPRECIATION
TH 123	INTRO TO FILM STUDIES
MU 100	INTRO TO MUSIC LITERATURE
Area III: Mathematics and Sciences	
Mathematics	3-4
MA 105	NATURE OF MATHEMATICS
MA 107	ALGEBRA WITH APPLICATIONS
MA 110	FINITE MATHEMATICS
MA 112	PRECALCULUS ALGEBRA
MA 113	PRECALCULUS TRIGONOMETRY
MA 115	PRECALCULUS ALGEBRA & TRIG
MA 120	MATH PROFESSIONAL APPLICATIONS
MA 171	CALCULUS A
Natural Sciences (Lab)	8
AST 100	SURVEY OF ASTRONOMY
AST 106	EXPLORING THE COSMOS I
AST 107	EXPLORING THE COSMOS II
BYS 109	FUNDAMENTALS OF BIOLOGY
BYS 119	PRINCIPLES OF BIOLOGY
BYS 120	ORGANISMAL BIOLOGY
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II

CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB
ESS 103	ENVIRONMENTAL EARTH SCIENCE
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG
PH 100	CONCEPTUAL PHYSICS
PH 101	GENERAL PHYSICS I
PH 102	GENERAL PHYSICS II
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III

Area IV: History and Social and Behavioral Sciences* **12**

History **3-6**

HY 103	WORLD HISTORY TO 1500
HY 104	WORLD HISTORY SINCE 1500
HY 221	UNITED STATES TO 1877
HY 222	UNITED STATES SINCE 1877

Social and Behavioral Sciences **6-9**

ECN 142	PRINC OF MACROECONOMICS
ECN 143	PRINC OF MICROECONOMICS
GS 200	GLOBAL SYSTEMS AND CULTURES
ESS 105	WORLD REGIONAL GEOGRAPHY
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY
PSC 101	INTRO TO AMERICAN GOVERNMENT
PSC 102	INTRO TO COMPARATIVE POLITICS
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS
PY 101	GENERAL PSYCHOLOGY I
PY 201	LIFE-SPAN DEVELOPMENT
SOC 100	INTRO TO SOCIOLOGY
SOC 102	ANALYSIS OF SOCIAL PROBLEMS
SOC 103	INTRO TO CRIMINOLOGY
SOC 105	INTRO CULTURAL ANTHROPOLOGY

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Take no more than six hours in a single discipline in Area II or Area IV.

Area V: Pre Professional Requirements

Code	Title	Semester Hours
Courses in this area may also fulfill Charger Foundations requirements		
Communications		3
CM 113	Intro to Rhetorical Communication	
Physics sequence		8
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
Additional Lab Science: choose one		4
AST 106 & 106L	EXPLORING THE COSMOS I and ASTRONOMY LABORATORY	
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB	

CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I
ESS 103 & 103L	ENVIRONMENTAL EARTH SCIENCE and LABORATORY
ESS 111 & 111L	WEATHER, CLIMATE & GLOBAL CHNG and LABORATORY
BYS 119 & 119L	PRINCIPLES OF BIOLOGY and LABORATORY
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III

Computer Science	6
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CS 102 or CS 104	INTRO TO C PROGRAMMING INTRO TO CS USING PYTHON
CS 121	COMPUTER SCIENCE I

Technical Writing	3
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EH 301	TECHNICAL WRITING
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Major Requirements

Code	Title	Semester Hours
Mathematics Core		17

MA 171	CALCULUS A
MA 172	CALCULUS B
MA 201	CALCULUS C
MA 244	INTRO TO LINEAR ALGEBRA
MA 330	FOUNDATIONS OF MATH
MA 385	INTRO TO PROBABILITY & STATIST

Mathematics Secondary Education Concentration II Requirements	18
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MA 433	INTRODUCTION TO GEOMETRY
MA 442	ALGEBRAIC STRUCTURES W/APPLIC
MA 452	INTRO TO REAL ANALYSIS
MA 487	INTRO TO MATH STATISTICS
MA 300+ level or higher course	
MA 300+ level or higher course	

Education Requirements

Code	Title	Semester Hours
Education Courses		40

ED 301	INTRO TO EDUCATION PRACTICUM
ED 307	MULTICULTURAL FND EDUCATION
ED 308	EDUCATIONAL PSYCHOLOGY
EDC 301	TCHG THE EXCEPTIONAL CHILD
EDC 311	INSTR STRATEGIES INCLUSIVE CLR
ED 410	FOUNDATIONS EDUC EVALUAT
ED 423	TCHNG SCIENCE MID & SEC SCH I
ED 309	CLASSROOM & BEHAVIOR MGMT
ED 350	TECHNOLOGY IN CLASSROOM
ED 408	TCHG READING/CONTENT AREA
ED 497	HIGH SCHOOL INTERNSHIP

Total Semester Hours	131
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Overall Requirements

Code	Title	Semester Hours
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All College of Science degrees must have at least 128 credits.

At least 39 of the 128 credits must be at the 300+ level. These may be taken in any area including electives.

- ¹ Students must take one literature and one history course. Students must also take either a second literature or history course to complete a sequence. Acceptable Literature sequences must include one early literature (EH 207 or EH 242 or EH 209) and one later literature (EH 208 or EH 210). Acceptable history sequences are (HY 103 + HY 104), or (HY 221 + HY 222)
- ² Based on Math placement, (<http://www.uah.edu/science/departments/math/undergraduate-students/placement/>) prerequisite MA 112 and/or MA 113 Mathematics courses may be required.
- ³ No more than 6 credit hours can be taken in a single discipline.
- ⁴ For choices see the World Languages and Cultures (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/foreign-languages-literatures/>) department.

Sample Four-Year Plan for Mathematical Sciences, Secondary Education, Concentration II, BS degree:

Note: This is only an example and variations are possible.

Year 1

Fall		Semester Hours
FYE 101S	CHARGER SUCCESS - SCIENCE	1
MA 171	CALCULUS A	4
EH 101	COLLEGE WRITING I	3
Fine Art		3
See Requirements tab for approved list.		
Lab Science		4
See Requirements tab for approved list.		

Term Semester Hours: 15

Spring

MA 172	CALCULUS B	4
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	4
EH 102	COLLEGE WRITING II	3
PY 101	GENERAL PSYCHOLOGY I	3

Term Semester Hours: 14

Year 2

Fall		
MA 201	CALCULUS C	4
MA 244	INTRO TO LINEAR ALGEBRA	3
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	4
PY 201	LIFE-SPAN DEVELOPMENT	3

Term Semester Hours: 14

Spring

MA 330	FOUNDATIONS OF MATH	3
CS 102 or CS 104	INTRO TO C PROGRAMMING or INTRO TO CS USING PYTHON	3
CM 113	Intro to Rhetorical Communication	3
Literature		3
See Requirements tab for approved list.		
History		3
See Requirements tab for approved list.		

Term Semester Hours: 15

Year 3

Fall

MA 385	INTRO TO PROBABILITY STATIST	3
MA 442	ALGEBRAIC STRUCTURES W/ APPLIC	3
MA 452	INTRO TO REAL ANALYSIS	3
CS 121	COMPUTER SCIENCE I	3
Humanities, 2nd Fine Art or 2nd Literature		3

See Requirements tab for approved list.

Term Semester Hours:	15
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Spring

MA 433	INTRODUCTION TO GEOMETRY	3
MA 487	INTRO TO MATH STATISTICS	3
MA 300+ level or higher course		3
MA 300+ level or higher course		3
2nd History or 3rd Social and Behavioral Science		3

See Requirements tab for approved list.

Term Semester Hours:	15
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Year 4**Fall**

ED 301	INTRO TO EDUCATION PRACTICUM	1
ED 307	MULTICULTURAL FND EDUCATION	3
ED 308	EDUCATIONAL PSYCHOLOGY	3
EDC 301	TCHG THE EXCEPTIONAL CHILD	3
EDC 311	INSTR STRATEGIES INCLUSIVE CLR	3

Term Semester Hours:	13
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Spring

ED 410	FOUNDATIONS EDUC EVALUAT	3
ED 423	TCHNG SCIENCE MID SEC SCH I	3
ED 350	TECHNOLOGY IN CLASSROOM	3
EH 301	TECHNICAL WRITING	3

Term Semester Hours:	12
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Fifth Year**Fall**

ED 309	CLASSROOM BEHAVIOR MGMT	3
ED 408	TCHG READING/CONTENT AREA	3

Term Semester Hours:	6
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Spring

ED 497	HIGH SCHOOL INTERNSHIP	12
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Term Semester Hours:	12
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Total Semester Hours:	131
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Mathematical Sciences, Double Major in Science or Dual Degree in Engineering, BS - Concentration III

Mathematical Sciences, Double Major or Dual Degree, (p. 597) Concentration III, BS Requirements:

- All students are encouraged to see an advisor after completion of 24 credits.
- Mathematical Sciences, Double Major or Dual Degree, Concentration III, BS degree requires a minimum of 128 credit hours depending upon the second major or dual degree chosen.
- 39 of 128 credit hours must be taken at 300 level or higher (39 credits includes courses taken at the 300+ level in major, minor (if chosen), Pre-professional area and electives).
- 12 credit hours of 300 level and above must be taken in the major or 6 credit hours in the major and 6 credit hours in the minor (if chosen).
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- Unless otherwise noted a C- or better is required for all College of Science prerequisite courses.
- No more than 64 credit hours from a two-year college can be applied toward a UAH degree.
- For graduation application instructions, see here (p. 812)

Degree Requirements

Charger Foundation Requirements

*Please see Area V for CoS requirements that can also be used to fulfill Charger Foundations Requirements.

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S or WLC 101A or WLC 101F or WLC 101G or WLC 101J or WLC 101R	INTRO FOREIGN LANG I: SPANISH INTRO FOREIGN LANG I: ARABIC INTRO FOREIGN LANG I:FRENCH INTRO FOREIGN LANG I:GERMAN INTRO FOREIGN LANG I:JAPANESE INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S or WLC 102A	INTRO FOREIGN LANG II:SPANISH INTRO FOREIGN LANG II: ARABIC	

or WLC 102F	INTRO FOREIGN LANG II:FRENCH
or WLC 102G	INTRO FOREIGN LANG II:GERMAN
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN
WLC 201S	INTERM FOREIGN LANG:SPANISH
or WLC 201A	INTERM FOREIGN LANG I: ARABIC
or WLC 201F	INTERM FOREIGN LANG:FRENCH
or WLC 201G	INTERM FOREIGN LANG:GERMAN
or WLC 201J	INTERM FOREIGN LANG: JAPANESE
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN
WLC 202S	INTERM FOREIGN LANG II:SPANISH
or WLC 202A	INTERM FOREIGN LANG II: ARABIC
or WLC 202F	INTERM FOREIGN LANG II:FRENCH
or WLC 202G	INTERM FOREIGN LANG II:GERMAN
or WLC 202J	INTERM FORGN LANG II:JAPANESE
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN
WLC 204	INTERNATIONAL CINEMA
PHL 101	INTRODUCTION TO PHILOSOPHY
PHL 102	INTRO TO ETHICS
PHL 103	INTRODUCTION TO LOGIC
PHL 150	TECH, SCIENCE & HUMAN VALUES
WGS 200	INTRO WOMEN'S & GENDER STUDIES
AMS 229	ANCIENT & MEDIEVAL WORLDS
ARH 100	ARH SURV:ANCIENT-MEDIEVAL
ARH 101	ARH SURV:RENAISSANCE-MODERN
ARH 103	ARH SUR:NON-WESTERN TRADITIONS
ARS 160	DRAWING: FOUNDATIONS
TH 122	THEATRE APPRECIATION
TH 123	INTRO TO FILM STUDIES
MU 100	INTRO TO MUSIC LITERATURE
Area III: Mathematics and Sciences	
Mathematics	
MA 105	NATURE OF MATHEMATICS
MA 107	ALGEBRA WITH APPLICATIONS
MA 110	FINITE MATHEMATICS
MA 112	PRECALCULUS ALGEBRA
MA 113	PRECALCULUS TRIGONOMETRY
MA 115	PRECALCULUS ALGEBRA & TRIG
MA 120	MATH PROFESSIONAL APPLICATIONS
MA 171	CALCULUS A
Natural Sciences (Lab)	
AST 100	SURVEY OF ASTRONOMY
AST 106	EXPLORING THE COSMOS I
AST 107	EXPLORING THE COSMOS II
BYS 109	FUNDAMENTALS OF BIOLOGY
BYS 119	PRINCIPLES OF BIOLOGY
BYS 120	ORGANISMAL BIOLOGY
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I

11-12

3-4

8

CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB
ESS 103	ENVIRONMENTAL EARTH SCIENCE
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG
PH 100	CONCEPTUAL PHYSICS
PH 101	GENERAL PHYSICS I
PH 102	GENERAL PHYSICS II
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III

Area IV: History and Social and Behavioral Sciences* **12**

History **3-6**

HY 103	WORLD HISTORY TO 1500
HY 104	WORLD HISTORY SINCE 1500
HY 221	UNITED STATES TO 1877
HY 222	UNITED STATES SINCE 1877

Social and Behavioral Sciences **6-9**

ECN 142	PRINC OF MACROECONOMICS
ECN 143	PRINC OF MICROECONOMICS
GS 200	GLOBAL SYSTEMS AND CULTURES
ESS 105	WORLD REGIONAL GEOGRAPHY
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY
PSC 101	INTRO TO AMERICAN GOVERNMENT
PSC 102	INTRO TO COMPARATIVE POLITICS
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS
PY 101	GENERAL PSYCHOLOGY I
PY 201	LIFE-SPAN DEVELOPMENT
SOC 100	INTRO TO SOCIOLOGY
SOC 102	ANALYSIS OF SOCIAL PROBLEMS
SOC 103	INTRO TO CRIMINOLOGY
SOC 105	INTRO CULTURAL ANTHROPOLOGY

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Take no more than six hours in a single discipline in Area II or Area IV.

Area V: Pre-Professional Requirements

Code	Title	Semester Hours
Courses in this area may also fulfill Charger Foundations requirements		
Communications		3
CM 113	Intro to Rhetorical Communication	
Physics sequence		8
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
Additional Lab Science (may be fulfilled by second science major): choose one		4
AST 106 & 106L	EXPLORING THE COSMOS I and ASTRONOMY LABORATORY	

CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I
ESS 103 & 103L	ENVIRONMENTAL EARTH SCIENCE and LABORATORY
ESS 111 & 111L	WEATHER, CLIMATE & GLOBAL CHNG and LABORATORY
BYS 119 & 119L	PRINCIPLES OF BIOLOGY and LABORATORY
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III

Computer Science **6**

CS 102 or CS 104	INTRO TO C PROGRAMMING INTRO TO CS USING PYTHON
CS 121	COMPUTER SCIENCE I

Technical Writing **3**

EH 301	TECHNICAL WRITING
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Major Requirements

Code	Title	Semester Hours
Mathematics Core		17

MA 171	CALCULUS A
MA 172	CALCULUS B
MA 201	CALCULUS C
MA 244	INTRO TO LINEAR ALGEBRA
MA 330	FOUNDATIONS OF MATH
MA 385	INTRO TO PROBABILITY & STATIST

Mathematics Double Major in Science or Dual Degree in Engineering Concentration III Requirements **18**

MA 238	APPL DIFFERENTIAL EQUATIONS
Choose one analysis course:	
MA 415	INTRO NUMERICAL METHODS
MA 452	INTRO TO REAL ANALYSIS ⁵
MA 453	INTRO TO COMPLEX ANALYSIS
MA 460	INTRO FOURIER ANALYSIS
Choose one algebra course:	
MA 442	ALGEBRAIC STRUCTURES W/APPLIC ⁵
MA 450	COMBINATORIAL ENUMERATION
MA 458	APPLIED LINEAR ALGEBRA
MA 300+ level or higher course	
MA 300+ level or higher course	
MA 300+ level or higher course	

Second Major or Degree Requirements

Code	Title	Semester Hours
May be used to fulfill Charger Foundations or Pre Professional requirements - minimum of 36 credits		36+

Elective Requirements

Code	Title	Semester Hours
Elective Courses		0-2

Additional Elective courses 100+ level to reach 128 credit hours. Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credits of 100 level HPE courses can count toward degree requirements.

Overall Requirements

Code	Title	Semester Hours
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All College of Science degrees must have at least 128 credits.

At least 39 of the 128 credits must be at the 300+ level. These may be taken in any area including electives.

- 1 Students must take one literature and one history course. Students must also take either a second literature or history course to complete a sequence. Acceptable Literature sequences must include one early literature (EH 207 or EH 242 or EH 209) and one later literature (EH 208 or EH 210). Acceptable history sequences are (HY 103 + HY 104), or (HY 221 + HY 222)
- 2 Based on Math placement, (<http://www.uah.edu/science/departments/math/undergraduate-students/placement/>) prerequisite MA 112 and/or MA 113 Mathematics courses may be required.
- 3 No more than 6 credit hours can be taken in a single discipline.
- 4 For choices see the World Languages and Cultures (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/foreign-languages-literatures/>) department.
- 5 If neither MA 442 or 452 is taken, choose an additional MA 300+ level or higher course.

Sample four year plan for Mathematical Sciences, Double major with Computer Science, Curriculum III, BS degree:

Note: This is only an example and variations are possible.

Year 1

Fall		Semester Hours
FYE 101S	CHARGER SUCCESS - SCIENCE	1
MA 171	CALCULUS A	4
CS 102	INTRO TO C PROGRAMMING	3
or CS 104	or INTRO TO CS USING PYTHON	
EH 101	COLLEGE WRITING I	3
Social and Behavioral science		3
See Requirements tab for approved list.		
Fine art		3
See Requirements tab for approved list.		

Term Semester Hours: 17

Spring		
MA 172	CALCULUS B	4
CS 121	COMPUTER SCIENCE I	3
PH 111	GEN PHYSICS W/CALCULUS I	4
& PH 114	and GENERAL PHYSICS LAB I	
EH 102	COLLEGE WRITING II	3
Social and Behavioral science		3
See Requirements tab for approved list.		

Term Semester Hours: 17

Year 2

Fall		
MA 201	CALCULUS C	4
CS 221	COMP SCI II: DATA STRUCTURES	3
CS 214	INTRO DISCRETE STRUCTURE	3
PH 112	GEN PHYSICS W/CALC II	4
& PH 115	and GENERAL PHYSICS LAB II	
Literature		3

See Requirements tab for approved list.

	Term Semester Hours:	17
Spring		
MA 238	APPL DIFFERENTIAL EQUATIONS	3
MA 244	INTRO TO LINEAR ALGEBRA	3
CS 105	COMP SCI SEM:ETH/PROFESS	1
CS 309 & 309L	COMPUTER ORG & SWTCHNG THRY and LABORATORY	3
CS 321	INTRO OBJECT-ORIENTED PROG JAV	3
Lab Science		4
See Requirements tab for approved list.		

	Term Semester Hours:	17
Year 3		
Fall		
MA 330	FOUNDATIONS OF MATH	3
MA 385	INTRO TO PROBABILITY STATIST	3
CS 317	INTRO DESIGN/ANALYSIS OF ALG	3
CS 300+ level or higher course		3
CM 113	Intro to Rhetorical Communication	3
Humanities, 2nd Fine Art or 2nd Literature		3
See Requirements tab for approved list.		

	Term Semester Hours:	18
Spring		
MA 442	ALGEBRAIC STRUCTURES W/ APPLIC	3
or MA 450	or COMBINATORIAL ENUMERATION	
or MA 458	or APPLIED LINEAR ALGEBRA	
MA 300+ level or higher course		3
CS 413 & 413L	INTRO DIGITAL COMP ARCHITECTUR and LABORATORY	3
CS 300+ level or higher course		3
History		3
See Requirements tab for approved list.		

	Term Semester Hours:	15
Year 4		
Fall		
MA 415	INTRO NUMERICAL METHODS	3
or MA 452	or INTRO TO REAL ANALYSIS	
or MA 453	or INTRO TO COMPLEX ANALYSIS	
or MA 460	or INTRO FOURIER ANALYSIS	
MA 300+ level or higher course		3
CS 300+ level or higher course		3
CS 424	PRINCIPLES PROGRAMMING LANG	3
EH 301	TECHNICAL WRITING	3
2nd History or 3rd Social and Behavioral science		3

See Requirements tab for approved list.

	Term Semester Hours:	18
Spring		
CS 490	INTRO TO OPERATING SYSTEMS	3
CS 499	SR PROJ:TEAM SOFTWARE DESIGN	3
MA 300+ level or higher course		3
CS 400+ level or higher course		3
CS 400+ level or higher course		3
	Term Semester Hours:	15
	Total Semester Hours:	134

Mathematical Sciences Minor

A minor in Mathematical Sciences consists of:

Code	Title	Semester Hours
MA 171	CALCULUS A	4
MA 172	CALCULUS B	4
MA 201	CALCULUS C	4
MA 244	INTRO TO LINEAR ALGEBRA	3
Select two MA or ST 300+ or 400+ level courses.		6
Total Semester Hours		21

Physics and Astronomy

Room 201C Optics Building
Telephone: 256.824.2482
Email: physics@uah.edu

Chair: Dr. James Miller, Professor (<https://www.uah.edu/science/departments/physics/faculty-staff/dr-james-a-miller/>)

The Physics and Astronomy department offers the following undergraduate degrees:

- Physics, BS (p. 608)
- Physics, BS - Applied and Theoretical Physics Concentration (p. 614)
- Physics, BS - Optics Concentration (p. 632)
- Physics, BS - Astronomy and Astrophysics Concentration (p. 620)
- Physics, BS - Engineering Physics Concentration (p. 626)
- Physics, BS - Secondary Education Concentration (p. 639)

Program Objectives

Our primary objective is to educate and train the next generation of physicists, perform cutting-edge and internationally-recognized research, and support the education of students in allied areas such as engineering, chemistry, atmospheric science, and the biological sciences. Our second objective is to prepare physics majors for employment in industrial research or for further graduate studies in physics or related fields, including astrophysics, optics, biophysics, engineering, or medicine.

Learning Outcomes

Physics students and majors will:

- Demonstrate an understanding of the basic principles and modern tools (viz., numerical methods) of physics
- Engage in service-based learning and public outreach related to physics and science
- Have a rigorous research experience prior to graduation

Majors in Physics

- Physics, BS (p. 608)
- Physics, BS - Applied and Theoretical Physics Concentration (p. 614)
- Physics, BS - Optics Concentration (p. 632)
- Physics, BS - Astronomy and Astrophysics Concentration (p. 620)
- Physics, BS - Engineering Physics Concentration (p. 626)
- Physics, BS - Secondary Education Concentration (p. 639)

Students majoring in other academic areas may minor in physics. The Department of Physics and Astronomy offers three minors: Physics, Optics, and Astronomy & Astrophysics. An overall average of C or better is required for the courses in the minor.

Minors in Physics

- Physics (p. 645)
- Optics (p. 645)
- Astronomy and Astrophysics (p. 645)

UAH's Joint Undergraduate Master's Program (JUMP) allows undergraduate students to study at the graduate level. By completing graduate courses in your senior year you may reduce the time taken to earn a graduate (MS) degree. Please visit the JUMP (p. 18) page for general information.

Requirements For Admissions

1. Cumulative overall 3.5 GPA
2. Major GPA of 3.5
3. Student shall complete PH 110, PH 111, PH 112, PH 113, PH 114, PH 115, PH 116, PH 251, PH 301, PH 305, PH 351, PH 431, PH 432, MA 171, MA 172, MA 201, MA 238, MA 244 by Junior year

Additional Information

- Maximum of 12 credit hours count toward both degrees

Designated Faculty Contact/Advisor

Dr. James Miller
james.miller@uah.edu
256.824.2482

AST 100 - SURVEY OF ASTRONOMY

Semester Hours: 4

One semester survey of astronomy from visible phenomena in the sky to the latest astronomical discoveries. Topics include properties of solar system bodies, origin of the solar system, life cycles of stars and galaxies, exoplanets, cosmology, life in the universe. Includes laboratory. May not be taken in combination with AST 106 or AST 107.

AST 100L - SURVEY OF ASTRONOMY LAB

Semester Hours: 0

Laboratory instruction in support of material covered in AST 100.

AST 106 - EXPLORING THE COSMOS I

Semester Hours: 4

Introduces astronomy emphasizing quantitative aspects of physical phenomena in the universe. Motions of celestial bodies, development of astronomy, gravity and motion, light and telescopes, properties of gases and radiation, earth and moon, eclipses, survey of the solar system. Laboratory included.

AST 106L - ASTRONOMY LABORATORY

Semester Hours: 0

AST 107 - EXPLORING THE COSMOS II

Semester Hours: 4

Continuation of AST 106. The sun, stars and stellar evolution, white dwarfs, neutron stars, black holes, binary stars, the Milky Way galaxy, galaxies, quasars and other active galaxies, cosmology, life in the universe. Laboratory included. Offered Spring. Prerequisite: AST 106.

AST 107L - GEN ASTRONOMY II LAB

Semester Hours: 0

AST 210 - INTRO TO ASTROBIOLOGY

Semester Hours: 3

Studies the origin and search for life in the universe, including topics in astronomy, physics, biology, chemistry, and atmospheric science. Introduces research in astrobiology; known requirements for life, the origin and evolution of life of Earth, and the search for extraterrestrial life. Prerequisites: MA 171 and either PH 111, CH 121, or BYS 119.

AST 371 - INTRO TO ASTROPHYSICS

Semester Hours: 3

Gravitation: two-body problem, binary stars. Radiation theory. Spectral classification, Hertzsprung-Russell diagram, and introduction to stellar structure and evolution. Large-scale structure, and the evolution of the universe. Offered Spring. Prerequisites: PH 111 or PH 114, and MA 201.

AST 471 - ASTROPHYSICS

Semester Hours: 3

Structure and physical processes of stars from the interior to the atmosphere: energy production and transfer, atmospheric properties, and observed spectral features. Models for stellar structure. Star formation and evolution, including the effects of a companion. Offered Fall. Prerequisites: AST 371 and PH 351.

PH 100 - CONCEPTUAL PHYSICS

Semester Hours: 4

Classical and modern physics survey course. Approach physical laws conceptually and intuitively, with minimal mathematics. Motion, gravitation, energy, electricity and magnetism, quantum mechanics, physics of everyday phenomena, philosophical and historical implications. Offered Spring.

PH 100L - CONCEPTUAL PHYSICS LAB

Semester Hours: 0

PH 101 - GENERAL PHYSICS I

Semester Hours: 4

Introductory non-calculus based course using algebra and trigonometry. The basic laws of physics and their application to specific problems. Newtonian mechanics, energy, conservation laws and thermodynamics. Laboratory included. PH 101 and 102 satisfy the laboratory science requirement. Offered Fall. Corequisite: PH 101L.

PH 101L - GENERAL PHYSICS I LAB

Semester Hours: 0

Laboratory for PH 101. Corequisite: PH 101.

PH 102 - GENERAL PHYSICS II

Semester Hours: 4

Continuation of PH 101. Electrostatics, currents, magnetic phenomena, relativity, waves, quantum nature of matter. Laboratory included. Offered Spring. Prerequisite: PH 101. Corequisite: PH 102L.

PH 102L - GENERAL PHYSICS LAB II

Semester Hours: 0

Laboratory for PH 102. Corequisite: PH 102.

PH 110 - FRONTIERS IN SCIENCE

Semester Hours: 3

Introduces frontiers and problems of modern physical science. Physicist present the role of physics in diverse careers and physics fields. Introduction to physics applications and future employment opportunities motivates students to master skills required in undergraduate studies. Offered Fall. Freshmen physics majors (<30 credit hours), physics minors, and physics major transfers. All others by permission of chair.

PH 111 - GEN PHYSICS W/CALCULUS I

Semester Hours: 3

For science and engineering students. Basic laws of physics and their application to specific problems: vectors, Newtonian mechanics, energy, conservation laws, simple harmonic motion, statics, fluids. Offered all terms. Prerequisite: MA 171. Corequisite: PH 114.

PH 111R - RECITATION

Semester Hours: 0

PH 112 - GEN PHYSICS W/CALC II

Semester Hours: 3

Continuation of PH 111. Heat and thermodynamics, basic electricity, electric and magnetic fields. Offered all terms. Prerequisite: MA 172, PH 111, PH 114. Corequisite: PH 115.

PH 112R - RECITATION

Semester Hours: 0

PH 113 - GEN PHYSICS W/CALC III

Semester Hours: 3

Continuation of PH 111 and 112. Wave motion, optics, relativity, quantum effects, atomic and nuclear structure, and elementary particles. Offered all terms. Prerequisite: MA 201 (or higher), PH 112, and PH 115. Corequisite: PH 116.

PH 113R - RECITATION

Semester Hours: 0

PH 114 - GENERAL PHYSICS LAB I

Semester Hour: 1

Laboratory instruction in support of material covered in PH 111. Offered all terms. Corequisite: PH 111.

PH 115 - GENERAL PHYSICS LAB II

Semester Hour: 1

Laboratory instruction in support of material covered in PH 112. Offered all terms. Corequisite: PH 112.

PH 116 - GENERAL PHYSICS LAB III

Semester Hour: 1

Laboratory instruction in support of material covered in PH 113. Offered all terms. Corequisite: PH 113.

PH 251 - SPECIAL RELATIVITY

Semester Hour: 1

Einstein's theory of special relativity. Invariance, geometry of Minkowski spacetime, non-Euclidean geometry; Principle of Relativity; clock synchronization; Lorentz transformations; counter-intuitive effects measured in relative motion; casualty and the speed of light; relativistic dynamics. Prerequisite: PH 112 and MA 172. Prerequisite with concurrency: PH 113.

PH 301 - INTERMEDIATE MECHANICS

Semester Hours: 3

Reviews Newtonian mechanics, natural and driven oscillations, variational calculus and Lagrange's equations, application to central force motion, rigid body rotation and coupled oscillators. Offered Spring. Prerequisite: PH 111 and either PH 305 or MA 238.

PH 305 - MATH METHODS IN PHYSICS

Semester Hours: 3

Applied analytical techniques to solve problems in physics. Complex analysis, Fourier series, linear algebra, differential equations and vector calculus. Applications to mechanics, electricity and magnetism, optics, and thermodynamics. Offered Spring. Prerequisite: PH 112.

PH 306 - APPLIED PHYSICS

Semester Hours: 3

Computational and numerical techniques for problem solving. Applications to classical mechanics, electrodynamics, quantum mechanics, optics, astrophysics. Offered Fall. Prerequisite: PH 305, (CS 102 or CPE 112 or CS 121) and (MA 238 or MA 244 or MA 324).

PH 310 - INTERMEDIATE LAB I

Semester Hours: 2

Experiments in classical physics. Introduction to statistical methods. Offered Fall. Prerequisites: PH 113 or 116.

PH 311 - INTERMEDIATE LAB II

Semester Hours: 2

Experiments in modern physics. Offered Spring. Prerequisite: PH 251 and PH 310.

PH 337 - ELECTRONICS

Semester Hours: 4

Introductory course for all science students. Basic AC and DC circuits, operational amplifier circuits, transistor circuits, power supplies, digital logic and their use in laboratory instruments. Laboratory included. Offered Fall, odd years. Prerequisite: PH 112.

PH 351 - INTRODUCTION TO MODERN PHYSICS

Semester Hours: 3

Kinetic theory, Blackbody radiation, Quantum physics: wave packets, the uncertainty principle, Schrodinger's equation and solutions for simple systems, application to atomic, nuclear, and solid-state physics. Offered Fall. Prerequisite: PH 113, and either MA 238 or 244. Prerequisite with concurrency: PH 251.

PH 416 - SENIOR LABORATORY

Semester Hours: 2

Advanced experimental techniques in various sub-fields of physics. Offered Fall, Spring. Prerequisite: PH 311.

PH 420 - SENIOR THESIS

Semester Hours: 3

Research performed under direction of a faculty member. Final research report required. Offered all terms.

PH 421 - THERMAL & STATISTICAL PHYSICS

Semester Hours: 3

States of model system, entropy and temperature, Boltzmann distribution, thermal radiation and Planck distribution, chemical potential and Gibbs distribution, ideal gas, Fermi and Bose gases, heat and work, semiconductor statistics, kinetic theory. Offered Spring, even years. Prerequisite: PH 351. Prerequisite with concurrency: PH 301 and PH 306.

PH 431 - INTERM ELECTRIC & MAGNETISM I

Semester Hours: 3

Electrostatics: electric fields, electric potential, Poisson's equation. Electric fields in matter. Magnetostatics: currents, magnetic fields. Magnetic fields in matter. Prerequisite: PH 305 and MA 201. Prerequisite with concurrency: MA 238.

PH 432 - INTERM ELECTRIC & MAGNETISM II

Semester Hours: 3

Continuation of PH 431. Maxwell's equations for time-varying fields. Electromagnetic waves. AC circuits. Radiation. Relativistic electrodynamics. Offered Spring, odd years. Prerequisite: PH 431.

PH 451 - INTRO QUANTUM MECHANICS I

Semester Hours: 3

Waves and particles: deBroglie waves, wave-packets, and the uncertainty principle. Postulates of quantum mechanics. Schrodinger's equation: simple systems in one, two and three dimensions, the hydrogen atom. Angular momentum and spin. Offered Fall. Prerequisite: PH 305, PH 351, and (MA 244 or MA 238) and PH 306 with concurrency.

PH 452 - INTRO QUANTUM MECHANICS II

Semester Hours: 3

Multiparticle systems. Atomic structure. Approximation methods. Scattering. Applications to nuclear, atomic, and molecular systems. Offered Spring. Prerequisite: PH 451.

PH 453 - INTRO TO PARTICLE PHYSICS

Semester Hours: 3

Surveys elementary particle physics, Standard Model of quarks, leptons, and gauge bosons. Lorentz transformations, four-vectors and relativistic kinematics, angular momentum and spin. Lifetimes, cross-sections, and Feynman rules. Quantum electro and chromo-dynamics, Dirac equation, renormalization. Prerequisite with concurrency: PH 451.

PH 474 - INTRO TO GENERAL RELATIVITY

Semester Hours: 3

Introduces general relativity and gravitational physics as inferred from the behavior of particles and light rays for a selection of spacetimes. Major properties of black holes, wormholes, gravitational waves. Physics First approach, and introduces new math as required for discussion of physics. Prerequisite: PH 251 and PH 301.

PH 480 - SELECTED TOPICS

Semester Hours: 1-3

Offered upon demand. Topics include physics, optics, astrophysics, and space physics. Offered all terms. Prerequisite: PH 113 and MA 201.

PH 489 - SELECTED TOPICS

Semester Hours: 1-3

Offered upon demand. Topics include physics, optics, astrophysics, astronomy, computational physics, and space physics. Offered all terms. Prerequisites: PH 113 or 116 and MA 201.

PH 499 - PHYSICS PRACTICUM

Semester Hours: 3

'Capstone' course designed to provide real-world research experience for graduating seniors. Students work individually with faculty members on projects. Requires oral presentation and final research report. Offered all terms. Required courses on the POS must be taken prior to, or concurrently with, this course.

Physics, BS

Physics, BS Requirements:

- All students are encouraged to see an advisor after completion of 24 credits.
- Physics, BS degree requires 128 credit hours.
- 39 of 128 credit hours must be taken at 300 level or higher (39 credits includes courses taken at the 300+ level in major, minor (if chosen), Pre professional area and electives).
- 12 credit hours of 300 level and above must be taken in the major or 6 credit hours in the major and 6 credit hours in the minor (if chosen).
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- Unless otherwise noted a C- or better is required for all College of Science prerequisite courses.
- No more than 64 credit hours from a two-year college can be applied toward a UAH degree.
- For graduation application instructions, see here (p. 812).

Degree Requirements

Charger Foundations Requirements

*Please see Area V for CoS requirements that can also be used to fulfill Charger Foundations Requirements.

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	

Humanities and Fine Arts

3-6

CM 113	Intro to Rhetorical Communication
WLC 101S	INTRO FOREIGN LANG I: SPANISH
or WLC 101A	INTRO FOREIGN LANG I: ARABIC
or WLC 101F	INTRO FOREIGN LANG I:FRENCH
or WLC 101G	INTRO FOREIGN LANG I:GERMAN
or WLC 101J	INTRO FOREIGN LANG I:JAPANESE
or WLC 101R	INTRO FOREIGN LANG I:RUSSIAN
WLC 102S	INTRO FOREIGN LANG II:SPANISH
or WLC 102A	INTRO FOREIGN LANG II: ARABIC
or WLC 102F	INTRO FOREIGN LANG II:FRENCH
or WLC 102G	INTRO FOREIGN LANG II:GERMAN
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN
WLC 201S	INTERM FOREIGN LANG:SPANISH
or WLC 201A	INTERM FOREIGN LANG I: ARABIC
or WLC 201F	INTERM FOREIGN LANG:FRENCH
or WLC 201G	INTERM FOREIGN LANG:GERMAN
or WLC 201J	INTERM FOREIGN LANG: JAPANESE
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN
WLC 202S	INTERM FOREIGN LANG II:SPANISH
or WLC 202A	INTERM FOREIGN LANG II: ARABIC
or WLC 202F	INTERM FOREIGN LANG II:FRENCH
or WLC 202G	INTERM FOREIGN LANG II:GERMAN
or WLC 202J	INTERM FORGN LANG II:JAPANESE
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN
WLC 204	INTERNATIONAL CINEMA
PHL 101	INTRODUCTION TO PHILOSOPHY
PHL 102	INTRO TO ETHICS
PHL 103	INTRODUCTION TO LOGIC
PHL 150	TECH, SCIENCE & HUMAN VALUES
WGS 200	INTRO WOMEN'S & GENDER STUDIES
AMS 229	ANCIENT & MEDIEVAL WORLDS
ARH 100	ARH SURV:ANCIENT-MEDIEVAL
ARH 101	ARH SURV:RENAISSANCE-MODERN
ARH 103	ARH SUR:NON-WESTERN TRADITIONS
ARS 160	DRAWING: FOUNDATIONS
TH 122	THEATRE APPRECIATION
TH 123	INTRO TO FILM STUDIES
MU 100	INTRO TO MUSIC LITERATURE

Area III: Mathematics and Sciences**11-12**

Mathematics

3-4

MA 105	NATURE OF MATHEMATICS
MA 107	ALGEBRA WITH APPLICATIONS
MA 110	FINITE MATHEMATICS
MA 112	PRECALCULUS ALGEBRA
MA 113	PRECALCULUS TRIGONOMETRY
MA 115	PRECALCULUS ALGEBRA & TRIG
MA 120	MATH PROFESSIONAL APPLICATIONS
MA 171	CALCULUS A

Natural Sciences (Lab)

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AST 100	SURVEY OF ASTRONOMY
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AST 106	EXPLORING THE COSMOS I
AST 107	EXPLORING THE COSMOS II
BYS 109	FUNDAMENTALS OF BIOLOGY
BYS 119	PRINCIPLES OF BIOLOGY
BYS 120	ORGANISMAL BIOLOGY
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB
ESS 103	ENVIRONMENTAL EARTH SCIENCE
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG
PH 100	CONCEPTUAL PHYSICS
PH 101	GENERAL PHYSICS I
PH 102	GENERAL PHYSICS II
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III
Area IV: History and Social and Behavioral Sciences*	
History	
HY 103	WORLD HISTORY TO 1500
HY 104	WORLD HISTORY SINCE 1500
HY 221	UNITED STATES TO 1877
HY 222	UNITED STATES SINCE 1877
Social and Behavioral Sciences	
ECN 142	PRINC OF MACROECONOMICS
ECN 143	PRINC OF MICROECONOMICS
GS 200	GLOBAL SYSTEMS AND CULTURES
ESS 105	WORLD REGIONAL GEOGRAPHY
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY
PSC 101	INTRO TO AMERICAN GOVERNMENT
PSC 102	INTRO TO COMPARATIVE POLITICS
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS
PY 101	GENERAL PSYCHOLOGY I
PY 201	LIFE-SPAN DEVELOPMENT
SOC 100	INTRO TO SOCIOLOGY
SOC 102	ANALYSIS OF SOCIAL PROBLEMS
SOC 103	INTRO TO CRIMINOLOGY
SOC 105	INTRO CULTURAL ANTHROPOLOGY

12

3-6

6-9

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Take no more than six hours in a single discipline in Area II or Area IV.

Area V: Pre Professional Requirements

Code	Title	Semester Hours
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Courses in this area may also fulfill Charger Foundations requirements

Communications		
CM 113	Intro to Rhetorical Communication	
Chemistry sequence		8
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	
Mathematics²		18
MA 171	CALCULUS A	
MA 172	CALCULUS B	
MA 201	CALCULUS C	
MA 238	APPL DIFFERENTIAL EQUATIONS	
MA 244	INTRO TO LINEAR ALGEBRA	
Computer Science		3
CS 102 or CS 104	INTRO TO C PROGRAMMING INTRO TO CS USING PYTHON	
Technical Writing		3
EH 301	TECHNICAL WRITING	
Additional Science or Engineering course: Choose one		3-4
AST 106 & 106L	EXPLORING THE COSMOS I and ASTRONOMY LABORATORY	
BYS 119 & 119L & 119R	PRINCIPLES OF BIOLOGY and LABORATORY and RECITATION	
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB	
CS 121	COMPUTER SCIENCE I	
ESS 103 & 103L	ENVIRONMENTAL EARTH SCIENCE and LABORATORY	
ESS 111 & 111L	WEATHER, CLIMATE & GLOBAL CHNG and LABORATORY	
MA 112	PRECALCULUS ALGEBRA	
MA 113	PRECALCULUS TRIGONOMETRY	
MA 281	ELEMENTS OF STATISTICAL ANALYS	
Higher level math course		
Engineering course		

Major Requirements

Code	Title	Semester Hours
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Physics Core		28
PH 110	FRONTIERS IN SCIENCE	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	
PH 251	SPECIAL RELATIVITY	
PH 301	INTERMEDIATE MECHANICS	
PH 305	MATH METHODS IN PHYSICS	

PH 351	INTRODUCTION TO MODERN PHYSICS
PH 499	PHYSICS PRACTICUM

Physics Elective Courses **8**

PH/OPT/AST 300+ level or higher course
PH/OPT/AST 300+ level or higher course
PH/OPT/AST 300+ level or higher course

Elective Requirements

Code	Title	Semester Hours
Elective Courses		26-27

Additional Elective courses 100+ level to reach 128 credit hours. Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credits of 100 level HPE courses can count toward degree requirements.

Overall Requirements

Code	Title	Semester Hours
All College of Science degrees must have at least 128 credits.		
At least 39 of the 128 credits must be at the 300+ level. These may be taken in any area including electives.		

Total Semester Hours **128**

- 1 Students must take one literature and one history course. Students must also take either a second literature or history course to complete a sequence. Acceptable Literature sequences must include one early literature (EH 207 or EH 242 or EH 209) and one later literature (EH 208 or EH 210). Acceptable history sequences are (HY 103 + HY 104), or (HY 221 + HY 222)
- 2 Based on Math placement, (<http://www.uah.edu/science/departments/math/undergraduate-students/placement/>) prerequisite MA 112 and/or MA 113 Mathematics courses may be required.
- 3 No more than 6 credit hours can be taken in a single discipline.
- 4 For choices see the World Languages and Cultures (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/foreign-languages-literatures/>) department.

Sample Four-Year Plan for Physics, BS degree:

Note: This is only an example and variations are possible.

Year 1

Fall		Semester Hours
FYE 101S	CHARGER SUCCESS - SCIENCE	1
PH 110	FRONTIERS IN SCIENCE	3
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	4
MA 171	CALCULUS A	4
EH 101	COLLEGE WRITING I	3
Term Semester Hours:		15
Spring		
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	4
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	4
MA 172	CALCULUS B	4
EH 102	COLLEGE WRITING II	3
Term Semester Hours:		15

Year 2

Fall		
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	4
CS 102	INTRO TO C PROGRAMMING	3

or CS 104	or INTRO TO CS USING PYTHON	
MA 201	CALCULUS C	4
Fine Art		3
See Requirements tab for approved list.		
Literature		3
See Requirements tab for approved list.		
Term Semester Hours:		17
Spring		
PH 113	GEN PHYSICS W/CALC III	4
& PH 116	and GENERAL PHYSICS LAB III	
PH 251	SPECIAL RELATIVITY	1
MA 238	APPL DIFFERENTIAL EQUATIONS	3
CM 113	Intro to Rhetorical Communication	3
Elective		3
Elective		3
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		17
Year 3		
Fall		
PH 351	INTRODUCTION TO MODERN PHYSICS	3
MA 244	INTRO TO LINEAR ALGEBRA	3
Additional Science or Engineering Course		3-4
See Requirements tab for approved list.		
Social and Behavioral Science		3
See Requirements tab for approved list.		
Humanities, 2nd Fine Art or 2nd Literature		3
See Requirements tab for approved list.		
Term Semester Hours:		15-16
Spring		
PH 301	INTERMEDIATE MECHANICS	3
PH 305	MATH METHODS IN PHYSICS	3
PH/OPT/AST 300+ level or higher course		3
Social and Behavioral Science		3
See Requirements tab for approved list.		
Elective 300+ level or higher course		3
Elective		1
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		16
Year 4		
Fall		
PH/OPT/AST 300+ level or higher course		3
PH/OPT/AST 300+ level or higher course		2
EH 301	TECHNICAL WRITING	3
History		3

See Requirements tab for approved list.

Elective 300+ level or higher course	3
Elective 300+ level or higher course	3

Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.

	Term Semester Hours:	17
Spring		
PH 499	PHYSICS PRACTICUM	3
2nd History or 3rd Social and Behavioral science		3
See Requirements tab for approved list.		
Elective 300+ level or higher course		3
Elective 300+ level or higher course		3
Elective 300+ level or higher course		3
Elective		1
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
	Term Semester Hours:	16
	Total Semester Hours:	128-129

Physics, BS - Applied & Theoretical Physics Concentration

Physics, Applied & Theoretical Physics Concentration, BS Requirements:

- All students are encouraged to see an advisor after completion of 24 credits.
- Physics, Applied & Theoretical Physics Concentration, BS degree requires 128 credit hours.
- 39 of 128 credit hours must be taken at 300 level or higher (39 credits includes courses taken at the 300+ level in major, minor (if chosen), Pre professional area and electives).
- 12 credit hours of 300 level and above must be taken in the major or 6 credit hours in the major and 6 credit hours in the minor (if chosen).
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- Unless otherwise noted a C- or better is required for all College of Science prerequisite courses.
- No more than 64 credit hours from a two-year college can be applied toward a UAH degree.
- For graduation application instructions, see here (p. 812).

Degree Requirements

Charger Foundations Requirements

*Please see Area V for CoS requirements that can also be used to fulfill Charger Foundations Requirements.

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	

TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S	INTRO FOREIGN LANG I: SPANISH	
or WLC 101A	INTRO FOREIGN LANG I: ARABIC	
or WLC 101F	INTRO FOREIGN LANG I:FRENCH	
or WLC 101G	INTRO FOREIGN LANG I:GERMAN	
or WLC 101J	INTRO FOREIGN LANG I:JAPANESE	
or WLC 101R	INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S	INTRO FOREIGN LANG II:SPANISH	
or WLC 102A	INTRO FOREIGN LANG II: ARABIC	
or WLC 102F	INTRO FOREIGN LANG II:FRENCH	
or WLC 102G	INTRO FOREIGN LANG II:GERMAN	
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE	
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN	
WLC 201S	INTERM FOREIGN LANG:SPANISH	
or WLC 201A	INTERM FOREIGN LANG I: ARABIC	
or WLC 201F	INTERM FOREIGN LANG:FRENCH	
or WLC 201G	INTERM FOREIGN LANG:GERMAN	
or WLC 201J	INTERM FOREIGN LANG: JAPANESE	
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN	
WLC 202S	INTERM FOREIGN LANG II:SPANISH	
or WLC 202A	INTERM FOREIGN LANG II: ARABIC	
or WLC 202F	INTERM FOREIGN LANG II:FRENCH	
or WLC 202G	INTERM FOREIGN LANG II:GERMAN	
or WLC 202J	INTERM FORGN LANG II:JAPANESE	
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN	
WLC 204	INTERNATIONAL CINEMA	
PHL 101	INTRODUCTION TO PHILOSOPHY	
PHL 102	INTRO TO ETHICS	
PHL 103	INTRODUCTION TO LOGIC	
PHL 150	TECH, SCIENCE & HUMAN VALUES	
WGS 200	INTRO WOMEN'S & GENDER STUDIES	
AMS 229	ANCIENT & MEDIEVAL WORLDS	
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Area III: Mathematics and Sciences		11-12
Mathematics		3-4
MA 105	NATURE OF MATHEMATICS	
MA 107	ALGEBRA WITH APPLICATIONS	

MA 110	FINITE MATHEMATICS	
MA 112	PRECALCULUS ALGEBRA	
MA 113	PRECALCULUS TRIGONOMETRY	
MA 115	PRECALCULUS ALGEBRA & TRIG	
MA 120	MATH PROFESSIONAL APPLICATIONS	
MA 171	CALCULUS A	
Natural Sciences (Lab)		8
AST 100	SURVEY OF ASTRONOMY	
AST 106	EXPLORING THE COSMOS I	
AST 107	EXPLORING THE COSMOS II	
BYS 109	FUNDAMENTALS OF BIOLOGY	
BYS 119	PRINCIPLES OF BIOLOGY	
BYS 120	ORGANISMAL BIOLOGY	
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I	
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB	
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB	
ESS 103	ENVIRONMENTAL EARTH SCIENCE	
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG	
PH 100	CONCEPTUAL PHYSICS	
PH 101	GENERAL PHYSICS I	
PH 102	GENERAL PHYSICS II	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	
Area IV: History and Social and Behavioral Sciences*		12
History		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Sciences		6-9
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	
GS 200	GLOBAL SYSTEMS AND CULTURES	
ESS 105	WORLD REGIONAL GEOGRAPHY	
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY	
PSC 101	INTRO TO AMERICAN GOVERNMENT	
PSC 102	INTRO TO COMPARATIVE POLITICS	
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS	
PY 101	GENERAL PSYCHOLOGY I	
PY 201	LIFE-SPAN DEVELOPMENT	
SOC 100	INTRO TO SOCIOLOGY	
SOC 102	ANALYSIS OF SOCIAL PROBLEMS	

SOC 103	INTRO TO CRIMINOLOGY
SOC 105	INTRO CULTURAL ANTHROPOLOGY

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Take no more than six hours in a single discipline in Area II or Area IV.

Area V: Pre Professional Requirements

Code	Title	Semester Hours
Courses in this area may also fulfill Charger Foundations requirements		
Communications		
CM 113	Intro to Rhetorical Communication	8
Chemistry sequence		
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	8
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	8
Mathematics ²		
MA 171	CALCULUS A	3
MA 172	CALCULUS B	3
MA 201	CALCULUS C	3
MA 238	APPL DIFFERENTIAL EQUATIONS	3
MA 244	INTRO TO LINEAR ALGEBRA	3
Computer Science		
CS 102 or CS 104	INTRO TO C PROGRAMMING INTRO TO CS USING PYTHON	3
Technical Writing		
EH 301	TECHNICAL WRITING	3
Additional Science or Engineering course: Choose one		
AST 106 & 106L	EXPLORING THE COSMOS I and ASTRONOMY LABORATORY	3-4
BYS 119 & 119L & 119R	PRINCIPLES OF BIOLOGY and LABORATORY and RECITATION	3-4
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB	3-4
CS 121	COMPUTER SCIENCE I	3-4
ESS 103 & 103L	ENVIRONMENTAL EARTH SCIENCE and LABORATORY	3-4
ESS 111 & 111L	WEATHER, CLIMATE & GLOBAL CHNG and LABORATORY	3-4
MA 112	PRECALCULUS ALGEBRA	3-4
MA 113	PRECALCULUS TRIGONOMETRY	3-4
MA 281	ELEMENTS OF STATISTICAL ANALYS	3-4
Higher level math course		
Engineering course		

Major Requirements

Code	Title	Semester Hours
Physics Core		
PH 110	FRONTIERS IN SCIENCE	28
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	28

PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	
PH 251	SPECIAL RELATIVITY	
PH 301	INTERMEDIATE MECHANICS	
PH 305	MATH METHODS IN PHYSICS	
PH 351	INTRODUCTION TO MODERN PHYSICS	
PH 499	PHYSICS PRACTICUM	
Applied and Theoretical Concentration Requirements		19
PH 310	INTERMEDIATE LAB I	
PH 311	INTERMEDIATE LAB II	
PH 421	THERMAL & STATISTICAL PHYSICS (Note PH 306 prerequisite)	
PH 431	INTERM ELECTRICI & MAGNETISM I	
PH 432	INTERM ELECTRIC & MAGNETISM II	
PH 451	INTRO QUANTUM MECHANICS I (Note PH 306 prerequisite)	
PH 452	INTRO QUANTUM MECHANICS II	

Elective Requirements

Code	Title	Semester Hours
Elective Courses		15-16
Additional Elective courses 100+ level to reach 128 credit hours. Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credits of 100 level HPE courses can count toward degree requirements.		

Overall Requirements

Code	Title	Semester Hours
All College of Science degrees must have at least 128 credits.		
At least 39 of the 128 credits must be at the 300+ level. These may be taken in any area including electives.		
Total Semester Hours		128

- ¹ Students must take one literature and one history course. Students must also take either a second literature or history course to complete a sequence. Acceptable Literature sequences must include one early literature (EH 207 or EH 242 or EH 209) and one later literature (EH 208 or EH 210). Acceptable history sequences are (HY 103 + HY 104), or (HY 221 + HY 222)
- ² Based on Math placement, (<http://www.uah.edu/science/departments/math/undergraduate-students/placement/>) prerequisite MA 112 and/or MA 113 Mathematics courses may be required.
- ³ No more than 6 credit hours can be taken in a single discipline.
- ⁴ For choices see the World Languages and Cultures (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/foreign-languages-literatures/>) department.

Sample Four-Year Plan for Physics, Applied & Theoretical Physics Concentration, BS degree:**Note: This is only an example and variations are possible.****Year 1**

Fall		Semester Hours
FYE 101S	CHARGER SUCCESS - SCIENCE	1
PH 110	FRONTIERS IN SCIENCE	3
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	4
MA 171	CALCULUS A	4
EH 101	COLLEGE WRITING I	3
Term Semester Hours:		15

Spring

PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	4
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	4
MA 172	CALCULUS B	4
EH 102	COLLEGE WRITING II	3
Elective		2

Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.

Term Semester Hours:	17
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Year 2**Fall**

PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	4
CS 102 or CS 104	INTRO TO C PROGRAMMING or INTRO TO CS USING PYTHON	3
MA 201	CALCULUS C	4
Fine Art		3

See Requirements tab for approved list.

Literature	3
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See Requirements tab for approved list.

Term Semester Hours:	17
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Spring

PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	4
PH 251	SPECIAL RELATIVITY	1
MA 238	APPL DIFFERENTIAL EQUATIONS	3
CM 113	Intro to Rhetorical Communication	3
Social and Behavioral Science		3

See Requirements tab for approved list.

Humanities, 2nd Fine Art or 2nd	3
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Literature

See Requirements tab for approved list.

Term Semester Hours:	17
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Year 3**Fall**

PH 306	APPLIED PHYSICS	3
PH 310	INTERMEDIATE LAB I	2
PH 351	INTRODUCTION TO MODERN PHYSICS	3
MA 244	INTRO TO LINEAR ALGEBRA	3
Additional Science or Engineering Course		3-4

See Requirements tab for approved list.

Term Semester Hours:	14-15
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Spring

PH 301	INTERMEDIATE MECHANICS	3
PH 305	MATH METHODS IN PHYSICS	3
PH 311	INTERMEDIATE LAB II	2
PH 421	THERMAL STATISTICAL PHYSICS	3

Social and Behavioral Science	3
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See Requirements tab for approved list.

History		3
See Requirements tab for approved list.		
Term Semester Hours:		17
Year 4		
Fall		
PH 431	INTERM ELECTRICI MAGNETISM I	3
PH 451	INTRO QUANTUM MECHANICS I	3
EH 301	TECHNICAL WRITING	3
2nd History or 3rd Social and Behavioral science		3
See Requirements tab for approved list.		
Elective		3
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		15
Spring		
PH 432	INTERM ELECTRIC MAGNETISM II	3
PH 452	INTRO QUANTUM MECHANICS II	3
PH 499	PHYSICS PRACTICUM	3
Elective 300+ level or higher course		3
Elective		3
Elective		1
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		16
Total Semester Hours:		128-129

Physics, BS - Astronomy & Astrophysics Concentration

The Astronomy & Astrophysics concentration covers basic astronomy and astrophysics, stellar and galactic structure, high-energy astrophysics, general relativity and cosmology. Graduates who complete this concentration find work in all aspects of astrophysics from low-level atmospheric physics, to solar physics and the Sun-Earth system, to the mysteries of dark matter and cosmology. With laboratory experience and exposure to electronics, students may also find work supporting astronomical guidance and control systems on terrestrial and space-borne platforms.

Physics, Astronomy & Astrophysics Concentration, BS Requirements:

- All students are encouraged to see an advisor after completion of 24 credits.
- Physics, Astronomy & Astrophysics Concentration, BS degree requires 128 credit hours.
- 39 of 128 credit hours must be taken at 300 level or higher (39 credits includes courses taken at the 300+ level in major, minor (if chosen), Pre-professional area and electives).
- 12 credit hours of 300 level and above must be taken in the major or 6 credit hours in the major and 6 credit hours in the minor (if chosen).
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- Unless otherwise noted a C- or better is required for all College of Science prerequisite courses.
- No more than 64 credit hours from a two-year college can be applied toward a UAH degree.
- For graduation application instructions, see here (p. 812).

Degree Requirements

Charger Foundations Requirements

*Please see Area V for CoS requirements that can also be used to fulfill Charger Foundations Requirements.

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101	COLLEGE WRITING I	

or EH 101S	COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S	INTRO FOREIGN LANG I: SPANISH	
or WLC 101A	INTRO FOREIGN LANG I: ARABIC	
or WLC 101F	INTRO FOREIGN LANG I:FRENCH	
or WLC 101G	INTRO FOREIGN LANG I:GERMAN	
or WLC 101J	INTRO FOREIGN LANG I:JAPANESE	
or WLC 101R	INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S	INTRO FOREIGN LANG II:SPANISH	
or WLC 102A	INTRO FOREIGN LANG II: ARABIC	
or WLC 102F	INTRO FOREIGN LANG II:FRENCH	
or WLC 102G	INTRO FOREIGN LANG II:GERMAN	
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE	
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN	
WLC 201S	INTERM FOREIGN LANG:SPANISH	
or WLC 201A	INTERM FOREIGN LANG I: ARABIC	
or WLC 201F	INTERM FOREIGN LANG:FRENCH	
or WLC 201G	INTERM FOREIGN LANG:GERMAN	
or WLC 201J	INTERM FOREIGN LANG: JAPANESE	
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN	
WLC 202S	INTERM FOREIGN LANG II:SPANISH	
or WLC 202A	INTERM FOREIGN LANG II: ARABIC	
or WLC 202F	INTERM FOREIGN LANG II:FRENCH	
or WLC 202G	INTERM FOREIGN LANG II:GERMAN	
or WLC 202J	INTERM FORGN LANG II:JAPANESE	
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN	
WLC 204	INTERNATIONAL CINEMA	
PHL 101	INTRODUCTION TO PHILOSOPHY	
PHL 102	INTRO TO ETHICS	
PHL 103	INTRODUCTION TO LOGIC	
PHL 150	TECH, SCIENCE & HUMAN VALUES	
WGS 200	INTRO WOMEN'S & GENDER STUDIES	
AMS 229	ANCIENT & MEDIEVAL WORLDS	

ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Area III: Mathematics and Sciences		11-12
Mathematics		3-4
MA 105	NATURE OF MATHEMATICS	
MA 107	ALGEBRA WITH APPLICATIONS	
MA 110	FINITE MATHEMATICS	
MA 112	PRECALCULUS ALGEBRA	
MA 113	PRECALCULUS TRIGONOMETRY	
MA 115	PRECALCULUS ALGEBRA & TRIG	
MA 120	MATH PROFESSIONAL APPLICATIONS	
MA 171	CALCULUS A	
Natural Sciences (Lab)		8
AST 100	SURVEY OF ASTRONOMY	
AST 106	EXPLORING THE COSMOS I	
AST 107	EXPLORING THE COSMOS II	
BYS 109	FUNDAMENTALS OF BIOLOGY	
BYS 119	PRINCIPLES OF BIOLOGY	
BYS 120	ORGANISMAL BIOLOGY	
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I	
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB	
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB	
ESS 103	ENVIRONMENTAL EARTH SCIENCE	
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG	
PH 100	CONCEPTUAL PHYSICS	
PH 101	GENERAL PHYSICS I	
PH 102	GENERAL PHYSICS II	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	
Area IV: History and Social and Behavioral Sciences*		12
History		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	
HY 221	UNITED STATES TO 1877	
HY 222	UNITED STATES SINCE 1877	
Social and Behavioral Sciences		6-9
ECN 142	PRINC OF MACROECONOMICS	
ECN 143	PRINC OF MICROECONOMICS	

GS 200	GLOBAL SYSTEMS AND CULTURES
ESS 105	WORLD REGIONAL GEOGRAPHY
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY
PSC 101	INTRO TO AMERICAN GOVERNMENT
PSC 102	INTRO TO COMPARATIVE POLITICS
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS
PY 101	GENERAL PSYCHOLOGY I
PY 201	LIFE-SPAN DEVELOPMENT
SOC 100	INTRO TO SOCIOLOGY
SOC 102	ANALYSIS OF SOCIAL PROBLEMS
SOC 103	INTRO TO CRIMINOLOGY
SOC 105	INTRO CULTURAL ANTHROPOLOGY

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Take no more than six hours in a single discipline in Area II or Area IV.

Area V: Pre Professional Requirements

Code	Title	Semester Hours
Courses in this area may also fulfill Charger Foundations requirements		
Communications		3
CM 113	Intro to Rhetorical Communication	
Chemistry sequence		8
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	
Mathematics ²		18
MA 171	CALCULUS A	
MA 172	CALCULUS B	
MA 201	CALCULUS C	
MA 238	APPL DIFFERENTIAL EQUATIONS	
MA 244	INTRO TO LINEAR ALGEBRA	
Computer Science		3
CS 102 or CS 104	INTRO TO C PROGRAMMING INTRO TO CS USING PYTHON	
Technical Writing		3
EH 301	TECHNICAL WRITING	
Additional Science or Engineering course: Choose one		3-4
AST 106 & 106L	EXPLORING THE COSMOS I and ASTRONOMY LABORATORY	
BYS 119 & 119L & 119R	PRINCIPLES OF BIOLOGY and LABORATORY and RECITATION	
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB	
CS 121	COMPUTER SCIENCE I	
ESS 103 & 103L	ENVIRONMENTAL EARTH SCIENCE and LABORATORY	
ESS 111 & 111L	WEATHER, CLIMATE & GLOBAL CHNG and LABORATORY	
MA 112	PRECALCULUS ALGEBRA	
MA 113	PRECALCULUS TRIGONOMETRY	
MA 281	ELEMENTS OF STATISTICAL ANALYS	

Higher level math course

Engineering course

Major Requirements

Code	Title	Semester Hours
Physics Core		28
PH 110	FRONTIERS IN SCIENCE	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	
PH 251	SPECIAL RELATIVITY	
PH 301	INTERMEDIATE MECHANICS	
PH 305	MATH METHODS IN PHYSICS	
PH 351	INTRODUCTION TO MODERN PHYSICS	
PH 499	PHYSICS PRACTICUM	
Astronomy and Astrophysics concentration courses		17
AST 106 & 106L	EXPLORING THE COSMOS I and ASTRONOMY LABORATORY	
AST 107 & 107L	EXPLORING THE COSMOS II and GEN ASTRONOMY II LAB	
AST 371	INTRO TO ASTROPHYSICS	
AST 471	ASTROPHYSICS	
PH/OPT/AST 300+ level or higher course		

Elective Requirements

Code	Title	Semester Hours
Elective Courses		17-18
Additional Elective courses 100+ level to reach 128 credit hours. Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credits of 100 level HPE courses can count toward degree requirements.		

Overall Requirements

Code	Title	Semester Hours
All College of Science degrees must have at least 128 credits.		
At least 39 of the 128 credits must be at the 300+ level. These may be taken in any area including electives.		
Total Semester Hours		128

- ¹ Students must take one literature and one history course. Students must also take either a second literature or history course to complete a sequence. Acceptable Literature sequences must include one early literature (EH 207 or EH 242 or EH 209) and one later literature (EH 208 or EH 210). Acceptable history sequences are (HY 103 + HY 104), or (HY 221 + HY 222)
- ² Based on Math placement, (<http://www.uah.edu/science/departments/math/undergraduate-students/placement/>) prerequisite MA 112 and/or MA 113 Mathematics courses may be required.
- ³ No more than 6 credit hours can be taken in a single discipline.
- ⁴ For choices see the World Languages and Cultures (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/foreign-languages-literatures/>) department.

Sample Four-Year plan for Physics, Astronomy & Astrophysics Concentration, BS degree:**Note: This is only an example and variations are possible.**

Year 1

Fall		Semester Hours
FYE 101S	CHARGER SUCCESS - SCIENCE	1
PH 110	FRONTIERS IN SCIENCE	3
AST 106 & 106L	EXPLORING THE COSMOS I and ASTRONOMY LABORATORY	4
MA 171	CALCULUS A	4
EH 101	COLLEGE WRITING I	3
Term Semester Hours:		15
Spring		
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	4
AST 107 & 107L	EXPLORING THE COSMOS II and GEN ASTRONOMY II LAB	4
MA 172	CALCULUS B	4
EH 102	COLLEGE WRITING II	3
Elective		2
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		17

Year 2

Fall		
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	4
MA 201	CALCULUS C	4
MA 244	INTRO TO LINEAR ALGEBRA	3
Literature		3
See Requirements tab for approved list.		
Fine Art		3
See Requirements tab for approved list.		
Term Semester Hours:		17
Spring		
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	4
PH 251	SPECIAL RELATIVITY	1
MA 238	APPL DIFFERENTIAL EQUATIONS	3
Social and Behavioral science		3
See Requirements tab for approved list.		
Humanities, 2nd Fine Art or 2nd Literature		3
See Requirements tab for approved list.		
Elective		2
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		16

Year 3

Fall		
PH 351	INTRODUCTION TO MODERN PHYSICS	3
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	4
CS 102	INTRO TO C PROGRAMMING	3

or CS 104	or INTRO TO CS USING PYTHON	
CM 113	Intro to Rhetorical Communication	3
Social and Behavioral science		3
See Requirements tab for approved list.		
Term Semester Hours:		16
Spring		
PH 301	INTERMEDIATE MECHANICS	3
PH 305	MATH METHODS IN PHYSICS	3
AST 371	INTRO TO ASTROPHYSICS	3
CH 123	GENERAL CHEMISTRY II	4
& CH 126	and GENERAL CHEMISTRY LAB II	
History		3
See Requirements tab for approved list.		
Term Semester Hours:		16
Year 4		
Fall		
AST 471	ASTROPHYSICS	3
EH 301	TECHNICAL WRITING	3
PH/OPT/AST 300+ level or higher course		3
2nd History or 3rd Social and Behavioral science		3
See Requirements tab for approved list.		
Elective 300+ level or higher course		3
Term Semester Hours:		15
Spring		
PH 499	PHYSICS PRACTICUM	3
Elective 300+ level or higher course		3
Elective 300+ level or higher course		3
Elective 300+ level or higher course		3
Elective 300+ level or higher course		3
Elective		1
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		16
Total Semester Hours:		128

Physics, BS - Engineering Physics Concentration

Physics, Engineering Physics Concentration, BS Requirements:

- All students are encouraged to see an advisor after completion of 24 credits.
- Physics, Engineering Physics Concentration, BS degree requires 128 credit hours.
- 39 of 128 credit hours must be taken at 300 level or higher (39 credits includes courses taken at the 300+ level in major, minor (if chosen), Pre-professional area and electives).
- 12 credit hours of 300 level and above must be taken in the major or 6 credit hours in the major and 6 credit hours in the minor (if chosen).
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- Unless otherwise noted a C- or better is required for all College of Science prerequisite courses.
- No more than 64 credit hours from a two-year college can be applied toward a UAH degree.
- For graduation application instructions, see here (p. 812).

Degree Requirements

Charger Foundations Requirements

*Please see Area V for CoS requirements that can also be used to fulfill Charger Foundations Requirements.

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S or WLC 101A or WLC 101F or WLC 101G or WLC 101J or WLC 101R	INTRO FOREIGN LANG I: SPANISH INTRO FOREIGN LANG I: ARABIC INTRO FOREIGN LANG I:FRENCH INTRO FOREIGN LANG I:GERMAN INTRO FOREIGN LANG I:JAPANESE INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S or WLC 102A or WLC 102F or WLC 102G or WLC 102J or WLC 102R	INTRO FOREIGN LANG II:SPANISH INTRO FOREIGN LANG II: ARABIC INTRO FOREIGN LANG II:FRENCH INTRO FOREIGN LANG II:GERMAN INTRO FOREIGN LANG II:JAPANESE INTRO FOREIGN LANG II:RUSSIAN	
WLC 201S or WLC 201A or WLC 201F or WLC 201G or WLC 201J or WLC 201R	INTERM FOREIGN LANG:SPANISH INTERM FOREIGN LANG I: ARABIC INTERM FOREIGN LANG:FRENCH INTERM FOREIGN LANG:GERMAN INTERM FOREIGN LANG: JAPANESE INTERM FOREIGN LANG:RUSSIAN	
WLC 202S or WLC 202A or WLC 202F or WLC 202G or WLC 202J or WLC 202R	INTERM FOREIGN LANG II:SPANISH INTERM FOREIGN LANG II: ARABIC INTERM FOREIGN LANG II:FRENCH INTERM FOREIGN LANG II:GERMAN INTERM FORGN LANG II:JAPANESE INTERM FOREIGN LANG II:RUSSIAN	
WLC 204	INTERNATIONAL CINEMA	
PHL 101	INTRODUCTION TO PHILOSOPHY	

PHL 102	INTRO TO ETHICS	
PHL 103	INTRODUCTION TO LOGIC	
PHL 150	TECH, SCIENCE & HUMAN VALUES	
WGS 200	INTRO WOMEN'S & GENDER STUDIES	
AMS 229	ANCIENT & MEDIEVAL WORLDS	
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Area III: Mathematics and Sciences		11-12
Mathematics		3-4
MA 105	NATURE OF MATHEMATICS	
MA 107	ALGEBRA WITH APPLICATIONS	
MA 110	FINITE MATHEMATICS	
MA 112	PRECALCULUS ALGEBRA	
MA 113	PRECALCULUS TRIGONOMETRY	
MA 115	PRECALCULUS ALGEBRA & TRIG	
MA 120	MATH PROFESSIONAL APPLICATIONS	
MA 171	CALCULUS A	
Natural Sciences (Lab)		8
AST 100	SURVEY OF ASTRONOMY	
AST 106	EXPLORING THE COSMOS I	
AST 107	EXPLORING THE COSMOS II	
BYS 109	FUNDAMENTALS OF BIOLOGY	
BYS 119	PRINCIPLES OF BIOLOGY	
BYS 120	ORGANISMAL BIOLOGY	
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I	
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB	
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB	
ESS 103	ENVIRONMENTAL EARTH SCIENCE	
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG	
PH 100	CONCEPTUAL PHYSICS	
PH 101	GENERAL PHYSICS I	
PH 102	GENERAL PHYSICS II	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	
Area IV: History and Social and Behavioral Sciences*		12
History		3-6
HY 103	WORLD HISTORY TO 1500	
HY 104	WORLD HISTORY SINCE 1500	

HY 221	UNITED STATES TO 1877
HY 222	UNITED STATES SINCE 1877
Social and Behavioral Sciences	
ECN 142	PRINC OF MACROECONOMICS
ECN 143	PRINC OF MICROECONOMICS
GS 200	GLOBAL SYSTEMS AND CULTURES
ESS 105	WORLD REGIONAL GEOGRAPHY
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY
PSC 101	INTRO TO AMERICAN GOVERNMENT
PSC 102	INTRO TO COMPARATIVE POLITICS
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS
PY 101	GENERAL PSYCHOLOGY I
PY 201	LIFE-SPAN DEVELOPMENT
SOC 100	INTRO TO SOCIOLOGY
SOC 102	ANALYSIS OF SOCIAL PROBLEMS
SOC 103	INTRO TO CRIMINOLOGY
SOC 105	INTRO CULTURAL ANTHROPOLOGY

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Take no more than six hours in a single discipline in Area II or Area IV.

Area V: Pre Professional Requirements

Code	Title	Semester Hours
Courses in this area may also fulfill Charger Foundations requirements		
Communications		3
CM 113	Intro to Rhetorical Communication	
Chemistry sequence		8
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	
Mathematics ²		18
MA 171	CALCULUS A	
MA 172	CALCULUS B	
MA 201	CALCULUS C	
MA 238	APPL DIFFERENTIAL EQUATIONS	
MA 244	INTRO TO LINEAR ALGEBRA	
Computer Science		3
CS 102 or CS 104	INTRO TO C PROGRAMMING INTRO TO CS USING PYTHON	
Technical Writing		3
EH 301	TECHNICAL WRITING	
Additional Science or Engineering course: Choose one		3-4
AST 106 & 106L	EXPLORING THE COSMOS I and ASTRONOMY LABORATORY	
BYS 119 & 119L & 119R	PRINCIPLES OF BIOLOGY and LABORATORY and RECITATION	
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB	
CS 121	COMPUTER SCIENCE I	
ESS 103 & 103L	ENVIRONMENTAL EARTH SCIENCE and LABORATORY	

ESS 111 & 111L	WEATHER, CLIMATE & GLOBAL CHNG and LABORATORY
MA 112	PRECALCULUS ALGEBRA
MA 113	PRECALCULUS TRIGONOMETRY
MA 281	ELEMENTS OF STATISTICAL ANALYS
Higher level math course	
Engineering course	

Major Requirements

Code	Title	Semester Hours
Physics Core		28
PH 110	FRONTIERS IN SCIENCE	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	
PH 251	SPECIAL RELATIVITY	
PH 301	INTERMEDIATE MECHANICS	
PH 305	MATH METHODS IN PHYSICS	
PH 351	INTRODUCTION TO MODERN PHYSICS	
PH 499	PHYSICS PRACTICUM	
Physics Elective		3
PH/OPT/AST Elective 300+ level or higher course		
Engineering Physics Concentration courses		15
Engineering courses 300+ level or higher		

Elective Requirements

Code	Title	Semester Hours
Elective Courses		16-17
Additional Elective courses 100+ level to reach 128 credit hours. Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credits of 100 level HPE courses can count toward degree requirements.		

Overall Requirements

Code	Title	Semester Hours
All College of Science degrees must have at least 128 credits.		
At least 39 of the 128 credits must be at the 300+ level. These may be taken in any area including electives.		
Total Semester Hours		128

- 1 Students must take one literature and one history course. Students must also take either a second literature or history course to complete a sequence. Acceptable Literature sequences must include one early literature (EH 207 or EH 242 or EH 209) and one later literature (EH 208 or EH 210). Acceptable history sequences are (HY 103 + HY 104), or (HY 221 + HY 222)
- 2 Based on Math placement, (<http://www.uah.edu/science/departments/math/undergraduate-students/placement/>) prerequisite MA 112 and/or MA 113 Mathematics courses may be required.
- 3 No more than 6 credit hours can be taken in a single discipline.
- 4 For choices see the World Languages and Cultures (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/foreign-languages-literatures/>) department.

Sample Four-Year plan for Physics, Engineering Physics Concentration, BS degree:

Note: This is only an example and variations are possible.

Year 1

Fall		Semester Hours
FYE 101S	CHARGER SUCCESS - SCIENCE	1
PH 110	FRONTIERS IN SCIENCE	3
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	4
MA 171	CALCULUS A	4
EH 101	COLLEGE WRITING I	3
Term Semester Hours:		15
Spring		
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	4
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	4
MA 172	CALCULUS B	4
EH 102	COLLEGE WRITING II	3
Elective		2
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		17

Year 2

Fall		
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	4
CS 102 or CS 104	INTRO TO C PROGRAMMING or INTRO TO CS USING PYTHON	3
MA 201	CALCULUS C	4
Fine Art		3
See Requirements tab for approved list.		
Literature		3
See Requirements tab for approved list.		
Term Semester Hours:		17
Spring		
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	4
PH 251	SPECIAL RELATIVITY	1
PH 305	MATH METHODS IN PHYSICS	3
MA 238	APPL DIFFERENTIAL EQUATIONS	3
Social and Behavioral science		3
See Requirements tab for approved list.		
Elective		3
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		17

Year 3

Fall		
PH 351	INTRODUCTION TO MODERN PHYSICS	3
MA 244	INTRO TO LINEAR ALGEBRA	3
Additional Science or Engineering Course		3-4
See Requirements tab for approved list.		

Social and Behavioral Science		3
See Requirements tab for approved list.		
Humanities, 2nd Fine Art or 2nd Literature		3
See Requirements tab for approved list.		
Term Semester Hours:		15-16
Spring		
PH 301	INTERMEDIATE MECHANICS	3
PH/OPT/AST 300+ level or higher course		3
CM 113	Intro to Rhetorical Communication	3
History		3
See Requirements tab for approved list.		
Engineering Elective Course		3
Elective		1
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		16
Year 4		
Fall		
Engineering Elective Course		3
Engineering Elective Course		3
EH 301	TECHNICAL WRITING	3
2nd History or 3rd Social and Behavioral science		3
See Requirements tab for approved list.		
Elective 300+ level or higher course		3
Elective		1
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		16
Spring		
PH 499	PHYSICS PRACTICUM	3
Engineering Elective Course		3
Engineering Elective Course		3
Elective 300+ level or higher course		3
Elective		3
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		15
Total Semester Hours:		128-129

Physics, BS - Optics Concentration

Optics is a multidisciplinary field. Students completing the optics concentration receive exposure to geometrical optics, physical optics, optical instruments, interference and diffraction, polarimetry, optoelectronics, lasers, optical sources and detectors, and radiometry along with laboratory experience using state-of-the-art equipment and modern optical techniques.

Physics, Optics Concentration, BS Requirements:

- All students are encouraged to see an advisor after completion of 24 credits.
- Physics, Optics Concentration, BS degree requires 128 credit hours.

- 39 of 128 credit hours must be taken at 300 level or higher (39 credits includes courses taken at the 300+ level in major, minor (if chosen), Pre-professional area and electives).
- 12 credit hours of 300 level and above must be taken in the major or 6 credit hours in the major and 6 credit hours in the minor (if chosen).
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- Unless otherwise noted a C- or better is required for all College of Science prerequisite courses.
- No more than 64 credit hours from a two-year college can be applied toward a UAH degree.
- For graduation application instructions, see here (p. 812).

Degree Requirements

Charger Foundations Requirements

*Please see Area V for CoS requirements that can also be used to fulfill Charger Foundations Requirements.

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S or WLC 101A or WLC 101F or WLC 101G or WLC 101J or WLC 101R	INTRO FOREIGN LANG I: SPANISH INTRO FOREIGN LANG I: ARABIC INTRO FOREIGN LANG I:FRENCH INTRO FOREIGN LANG I:GERMAN INTRO FOREIGN LANG I:JAPANESE INTRO FOREIGN LANG I:RUSSIAN	
WLC 102S or WLC 102A or WLC 102F or WLC 102G or WLC 102J or WLC 102R	INTRO FOREIGN LANG II:SPANISH INTRO FOREIGN LANG II: ARABIC INTRO FOREIGN LANG II:FRENCH INTRO FOREIGN LANG II:GERMAN INTRO FOREIGN LANG II:JAPANESE INTRO FOREIGN LANG II:RUSSIAN	
WLC 201S or WLC 201A or WLC 201F or WLC 201G or WLC 201J	INTERM FOREIGN LANG:SPANISH INTERM FOREIGN LANG I: ARABIC INTERM FOREIGN LANG:FRENCH INTERM FOREIGN LANG:GERMAN INTERM FOREIGN LANG: JAPANESE	

or WLC 201R	INTERM FOREIGN LANG:RUSSIAN	
WLC 202S	INTERM FOREIGN LANG II:SPANISH	
or WLC 202A	INTERM FOREIGN LANG II: ARABIC	
or WLC 202F	INTERM FOREIGN LANG II:FRENCH	
or WLC 202G	INTERM FOREIGN LANG II:GERMAN	
or WLC 202J	INTERM FORGN LANG II:JAPANESE	
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN	
WLC 204	INTERNATIONAL CINEMA	
PHL 101	INTRODUCTION TO PHILOSOPHY	
PHL 102	INTRO TO ETHICS	
PHL 103	INTRODUCTION TO LOGIC	
PHL 150	TECH, SCIENCE & HUMAN VALUES	
WGS 200	INTRO WOMEN'S & GENDER STUDIES	
AMS 229	ANCIENT & MEDIEVAL WORLDS	
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Area III: Mathematics and Sciences		11-12
Mathematics		3-4
MA 105	NATURE OF MATHEMATICS	
MA 107	ALGEBRA WITH APPLICATIONS	
MA 110	FINITE MATHEMATICS	
MA 112	PRECALCULUS ALGEBRA	
MA 113	PRECALCULUS TRIGONOMETRY	
MA 115	PRECALCULUS ALGEBRA & TRIG	
MA 120	MATH PROFESSIONAL APPLICATIONS	
MA 171	CALCULUS A	
Natural Sciences (Lab)		8
AST 100	SURVEY OF ASTRONOMY	
AST 106	EXPLORING THE COSMOS I	
AST 107	EXPLORING THE COSMOS II	
BYS 109	FUNDAMENTALS OF BIOLOGY	
BYS 119	PRINCIPLES OF BIOLOGY	
BYS 120	ORGANISMAL BIOLOGY	
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I	
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB	
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB	
ESS 103	ENVIRONMENTAL EARTH SCIENCE	
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG	
PH 100	CONCEPTUAL PHYSICS	
PH 101	GENERAL PHYSICS I	
PH 102	GENERAL PHYSICS II	

PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III

Area IV: History and Social and Behavioral Sciences* **12**

History **3-6**

HY 103	WORLD HISTORY TO 1500
HY 104	WORLD HISTORY SINCE 1500
HY 221	UNITED STATES TO 1877
HY 222	UNITED STATES SINCE 1877

Social and Behavioral Sciences **6-9**

ECN 142	PRINC OF MACROECONOMICS
ECN 143	PRINC OF MICROECONOMICS
GS 200	GLOBAL SYSTEMS AND CULTURES
ESS 105	WORLD REGIONAL GEOGRAPHY
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY
PSC 101	INTRO TO AMERICAN GOVERNMENT
PSC 102	INTRO TO COMPARATIVE POLITICS
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS
PY 101	GENERAL PSYCHOLOGY I
PY 201	LIFE-SPAN DEVELOPMENT
SOC 100	INTRO TO SOCIOLOGY
SOC 102	ANALYSIS OF SOCIAL PROBLEMS
SOC 103	INTRO TO CRIMINOLOGY
SOC 105	INTRO CULTURAL ANTHROPOLOGY

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Take no more than six hours in a single discipline in Area II or Area IV.

Area V: Pre Professional Requirements

Code	Title	Semester Hours
Courses in this area may also fulfill Charger Foundations requirements		
Communications		3
CM 113	Intro to Rhetorical Communication	
Chemistry sequence		8
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	
Mathematics ²		18
MA 171	CALCULUS A	
MA 172	CALCULUS B	
MA 201	CALCULUS C	
MA 238	APPL DIFFERENTIAL EQUATIONS	
MA 244	INTRO TO LINEAR ALGEBRA	
Computer Science		3
CS 102 or CS 104	INTRO TO C PROGRAMMING INTRO TO CS USING PYTHON	
Technical Writing		3
EH 301	TECHNICAL WRITING	
Additional Science or Engineering course: Choose one		3-4

AST 106 & 106L	EXPLORING THE COSMOS I and ASTRONOMY LABORATORY
BYS 119 & 119L & 119R	PRINCIPLES OF BIOLOGY and LABORATORY and RECITATION
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB
CS 121	COMPUTER SCIENCE I
ESS 103 & 103L	ENVIRONMENTAL EARTH SCIENCE and LABORATORY
ESS 111 & 111L	WEATHER, CLIMATE & GLOBAL CHNG and LABORATORY
MA 112	PRECALCULUS ALGEBRA
MA 113	PRECALCULUS TRIGONOMETRY
MA 281	ELEMENTS OF STATISTICAL ANALYS
Higher level math course	
Engineering course	

Major Requirements

Code	Title	Semester Hours
Physics Core		28
PH 110	FRONTIERS IN SCIENCE	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	
PH 251	SPECIAL RELATIVITY	
PH 301	INTERMEDIATE MECHANICS	
PH 305	MATH METHODS IN PHYSICS	
PH 351	INTRODUCTION TO MODERN PHYSICS	
PH 499	PHYSICS PRACTICUM	
Optics Concentration Requirements		15
OPT 341	GEOMETRICAL OPTICS	
OPT 342	PHYSICAL OPTICS	
OPT 411	OPTICS LAB	
PH/OPT 300+ level or higher course		
PH/OPT 400+ level or higher course		

Elective Requirements

Code	Title	Semester Hours
Elective Courses		19-20
Additional Elective courses 100+ level to reach 128 credit hours. Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credits of 100 level HPE courses can count toward degree requirements.		

Overall Requirements

Code	Title	Semester Hours
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All College of Science degrees must have at least 128 credits.

At least 39 of the 128 credits must be at the 300+ level. These may be taken in any area including electives.

Total Semester Hours	128
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- ¹ Students must take one literature and one history course. Students must also take either a second literature or history course to complete a sequence. Acceptable Literature sequences must include one early literature (EH 207 or EH 242 or EH 209) and one later literature (EH 208 or EH 210). Acceptable history sequences are (HY 103 + HY 104), or (HY 221 + HY 222)
- ² Based on Math placement, (<http://www.uah.edu/science/departments/math/undergraduate-students/placement/>) prerequisite MA 112 and/or MA 113 Mathematics courses may be required.
- ³ No more than 6 credit hours can be taken in a single discipline.
- ⁴ For choices see the World Languages and Cultures (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/foreign-languages-literatures/>) department.

Sample Four-Year Plan for Physics, Optics Concentration, BS degree:

Note: This is only an example and variations are possible.

Year 1

Fall		Semester Hours
FYE 101S	CHARGER SUCCESS - SCIENCE	1
PH 110	FRONTIERS IN SCIENCE	3
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	4
MA 171	CALCULUS A	4
EH 101	COLLEGE WRITING I	3
Term Semester Hours:		15
Spring		
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	4
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	4
MA 172	CALCULUS B	4
EH 102	COLLEGE WRITING II	3
Elective		2
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		17

Year 2

Fall		
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	4
MA 201	CALCULUS C	4
CS 102 or CS 104	INTRO TO C PROGRAMMING or INTRO TO CS USING PYTHON	3
Fine Art		3
See Requirements tab for approved list.		
Literature		3
See Requirements tab for approved list.		
Term Semester Hours:		17
Spring		
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	4
PH 251	SPECIAL RELATIVITY	1

MA 238	APPL DIFFERENTIAL EQUATIONS	3
CM 113	Intro to Rhetorical Communication	3
Humanities, 2nd Fine Art or 2nd Literature		3
See Requirements tab for approved list.		
Elective		3
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		17
Year 3		
Fall		
PH 351	INTRODUCTION TO MODERN PHYSICS	3
OPT 341	GEOMETRICAL OPTICS	3
MA 244	INTRO TO LINEAR ALGEBRA	3
Additional Science or Engineering Course		3-4
See Requirements tab for approved list.		
Social and Behavioral Science		3
See Requirements tab for approved list.		
Term Semester Hours:		15-16
Spring		
PH 301	INTERMEDIATE MECHANICS	3
PH 305	MATH METHODS IN PHYSICS	3
OPT 342	PHYSICAL OPTICS	3
Social and Behavioral science		3
See Requirements tab for approved list.		
History		3
See Requirements tab for approved list.		
Term Semester Hours:		15
Year 4		
Fall		
OPT 411	OPTICS LAB	3
PH/OPT 300+ level or higher course		3
EH 301	TECHNICAL WRITING	3
2nd History or 3rd Social and Behavioral science		3
See Requirements tab for approved list.		
Elective 300+ level or higher		3
Elective		1
Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.		
Term Semester Hours:		16
Spring		
PH 499	PHYSICS PRACTICUM	3
PH/OPT 400+ level or higher course		3
Elective 300+ level or higher course		3
Elective 300+ level or higher course		3
Elective		3
Elective		1

Electives can be taken from any department and do not have to be taken in your major or minor. No more than 4 credit hours of 100 level HPE courses can count toward degree requirements.

Term Semester Hours:	16
Total Semester Hours:	128-129

Physics, BS - Secondary Education Certification

Physics, Secondary Education Concentration, BS Requirements:

- All students are encouraged to see an advisor after completion of 24 credits.
- Physics, Secondary Education Concentration, BS degree requires 142-143 credit hours.
- 39 credit hours must be taken at 300 level or higher (39 credits includes courses taken at the 300+ level in major, minor (if chosen), Pre professional area and electives).
- 12 credit hours of 300 level and above must be taken in the major or 6 credit hours in the major and 6 credit hours in the minor (if chosen).
- 12 of the last 18 credit hours must be taken at UAH, with an overall 25% of coursework taken at UAH.
- Unless otherwise noted a C- or better is required for all College of Science prerequisite courses.
- No more than 64 credit hours from a two-year college can be applied toward a UAH degree.
- For graduation application instructions, see here (p. 812).

This concentration leads to a B.S. degree with a major in Physics, and meets the requirements for an Alabama Class B Middle/Junior High School Teacher's Certificate or an Alabama Class B High School Teacher's Certificate.

Degree Requirements

Charger Foundations Requirements

*Please see Area V for CoS requirements that can also be used to fulfill Charger Foundations Requirements.

Code	Title	Semester Hours
Area I: Freshman Composition		3-6
EH 101 or EH 101S	COLLEGE WRITING I COLLEGE WRITING I W/STUDIO	
EH 102	COLLEGE WRITING II	
EH 103	ACCELERATED COLLEGE WRITING	
EH 105	HONORS ENGLISH SEMINAR	
Area II: Humanities and Fine Arts*		12
Fine Arts		3
ARH 100	ARH SURV:ANCIENT-MEDIEVAL	
ARH 101	ARH SURV:RENAISSANCE-MODERN	
ARH 103	ARH SUR:NON-WESTERN TRADITIONS	
ARS 160	DRAWING: FOUNDATIONS	
TH 122	THEATRE APPRECIATION	
TH 123	INTRO TO FILM STUDIES	
MU 100	INTRO TO MUSIC LITERATURE	
Literature		3-6
EH 207	READINGS LITERATURE/CULTURE I	
EH 208	READINGS LITERATURE/CULTURE 2	
EH 209	HONORS SEM READINGS LIT/CUL I	
EH 210	HONORS SEM READINGS LIT/CUL 2	
EH 242	MYTHOLOGY	
Humanities and Fine Arts		3-6
CM 113	Intro to Rhetorical Communication	
WLC 101S or WLC 101A or WLC 101F or WLC 101G	INTRO FOREIGN LANG I: SPANISH INTRO FOREIGN LANG I: ARABIC INTRO FOREIGN LANG I:FRENCH INTRO FOREIGN LANG I:GERMAN	

or WLC 101J	INTRO FOREIGN LANG I:JAPANESE
or WLC 101R	INTRO FOREIGN LANG I:RUSSIAN
WLC 102S	INTRO FOREIGN LANG II:SPANISH
or WLC 102A	INTRO FOREIGN LANG II: ARABIC
or WLC 102F	INTRO FOREIGN LANG II:FRENCH
or WLC 102G	INTRO FOREIGN LANG II:GERMAN
or WLC 102J	INTRO FOREIGN LANG II:JAPANESE
or WLC 102R	INTRO FOREIGN LANG II:RUSSIAN
WLC 201S	INTERM FOREIGN LANG:SPANISH
or WLC 201A	INTERM FOREIGN LANG I: ARABIC
or WLC 201F	INTERM FOREIGN LANG:FRENCH
or WLC 201G	INTERM FOREIGN LANG:GERMAN
or WLC 201J	INTERM FOREIGN LANG: JAPANESE
or WLC 201R	INTERM FOREIGN LANG:RUSSIAN
WLC 202S	INTERM FOREIGN LANG II:SPANISH
or WLC 202A	INTERM FOREIGN LANG II: ARABIC
or WLC 202F	INTERM FOREIGN LANG II:FRENCH
or WLC 202G	INTERM FOREIGN LANG II:GERMAN
or WLC 202J	INTERM FORGN LANG II:JAPANESE
or WLC 202R	INTERM FOREIGN LANG II:RUSSIAN
WLC 204	INTERNATIONAL CINEMA
PHL 101	INTRODUCTION TO PHILOSOPHY
PHL 102	INTRO TO ETHICS
PHL 103	INTRODUCTION TO LOGIC
PHL 150	TECH, SCIENCE & HUMAN VALUES
WGS 200	INTRO WOMEN'S & GENDER STUDIES
AMS 229	ANCIENT & MEDIEVAL WORLDS
ARH 100	ARH SURV:ANCIENT-MEDIEVAL
ARH 101	ARH SURV:RENAISSANCE-MODERN
ARH 103	ARH SUR:NON-WESTERN TRADITIONS
ARS 160	DRAWING: FOUNDATIONS
TH 122	THEATRE APPRECIATION
TH 123	INTRO TO FILM STUDIES
MU 100	INTRO TO MUSIC LITERATURE
Area III: Mathematics and Sciences	
Mathematics	
MA 105	NATURE OF MATHEMATICS
MA 107	ALGEBRA WITH APPLICATIONS
MA 110	FINITE MATHEMATICS
MA 112	PRECALCULUS ALGEBRA
MA 113	PRECALCULUS TRIGONOMETRY
MA 115	PRECALCULUS ALGEBRA & TRIG
MA 120	MATH PROFESSIONAL APPLICATIONS
MA 171	CALCULUS A
Natural Sciences (Lab)	
AST 100	SURVEY OF ASTRONOMY
AST 106	EXPLORING THE COSMOS I
AST 107	EXPLORING THE COSMOS II
BYS 109	FUNDAMENTALS OF BIOLOGY
BYS 119	PRINCIPLES OF BIOLOGY
BYS 120	ORGANISMAL BIOLOGY
BYS 215	HUMAN ANATOMY & PHYSIOLOGY I

11-12

3-4

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CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II
CH 151 & CH 105	GENERAL, ORGANIC, BIOCHEMISTRY and INTRO CHEMISTRY LAB
ESS 103	ENVIRONMENTAL EARTH SCIENCE
ESS 111	WEATHER, CLIMATE & GLOBAL CHNG
PH 100	CONCEPTUAL PHYSICS
PH 101	GENERAL PHYSICS I
PH 102	GENERAL PHYSICS II
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III

Area IV: History and Social and Behavioral Sciences* **12**

History **3-6**

HY 103	WORLD HISTORY TO 1500
HY 104	WORLD HISTORY SINCE 1500
HY 221	UNITED STATES TO 1877
HY 222	UNITED STATES SINCE 1877

Social and Behavioral Sciences **6-9**

ECN 142	PRINC OF MACROECONOMICS
ECN 143	PRINC OF MICROECONOMICS
GS 200	GLOBAL SYSTEMS AND CULTURES
ESS 105	WORLD REGIONAL GEOGRAPHY
ESS 110	PRINCIPLES OF HUMAN GEOGRAPHY
PSC 101	INTRO TO AMERICAN GOVERNMENT
PSC 102	INTRO TO COMPARATIVE POLITICS
PSC 260	INTRODUCTION TO INTERNATIONAL RELATIONS
PY 101	GENERAL PSYCHOLOGY I
PY 201	LIFE-SPAN DEVELOPMENT
SOC 100	INTRO TO SOCIOLOGY
SOC 102	ANALYSIS OF SOCIAL PROBLEMS
SOC 103	INTRO TO CRIMINOLOGY
SOC 105	INTRO CULTURAL ANTHROPOLOGY

* Take either 1 EH (Area II) + 2 HY (Area IV) <OR> 2 EH (Area II) + 1 HY (Area IV). Take no more than six hours in a single discipline in Area II or Area IV.

Area V: Pre Professional Requirements

Code	Title	Semester Hours
Courses in this area may also fulfill Charger Foundations requirements		
Communications		3
CM 113	Intro to Rhetorical Communication	
Chemistry sequence		8
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	

CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	
Mathematics ²		18
MA 171	CALCULUS A	
MA 172	CALCULUS B	
MA 201	CALCULUS C	
MA 238	APPL DIFFERENTIAL EQUATIONS	
MA 244	INTRO TO LINEAR ALGEBRA	
Computer Science		3
CS 102 or CS 104	INTRO TO C PROGRAMMING INTRO TO CS USING PYTHON	
Technical Writing		3
EH 301	TECHNICAL WRITING	
Additional Science or Engineering course: Choose one		3-4
AST 106 & 106L	EXPLORING THE COSMOS I and ASTRONOMY LABORATORY	
BYS 119 & 119L & 119R	PRINCIPLES OF BIOLOGY and LABORATORY and RECITATION	
CH 101 & CH 105	INTRO TO CHEMISTRY and INTRO CHEMISTRY LAB	
CS 121	COMPUTER SCIENCE I	
ESS 103 & 103L	ENVIRONMENTAL EARTH SCIENCE and LABORATORY	
ESS 111 & 111L	WEATHER, CLIMATE & GLOBAL CHNG and LABORATORY	
MA 112	PRECALCULUS ALGEBRA	
MA 113	PRECALCULUS TRIGONOMETRY	
MA 281	ELEMENTS OF STATISTICAL ANALYS	
Higher level math course		
Engineering course		

Major Requirements

Code	Title	Semester Hours
Physics Core		28
PH 110	FRONTIERS IN SCIENCE	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	
PH 113 & PH 116	GEN PHYSICS W/CALC III and GENERAL PHYSICS LAB III	
PH 251	SPECIAL RELATIVITY	
PH 301	INTERMEDIATE MECHANICS	
PH 305	MATH METHODS IN PHYSICS	
PH 351	INTRODUCTION TO MODERN PHYSICS	
PH 499	PHYSICS PRACTICUM	
Physics Elective Courses		8
PH/OPT/AST 300+ level or higher course		
PH/OPT/AST 300+ level or higher course		
PH/OPT/AST 300+ level or higher course		
Secondary Education Concentration Requirements		40
ED 301	INTRO TO EDUCATION PRACTICUM	

ED 307	MULTICULTURAL FND EDUCATION	
ED 308	EDUCATIONAL PSYCHOLOGY	
EDC 301	TCHG THE EXCEPTIONAL CHILD	
EDC 311	INSTR STRATEGIES INCLUSIVE CLR	
ED 410	FOUNDATIONS EDUC EVALUAT	
ED 423	TCHNG SCIENCE MID & SEC SCH I	
ED 350	TECHNOLOGY IN CLASSROOM	
ED 408	TCHG READING/CONTENT AREA	
ED 309	CLASSROOM & BEHAVIOR MGMT	
ED 497	HIGH SCHOOL INTERNSHIP	
Total Semester Hours		142-143

Overall Requirements

Code	Title	Semester Hours
All College of Science degrees must have at least 128 credits.		
At least 39 of the 128 credits must be at the 300+ level. These may be taken in any area including electives.		
Total Semester Hours		128

- Students must take one literature and one history course. Students must also take either a second literature or history course to complete a sequence. Acceptable Literature sequences must include one early literature (EH 207 or EH 242 or EH 209) and one later literature (EH 208 or EH 210). Acceptable history sequences are (HY 103 + HY 104), or (HY 221 + HY 222)
- Based on Math placement, (<http://www.uah.edu/science/departments/math/undergraduate-students/placement/>) prerequisite MA 112 and/or MA 113 Mathematics courses may be required.
- No more than 6 credit hours can be taken in a single discipline.
- For choices see the World Languages and Cultures (<http://catalog.uah.edu/undergrad/colleges-departments/arts-humanities-social-sciences/foreign-languages-literatures/>) department.

Sample Four-Year Plan for Physics, Secondary Education Concentration, BS degree:

Note: This is only an example and variations are possible.

Year 1

Fall		Semester Hours
FYE 101S	CHARGER SUCCESS - SCIENCE	1
PH 110	FRONTIERS IN SCIENCE	3
CH 121 & CH 125	GENERAL CHEMISTRY I and GENERAL CHEMISTRY LAB I	4
MA 171	CALCULUS A	4
EH 101	COLLEGE WRITING I	3
Term Semester Hours:		15
Spring		
EH 102	COLLEGE WRITING II	3
MA 172	CALCULUS B	4
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	4
CH 123 & CH 126	GENERAL CHEMISTRY II and GENERAL CHEMISTRY LAB II	4
Term Semester Hours:		15

Year 2

Fall		
PH 112 & PH 115	GEN PHYSICS W/CALC II and GENERAL PHYSICS LAB II	4
MA 201	CALCULUS C	4
CS 102 or CS 104	INTRO TO C PROGRAMMING or INTRO TO CS USING PYTHON	3

Fine Art		3
See Requirements tab for approved list.		
Term Semester Hours:		14
Spring		
PH 113	GEN PHYSICS W/CALC III	4
& PH 116	and GENERAL PHYSICS LAB III	
PH 251	SPECIAL RELATIVITY	1
PH 305	MATH METHODS IN PHYSICS	3
MA 238	APPL DIFFERENTIAL EQUATIONS	3
Literature		3
See Requirements tab for approved list.		
Term Semester Hours:		14
Year 3		
Fall		
PH 351	INTRODUCTION TO MODERN PHYSICS	3
MA 244	INTRO TO LINEAR ALGEBRA	3
Additional Science or Engineering Course		3-4
See Requirements tab for approved list.		
PY 101	GENERAL PSYCHOLOGY I	3
Required for Education Concentration		
Humanities, 2nd Fine Art or 2nd Literature		3
See Requirements tab for approved list.		
Term Semester Hours:		15-16
Spring		
PH 301	INTERMEDIATE MECHANICS	3
PH/OPT/AST 300+ level or higher course		3
PY 201	LIFE-SPAN DEVELOPMENT	3
Required for Education Concentration		
CM 113	Intro to Rhetorical Communication	3
History		3
See Requirements tab for approved list.		
Term Semester Hours:		15
Year 4		
Fall		
PH 499	PHYSICS PRACTICUM	3
EH 301	TECHNICAL WRITING	3
PH/OPT/AST 300+ level or higher course		3
PH/OPT/AST 300+ level or higher course		2
2nd History or 3rd Social and Behavioral science		3
See Requirements tab for approved list.		
Term Semester Hours:		14
Spring		
ED 301	INTRO TO EDUCATION PRACTICUM	1
ED 307	MULTICULTURAL FND EDUCATION	3

ED 308	EDUCATIONAL PSYCHOLOGY	3
EDC 301	TCHG THE EXCEPTIONAL CHILD	3
EDC 311	INSTR STRATEGIES INCLUSIVE CLR	3
Term Semester Hours:		13
Fifth Year		
Fall		
ED 309	CLASSROOM BEHAVIOR MGMT	3
ED 350	TECHNOLOGY IN CLASSROOM	3
ED 408	TCHG READING/CONTENT AREA	3
ED 410	FOUNDATIONS EDUC EVALUAT	3
ED 423	TCHNG SCIENCE MID SEC SCH I	3
Term Semester Hours:		15
Spring		
ED 497	HIGH SCHOOL INTERNSHIP	12
Term Semester Hours:		12
Total Semester Hours:		142-143

Astronomy and Astrophysics Minor

A minor in Astronomy and Astrophysics consists of:

Code	Title	Semester Hours
PH 110	FRONTIERS IN SCIENCE	
PH 111 & PH 114	GEN PHYSICS W/CALCULUS I and GENERAL PHYSICS LAB I	
AST 106	EXPLORING THE COSMOS I	
AST 107	EXPLORING THE COSMOS II	
AST 371	INTRO TO ASTROPHYSICS	
PH/OPT/AST 300+ or 400+ course ¹		
Total Semester Hours ²¹		21

¹ PH 499 is an acceptable course for the PH 300+ or 400+ course.

Optics Minor

A minor in Optics consists of:

Code	Title	Semester Hours
PH 110	FRONTIERS IN SCIENCE	
PH 111	GEN PHYSICS W/CALCULUS I	
PH 112	GEN PHYSICS W/CALC II	
PH 113	GEN PHYSICS W/CALC III	
OPT 341	GEOMETRICAL OPTICS	
OPT 411	OPTICS LAB	
PH or OPT 300+ or 400+ course ¹		
Total Semester Hours		24

¹ PH 499 is an acceptable course for the PH 300+ or 400+ course.

Physics Minor

A minor in Physics consists of:

Code	Title	Semester Hours
PH 110	FRONTIERS IN SCIENCE	
PH 111	GEN PHYSICS W/CALCULUS I	
PH 112	GEN PHYSICS W/CALC II	
PH 113	GEN PHYSICS W/CALC III	
PH 300+ or 400+ course ¹		
PH 300+ or 400+ course ¹		
Total Semester Hours		21

¹ Courses PH 351 and PH 301 are encouraged to meet these requirements. PH 499 can be used as well.

Course Descriptions

- Course Descriptions (p. 646)
 - Accounting (ACC) (p. 647)
 - Ancient and Medieval Studies (AMS) (p. 649)
 - Art History (ARH) (p. 649)
 - Art Studio (ARS) (p. 651)
 - Astronomy (AST) (p. 658)
 - Atmospheric Science (ATS) (p. 659)
 - Biological Sciences (BYS) (p. 663)
 - Business Legal Studies (BLS) (p. 668)
 - Chemical Engineering (CHE) (p. 669)
 - Chemistry (CH) (p. 671)
 - Civil Engineering (CE) (p. 675)
 - Communication Arts (CM) (p. 678)
 - Computer Engineering (CPE) (p. 682)
 - Computer Science (CS) (p. 685)
 - Early Childhood Education (ECH) (p. 690)
 - Earth System Science (ESS) (p. 690)
 - Economics (ECN) (p. 694)
 - Education (ED) (p. 696)
 - Education Collaborative (EDC) (p. 700)
 - Electrical Engineering (EE) (p. 701)
 - Engineering (ENG) (p. 704)
 - English (EH) (p. 704)
 - English Linguistics (EHL) (p. 710)
 - Finance (FIN) (p. 711)
 - Global Studies (GS) (p. 712)
 - Health & Physical Education (HPE) (p. 713)
 - History (HY) (p. 715)
 - Industrial & Systems Engineering (ISE) (p. 720)
 - Information Systems (IS) (p. 722)
 - Kinesiology (KIN) (p. 723)
 - Management (MGT) (p. 729)
 - Management Science (MSC) (p. 731)
 - Marine Science (MS) (p. 732)
 - Marketing (MKT) (p. 732)
 - Mathematics (MA) (p. 734)
 - Mechanical & Aerospace Engineering (MAE) (p. 738)
 - Military Science (MIL) (p. 743)
 - Music (MU) (p. 743)

- Music Applied (MUA) (p. 747)
- Music Education (MUE) (p. 756)
- Music Jazz (MUJ) (p. 756)
- Nursing (NUR) (p. 758)
- Optical Engineering (OPE) (p. 764)
- Optics (OPT) (p. 764)
- Philosophy (PHL) (p. 765)
- Physics (PH) (p. 768)
- Political Science (PSC) (p. 771)
- Professional Studies (PRO) (p. 773)
- Psychology (PY) (p. 775)
- Sociology (SOC) (p. 779)
- Statistics (ST) (p. 782)
- Theatre (TH) (p. 782)
- Womens and Gender Studies (WGS) (p. 786)
- World Languages and Cultures (WLC) (p. 786)

Accounting (ACC)

ACC 201 - ACC & FIN FOR ENTREPRENEURS

Semester Hours: 3

An introductory look at the basic principles of accounting and finance for small businesses: financial statement preparation and analysis, time value of money, sources of capital, cost of capital, job order costing, cost-volume-profit analysis and budgeting.

ACC 210 - ACCOUNTING FOR BUSINESS

Semester Hours: 4

An introduction to the role accounting information plays in business. Topics include both external and internal uses of accounting information with a particular focus on the accounting cycle, the preparation and interpretation of financial statements, and the role of accounting information in management decision making.

ACC 211 - PRINC OF FINANCIAL ACCOUNTING

Semester Hours: 3

Introduction to basic concepts that underlie accounting information. Topics include the statement of financial position, the income statement, the accounting cycle, internal control, and ethical and behavioral issues in financial reporting. Emphasis is placed on proper use of financial statement information.

ACC 212 - MANAGEMENT ACCOUNTING

Semester Hours: 3

An introduction to the use of accounting information for internal planning and control. Topics include cost behavior, cost-volume-profit analysis, cost measurement, relevant costs for decision-making, budgeting, and performance evaluation. Prerequisite: ACC 211.

ACC 307 - ACCOUNTING INFORMATION SYS

Semester Hours: 3

A detailed review and analysis of procedures required to capture, classify, summarize and report financial information. Topics include elements of accounting systems, business documents, consideration in systems design, flowcharting, and procedures to protect property and information. Extensive use is made of the personal computer and the SAP software to illustrate the concepts covered in the course. Prerequisite: ACC 210.

ACC 310 - INTERM FINANCIAL ACCT I

Semester Hours: 3

First in a two-course sequence to examine the measurement and reporting of income, cash flows, assets, liabilities, and owner's equity in financial statements. Topics include financial statements, current assets and liabilities, investments, revenue recognition, and error analysis. Prerequisite: ACC 210 (with a grade of B- or better).

ACC 310L - LABORATORY

Semester Hours: 0

Intermediate Accounting I Lab provides extra opportunities for students to practice and to develop their problem-solving skills.

ACC 311 - INTERM FINANCIAL ACCT II

Semester Hours: 3

Second in a two-course sequence to examine the measurement and reporting of income, cash flows, assets, liabilities, and owner's equity in financial statements. Topics include long-term assets and liabilities, leases, income taxes, pensions, and owner's equity. Prerequisite: ACC 310.

ACC 311L - LABORATORY

Semester Hours: 0

Intermediate Accounting II lab provides extra opportunities for students to practice and to develop their problem-solving skills.

ACC 313 - INDIVIDUAL/SMALL BUS INCOME TA

Semester Hours: 3

Determination of taxable income, business and non-business deductions, and selected aspects of tax accounting for individuals and sole proprietorships. Prerequisite: ACC 210.

ACC 413 - CORPORATE & PARTNERSHIP TAXATN

Semester Hours: 3

Tax accounting for partnerships, corporations, S corporations, estates, and trusts. Tax administration and research are emphasized. Prerequisite: ACC 313.

ACC 414 - COST ACCOUNTING

Semester Hours: 3

Development and use of cost data for external reporting and internal planning and control. Topics include cost modeling, job and process costing, standard costing, activity-based costing, and budgeting. Development of relevant cost information for special purposes is also considered. Prerequisite: ACC 310 (C or better).

ACC 415 - ADV FINANCIAL ACCOUNTING

Semester Hours: 3

Analysis of financial accounting issues and alternatives concerning business combinations, intercorporate investments, international business, and partnerships. Prerequisite: ACC 311.

ACC 417 - ACC ST/LOCAL GOV & NON-PROFITS

Semester Hours: 3

Fund accounting at federal, state, and local governments, hospitals, and universities. Special accounting principles, budgeting, accounting for various funds and account groups are emphasized. Prerequisite: ACC 210 or ACC 212.

ACC 420 - STATE AND LOCAL TAXATION

Semester Hours: 3

Principles of state income tax, sales and other excise taxes and property tax. Taxation of interstate commerce will be examined along with US constitutional restrictions on the ability of states to tax interstate commerce.

ACC 431 - PRINCIPLES OF AUDITING

Semester Hours: 3

Conceptual foundations of auditing practice. Basic auditing concepts including professional ethics, legal ability, independence, and competence. Auditing of computer-oriented systems, audit sampling, and standards of reporting. Role of the internal and independent auditor. Prerequisite: ACC 307 & ACC 310.

ACC 432 - ADVANCED AUDITING

Semester Hours: 3

Practical applications of auditing concepts and standards. An understanding of auditing principles is reinforced and expanded by exposure to problems and cases. Prerequisite: ACC 431.

ACC 433 - FORENSIC ACCOUNTING

Semester Hours: 3

Study of the nature and types of fraud. The course covers the tools and techniques used to prevent, investigate, and detect fraud. Prerequisite: ACC 431.

ACC 440 - BASIC GOV CONTRACT ACCTG

Semester Hours: 3

Basic coverage and principles of government contract accounting with an emphasis on the Federal Acquisition Regulation (FAR). Prerequisite: ACC 314 or ACC 414.

ACC 441 - ADVANCED GOV CONTRACT ACCTG

Semester Hours: 3

Advanced issues in government contract cost accounting with an emphasis on the Federal Acquisition Regulation (FAR) and Cost Accounting Standards (CAS) cost allocation guidelines. Prerequisite: ACC 440.

ACC 470 - SEMINAR/CONTEMP ACCTG ISSUES

Semester Hours: 3

Current topics in professional accounting. Prerequisite: ACC 311 and permission of instructor.

ACC 480 - PROFESSIONAL CERTIFICATION

Semester Hours: 3

Review of the four areas of the Accounting Standards and Procedures: Regulation, Business Environment and Concepts, Financial Accounting and Reporting, Auditing and Attestation. Knowledge of the concepts in each of the areas is required for professional accounting certification practice.

Prerequisite: Permission of Department Chair.

ACC 490 - SPECIAL PROJECTS

Semester Hours: 1-3

Independent study in an area of interest to the student in the fields of accounting. Department chair permission required.

ACC 495 - INTERNSHIP IN ACCOUNTING

Semester Hours: 1-3

Active involvement in a project in a business enterprise, professional organization, or government agency that has particular interest and relevance to the student. Subject to College's guidelines on internships. Course grade will be given on a satisfactory (S)/unsatisfactory (U) basis.

Ancient and Medieval Studies (AMS)

AMS 199 - SPECIAL TOPICS

Semester Hours: 3

Special topics. Selected special topics course offered in ancient languages, History, Art History, Philosophy.

AMS 229 - ANCIENT & MEDIEVAL WORLDS

Semester Hours: 3

A survey of ancient and medieval culture in the Mediterranean world with attention to the ancient cultures of the Near East, Egypt, Greece, and Rome as well as the development of medieval Christian and Muslim civilizations.

Art History (ARH)

ARH 100 - ARH SURV:ANCIENT-MEDIEVAL

Semester Hours: 3

Survey of Pre-historic to Medieval art. Course emphasizes study of cultural contexts that fostered art and introduces students to basic analytic tools and theories of art history. Very little in art is completely new. Learn about the visual traditions that shaped the culture we live in today.

ARH 101 - ARH SURV:RENAISSANCE-MODERN

Semester Hours: 3

Survey of the Major Western works of art produced since the Renaissance. Relates stylistic change to changes in historical and cultural contexts. Introduces students to basic analytic tools and theories of art history.

ARH 103 - ARH SUR:NON-WESTERN TRADITIONS

Semester Hours: 3

Survey of visual culture in India, the Far East, the Americas, the Pacific, and Africa. Focuses on relationships among art, religious beliefs, politics, and cultural practices. Studying the visual traditions of other cultures fosters greater understanding as our world becomes more global. Use the analytical tools and theories of art history to foster understandings of global cultures.

ARH 120 - ARH SURV: SPECIAL TOPICS

Semester Hours: 3

Course allows for survey-style exploration of special topics in art history and related fields such as archaeology.

ARH 301 - ANCIENT GREEK ART

Semester Hours: 3

Art of ancient Greece from the Bronze Age to the death of Cleopatra. Focuses on relationships of art to philosophy, politics, religion, literature, and drama. Greek art and culture heavily influenced our education system as well as the appearance of cities from Washington, DC to Huntsville, AL.

Prerequisites: ARH 100 and ARH 101.

ARH 302 - MEDIEVAL ART

Semester Hours: 3

Examines architecture, sculpture, manuscripts, metalwork, textiles, and stained glass from the fall of Rome to the Gothic era. In addition to a chronological study of the period, engage in case studies on courtship, warfare, religion, and cultural interactions that influenced practices today.

Prerequisites: ARH 100 and ARH 101.

ARH 303 - RENAISSANCE ART

Semester Hours: 3

The Renaissance supposedly ushered in advances in arts, humanities, and sciences. Rather than focusing on great masters, this course looks at regional trends in Italy as well as the rest of Europe to see what is innovative about this era considered a high point in Western culture. Prerequisites: ARH 100 and ARH 101.

ARH 304 - TWENTIETH CENTURY ART

Semester Hours: 3

Developments in European and American art from 1890 to World War II will be examined through historical, literary, philosophical, political, and social contexts and theories.. This course guides the student in critical reading of selected art historical and interdisciplinary scholarship. Prerequisites:

ARH 100 and ARH 101.

ARH 305 - ANCIENT ROMAN ART

Semester Hours: 3

Roman visual culture from the foundation of the city to its fall. Explore case studies such as the age of Augustus, Pompeii, Roman engineering, the Provinces, games and spectacle. Learn about the Roman legacy and consider its impact on modern Western Culture. Prerequisites: ARH 100 and ARH 101.

ARH 306 - COLLAPSE OF CIVILIZATIONS

Semester Hours: 3

Course investigates why some cultures succeed and others fail. Examine factors that lead to collapse to address a question relevant to the contemporary world: How severe do internal stresses have to become before relatively minor climate shifts can trigger a widespread cultural collapse?

Prerequisites: ARH 103 and ART major.

ARH 307 - IMPRESSIONISM & POST-IMP

Semester Hours: 3

European and American art from 1860 to 1900 examined through historical, political, social, philosophical, theoretical and literary perspective. This course guides the students in critical reading of selected art historical and interdisciplinary scholarship. Prerequisites: ARH 100 and ARH 101.

ARH 309 - CONTEMPORARY ART & ISSUES

Semester Hours: 3

Major movements since World War II examined through historical, political, social, philosophical, and literary perspectives. Contemporary art theories will also be explored. Course guides students in critical reading of selected art historical and interdisciplinary scholarship. Prerequisites: ARH 100 and ARH 101.

ARH 310 - NINETEENTH CENTURY ART

Semester Hours: 3

European and American art from 1780 to 1860 examined through historical, political, social, philosophical, theoretical and literary perspectives. Course guides students in critical reading of selected art historical and interdisciplinary scholarship. Prerequisites: ARH 100 and ARH 101.

ARH 311 - PHILOSOPHY OF ART

Semester Hours: 3

What is Art? This course explores and interrogates a wide range of contrasting aesthetic theories within the western tradition, with particular emphasis on the relation between artistic expression and philosophical frameworks. Prerequisites: ARH 100 and ARH 101. OR ARH 100 and ARH 103. OR ARH 101 and ARH 103. ART Major.

ARH 320 - SPECIAL TOPICS IN ART HY

Semester Hours: 3

Developed based on student and faculty interest, special topics courses explore content and issues not currently emphasized in the curriculum. Courses may focus on a particular issue like Women in Antiquity or a particular genre such as Modern Architecture. Prerequisites: ARH 100, ARH 101, and ARH 309.

ARH 395 - INDEPENDENT STUDY

Semester Hours: 3

Directed, independent study on a topic pre-arranged with instructor, normally as an outgrowth of a 300-level art history course. Weekly mentoring meetings with instructor help student develop a workable thesis, conduct research, and manage a project that results in a well-argued paper.

ARH 400 - SENIOR THESIS

Semester Hours: 3

Culminating experience for students with an Art History concentration. With the help of a faculty mentor, student will choose a topic, conduct research, and construct a well-argued paper. Student will present this research to the faculty, displaying skills valuable in most careers.

Art Studio (ARS)

ARS 123 - TWO-DIMENSIONAL DES/COLOR TH

Semester Hours: 3

Introduction to the principles and elements of design and color theory. Assignments explore design concepts and an understanding of color. Course stresses the development of visual and manual skills, problem solving, critical thinking, and the tools and materials used in the making of art.

ARS 140 - THREE-DIMENSIONAL DESIGN

Semester Hours: 3

Course introduces students to fundamental principles pertaining to the creation of three-dimensional art and prepares them for more advanced processes. Processes include, but are not limited to, drawing for sculpture, model making, woodworking, and sewing.

ARS 160 - DRAWING: FOUNDATIONS

Semester Hours: 3

Introduction to principles, materials, and techniques of drawing. Observational drawing and exercises teach students visual skills and introduce aesthetics and artistic expression. Class covers visual and manual skills, problem solving, critical thinking, and the tools and materials artists use.

ARS 210 - GAME DESIGN: INTRODUCTION

Semester Hours: 3

This course is an introduction to the principles and processes of game design. Students will play, research, design, modify, and prototype tabletop games throughout the semester to gain a better understanding of game design. Prerequisite: ARS 160 or permission of instructor.

ARS 220 - ANIMATION: INTRODUCTION

Semester Hours: 3

Course is an introduction to the principles of 3D computer generated imaging including modeling, texturing, rigging, animating, lighting, and rendering, as well as production processes such as storyboarding, sound design, and editing that together provide a basic working knowledge of 3D CGI. Prerequisites: ARS 160 and ARS 123.

ARS 230 - GRAPHIC DESIGN: INTRODUCTION

Semester Hours: 3

Introduction to graphic design theories, principles, and software. Instruction in the basics of graphic design through practical understanding of visual communication and logistics of advertising, conceptual thinking, and creative exploration. Course is a primer for the Macintosh platform. Prerequisites: ARS 123 and ARS 160.

ARS 240 - SCULPTURE: INTRODUCTION

Semester Hours: 3

Students will develop and explore their ideas using a variety of traditional and non-traditional tools, materials and processes. Assemblage, subtraction, modeling, 3D modeling/printing and casting processes will be addressed, preparing students for entrance into advanced coursework. Prerequisite: ARS 140.

ARS 250 - PHOTOGRAPHY: INTRODUCTION

Semester Hours: 3

Fundamentals and techniques of the digital camera, image capture, digital scanning, and image manipulation with Adobe PhotoShop software. Basic printing and image preparation for the web and other media will also be explored. Basic Mac OS and/or Windows skills, and digital camera required. Prerequisites: ARS 123 and ARS 160.

ARS 260 - DRAWING: INTRODUCTION

Semester Hours: 3

Course further develops drawing skills through study and practice. Materials, design, and creative ideas are explored. Critical thinking and visual analysis are used in critique. Students continue to develop visual and manual skills, problem solving abilities, and the use of tools and materials. Prerequisites: ARS 123 and ARS 160.

ARS 270 - PAINTING: INTRODUCTION

Semester Hours: 3

Students learn basic painting techniques, materials, and mediums. Problem solving assignments use two-dimensional design and color theory concepts and practices. Students are required to observe and think critically for critique and discussion. Prerequisites: ARS 123 and ARS 160.

ARS 280 - PRINTMAKING: INTRODUCTION

Semester Hours: 3

Introduction to basic areas of printmaking, including planographic, intaglio, and relief processes. Expands 2-D design concepts, color theory, and drawing skills. Develops proficiency with printmaking tools and materials as well as critical thinking and problem solving skills. Prerequisites: ARS 123 and ARS 160.

ARS 311 - GAME DESIGN: SCRIPTING & DES I

Semester Hours: 3

This course introduces students with limited programming experience to video game scripting using a visual programming language. Students will learn tools and techniques to design & script their own video games. Prerequisites: ARS 210, and one of the following: CS 102, CS 103, CS 121. Or permission of instructor.

ARS 321 - ANIMATION: ORGANIC MODELING

Semester Hours: 3

This course will focus on organic mesh design and production as well as surface and lighting properties for creating portfolio quality, real-time and pre-rendered, 3D organic models.

ARS 322 - ANIMATION: 3D ANIMATION

Semester Hours: 3

Course explores fundamental animation principles (timing/spacing, overlap, squash/stretch, anticipation, etc) along with digital animation tools (rigging, inverse kinematics, keyframing, etc) to help students gain experience and a better understanding of the role of CG animators. Prerequisite: ARS 220.

ARS 324 - ANIMATION: TECHNICAL ARTS

Semester Hours: 3

Course will concentrate on areas of production that require both technical and art skill, often called technical art. Topics include in-depth rigging, automating workflows, simulations, writing custom tools, writing shaders, etc. Students will gain experience in a sought-after production role. Prerequisite: ARS 220.

ARS 325 - ANIMATION: HARD SURF MODELING

Semester Hours: 3

This course will focus on hard surface mesh design and production as well as material and lighting properties for creating portfolio quality, real-time and pre-rendered, 3D hard surface models. Prerequisite: ARS 220.

ARS 327 - ANIMATION; VISUAL STORY DEV

Semester Hours: 3

This course focuses on developing visual storytelling as a graphic language for storyboarding films & animations, as well as creating comics and graphic novels. The principles of sequential art will be examined and applied to projects throughout the semester. This is a 2D course and is digital drawing intensive. Prerequisite with Concurrency: ARS 220.

ARS 328 - ANIMATION: CONCEPT ART

Semester Hours: 3

This class will cover the basics of concept art for the entertainment industry and related fields. Games, characters, and stories start out as ideas and concept art is how those ideas are visually developed, iterated, and refined before going into production. This course is digital drawing intensive.

Prerequisite with Concurrency: ARS 322.

ARS 329 - ANIMATION: 2D ANIMATION

Semester Hours: 3

This course focuses on creating traditional and tweened 2D animations using current digital tools and techniques. The principles of animation will be examined through a variety of exercises and applied to main projects. This course is digital drawing intensive. Prerequisite with Concurrency: ARS 220.

ARS 330 - GRAPHIC DESIGN: PRINT MEDIA I

Semester Hours: 3

Course emphasizes creative exploration in design and layout. Students will learn intermediate methods of graphic design. Focus for this course is additional study in design, creative thinking, and industry software. Prerequisite: ARS 230.

ARS 332 - GRAPHIC DESIGN: WEB DESIGN

Semester Hours: 3

Beginning course in web design using HTML and CSS to build effective and creative websites with strong user-centric design. Understanding HTML and current best web design practices is essential to web design and development. Prerequisite: ARS 230.

ARS 333 - GRAPH DES: WATERCOLOR & DIG I

Semester Hours: 3

Graphic design from an illustration and fine arts perspective. Course explores different creative directions using current software in combination with traditional watercolor media. Students will learn how to handle watercolor, develop creative concepts, and use software to support their design. Prerequisite: ARS 230.

ARS 334 - GRAPH DES: WEB USER EXPER I

Semester Hours: 3

Course places emphasis on user experience, web animation, and application for the purpose of media development. This course focuses on the understanding of user experience and user interface design through the study of how consumers interact with media. Prerequisite: ARS 230.

ARS 335 - GRAPHIC DESIGN: TYPOGRAPHY I

Semester Hours: 3

Course studies type design and the usage of basic letterforms, typographic contrast, and hierarchy of information, major type families and characteristics, the history of typography design, creativity, and grid layout. Prerequisite: ARS 230.

ARS 340 - SCULP: FABRICATION I

Semester Hours: 3

Exploration of a variety of assemblage processes including wood, metal, and fabric construction. Emphasis is placed on idea development and investigating a wide range of forms and materials. Course instruction includes welding, CNC plasma cutting, advanced wood joinery, and wood bending. Prerequisite: ARS 240.

ARS 341 - SCULP: CARVING I

Semester Hours: 3

Carving stone, wood, and other materials is investigated with emphasis placed on developing the ability to see and release forms and on the unique relationship evolving between maker and material. Instruction also includes CNC routing, wood turning, and sharpening techniques. Prerequisite: ARS 240.

ARS 342 - SCULP: CASTING I

Semester Hours: 3

Course instruction focuses on mold-making processes and materials involved in casting objects using both traditional and non-traditional methods. Metal casting is the principle focus of this course with investigation surrounding how digital practices continue to affect this age-old practice. Prerequisite: ARS 240.

ARS 346 - SCULP: FIGURE MODELING I

Semester Hours: 3

Study of the human form through direct clay modeling from life, including anatomical studies, armature construction, mold making, and casting. Nude models will be used. Prerequisite: ARS 240.

ARS 347 - SCULP: SPACE AND PLACE I

Semester Hours: 3

Investigation of installation and environmental art practices including site-specific work, public art and interactive environments. Students will explore works that relate to the experience of place and develop the potential to use sculptural objects to transform space. Prerequisite: ARS 240.

ARS 350 - PHOTO: DIGITAL I

Semester Hours: 3

Digital image creation and editing techniques using postproduction software, digital printing, and image presentation. Course addresses contemporary fine art issues and an introduction to studio lighting. Students are required to provide their own digital camera with RAW settings. Prerequisite: ARS 250.

ARS 352 - PHOTO: DARKROOM I

Semester Hours: 3

Black and white film and darkroom techniques explored as a means of expression. Course discusses artistic styles and the history of twentieth-century black and white photography. Students will produce a final fine art portfolio. 35mm camera required (available through department if necessary). Prerequisite: ARS 250.

ARS 353 - PHOTO: EXPER & HIST I

Semester Hours: 3

Introduction to alternative ways of working in the darkroom with an emphasis on historical photographic techniques. Experimentation with analog and digital materials are encouraged to produce a final portfolio. Students need a film camera (available through the department if necessary). Prerequisite: ARS 352.

ARS 355 - PHOTO: DOCUMENTARY I

Semester Hours: 3

Students study 'truth' in the image using the documentary style of photography. Emphasis on the history of the genre and how to work in the field with attention to ethical issues. Students are required to provide their own digital camera with RAW settings. Prerequisite: ARS 350.

ARS 360 - DRAWING: FIGURE

Semester Hours: 3

Drawing with an emphasis on life drawing utilizing both traditional and contemporary methods and materials. Figure drawing is the traditional cornerstone of art training, and includes anatomy, observation, and advanced technical skills. Nude models will be used. Prerequisite: ARS 260.

ARS 375 - PAINTING: TRADITIONAL I

Semester Hours: 3

Investigation of figure painting, focusing on technical and philosophical approaches to using the human form as subject matter. Nude models will be used. Students are guided in the development of artistic facility and vocabulary. Prerequisite: ARS 270.

ARS 376 - PAINTING: CONTEMPORARY I

Semester Hours: 3

Contemporary approaches toward painting are explored through technical and conceptual exercises based on contemporary painting practices. Students are guided in the development of artistic facility and personal expression. Prerequisite: ARS 270.

ARS 377 - PAINTING: MIXED MEDIA I

Semester Hours: 3

Exploration of painting with mixed and non-traditional media, including the use of assemblage and collage processes, shaped or contoured canvases, and related media. Students are guided in the development of artistic facility and a vocabulary of visual symbols for personal expression. Prerequisite: ARS 270.

ARS 381 - PRINT: ETCHING & RELIEF I

Semester Hours: 3

Etching and relief print processes are explored through woodblock, linoleum cut, aquatint and line etching. Through demonstrations, critical analysis, and making prints, students develop skills with tools, techniques and concepts associated with etching and relief printmaking. Prerequisite: ARS 280.

ARS 383 - PRINT: SCREENPRINT I

Semester Hours: 3

Studio practices in screenprint methods are used to synthesize technical skills and develop sophisticated aesthetic modes of printmaking. Through demonstrations, critical analysis, and making prints, students will consider complex ways in which printmaking becomes a tool for artistic expression. Prerequisite: ARS 280.

ARS 385 - PRINT: BOOK ARTS I

Semester Hours: 3

Students develop skills and aesthetic modes of narrative work through book arts. Emphasis on gaining skills in cutting, folding, measuring, gluing, sewing, printing, and binding. Students develop form and content through the exploration of structural mock ups and personal work. Prerequisite: ARS 280.

ARS 387 - PRINT: MONOPRINT & LITHOGRAPHY I

Semester Hours: 3

Monoprint and lithography are explored through planographic print processes. Through demonstrations, critical analysis, and making prints, student develop skills with tools techniques and concepts associated with monoprint and lithography printmaking. Prerequisite: ARS 280.

ARS 390 - PORTFOLIO DEVELOPMENT I

Semester Hours: 3

This course is focused on helping students create high quality portfolio work that demonstrates their skills and creative capabilities as artists. Multidisciplinary and discipline specific sections are offered - please see your advisor for details.

ARS 393 - MULTIMEDIA I

Semester Hours: 3

Study and practice of time-based and other artistic approaches that combine elements of various art forms, usually developed along strong conceptual or thematic lines. Readings, written assignments, and presentations foster an understanding of the wide varieties of contemporary art practice. Prerequisites: ARS 123, ARS 140, ARS 160 and ARS 260.

ARS 395 - SP TOPICS IN STUDIO ART

Semester Hours: 3

Special topics on particular media or conceptual approaches to art. This course allows the student to explore new media and/or critical theoretical approaches to contemporary art. Prerequisite: Instructor Approval.

ARS 415 - ANIMATION: TEAM GAME DESN I

Semester Hours: 3

Students in this collaborative game design and development course will work in teams to conceptualize and create working video games in one semester. Students will gain an understanding of industry standard tools and practices, as well as get valuable experience working in teams. Prerequisite: Choose one: ARS 321, ARS 322, ARS 324, ARS 325, ARS 329, ARS 311, CS 221.

ARS 416 - ANIMATION: TEAM GAME DESN II

Semester Hours: 3

In this advanced collaborative game design and development course, students take on leadership production roles on their game teams and help mentor junior members. Students will gain experience as team leads and learn to coordinate multidisciplinary projects. Prerequisite: ARS 415.

ARS 425 - ANIMATION: SHORT FILM I

Semester Hours: 3

In this course students will conceptualize and fully produce 3D animated short films. The story, characters, and world will be built from the ground up, and the production pipeline will mirror common industry practices. Experience with 3D is essential, but expertise in a particular discipline is not as critical as being driven to learn and create. Prerequisites: ARS 321 or 322 or 324 or 325 or 329.

ARS 426 - ANIMATION: SHORT FILM II

Semester Hours: 3

In this advanced short film production course students will take on leadership roles within their discipline and help guide the conceptualization and production of 3D animated short films. Advanced understanding of an aspect of production and short film pipelines is expected. Prerequisite: ARS 425.

ARS 430 - GRAPHIC DESIGN: PRINT MEDIA II

Semester Hours: 3

Course emphasizes print production, special applications of print design, environmental graphics, and advertising campaigns. Focus is on mastering print media methods and creating portfolio enhancement projects. Prerequisite: ARS 330.

ARS 432 - GRAPH DES: SENIOR PROJ MGMT

Semester Hours: 3

Students develop and/or manage one or more major web projects for clients as well as a professional site for students themselves. Course is the practical application of current best web design practices including user-centric design, HTML, CSS, Content Management Systems and current web standards. Prerequisite: ARS 332.

ARS 433 - GRAPH DES: WATERCOLOR & DIG II

Semester Hours: 3

Course extends a student's knowledge of digital and traditional watercolor media. The purpose of this course is to further explore creative techniques, develop a direction, and apply new techniques combining media. Prerequisite: ARS 333.

ARS 434 - GRAPH DES: WEB USER EXPER II

Semester Hours: 3

Course focuses on advanced methods of user experience and user interface design. With faculty mentoring, students learn how to develop complex designs using these methods in user experience for the purpose of advanced media usage. Prerequisite: ARS 334.

ARS 435 - GRAPHIC DESIGN: TYPOGRAPHY II

Semester Hours: 3

Course explores professional methods in type design and type application. Course teaches students how to develop advertising series and text design using illustrative approaches to hand lettering. Curriculum includes expressive methods in developing type for the purpose of environmental graphics. Prerequisite: ARS 335.

ARS 440 - SCULP: FABRICATION II

Semester Hours: 3

Course continues investigation of fabrication processes exploring the specific nature of each area of specialization with emphasis on integrating multiple processes into singular sculptural works. Emphasis is placed on ideation, discussion, and presentation of personal artistic interests. Prerequisite: ARS 340.

ARS 441 - SCULP: CARVING II

Semester Hours: 3

Continued exploration of subtractive processes with a focus on specific material, process, or context. Discussion of ideation, historical/contemporary contexts, and presentation specific to personal artistic interests. Prerequisite: ARS 341.

ARS 442 - SCULP: CASTING II

Semester Hours: 3

Continued exploration of mold-making, patination, casting, and foundry processes as well as investigation of contemporary methods and materials. Students develop further technical knowledge and conceptual motivation related to casting with an emphasis on individual exploration. Prerequisite: ARS 342.

ARS 447 - SCULP: SPACE AND PLACE II

Semester Hours: 3

Exploration of installation and environmental art practices with an emphasis on creating work at off-campus sites. Students will engage in rigorous ideation through site research and public presentation. Students will have the opportunity to create public artworks on campus and in the City of Huntsville. Prerequisite: ARS 347.

ARS 450 - PHOTO: DIGITAL II

Semester Hours: 3

Advanced digital image creation and image presentation. Class is open to experimentation with analog materials to produce digital media. There is an emphasis on personal style to produce a cohesive final project. Students are required to provide their own digital camera with RAW settings. Prerequisite: ARS 350.

ARS 452 - PHOTO: DARKROOM II

Semester Hours: 3

Advanced class in black and white darkroom photography. Students will explore the techniques of medium and large format photography to produce a final fine art print portfolio. 120 and/or 4x5 view camera required (available through department if necessary). Prerequisite: ARS 352.

ARS 453 - PHOTO: EXPER & HIST II

Semester Hours: 3

Advanced alternative and historical techniques in photography with an emphasis on personal style. Individual projects will be assigned to produce a cohesive portfolio. Prerequisite: ARS 353.

ARS 455 - PHOTO: DOCUMENTARY II

Semester Hours: 3

Advanced study of the documentary genre of photography throughout the history of the medium from the first portraits and travel photographs to the photojournalism and ethical issues of the modern world. Students are required to present a final portfolio of photographs. Prerequisite: ARS 355.

ARS 460 - DRAWING: CONCEPTUAL

Semester Hours: 3

Practice and theory focusing on drawing as a major medium, utilizing both traditional and contemporary methods and materials. Assignments are concept based. Nude models may be used. Prerequisite: ARS 360.

ARS 475 - PAINTING: TRADITIONAL II

Semester Hours: 3

Continued exploration of figurative painting processes with an emphasis on portfolio development and professional practices. Students are guided in the development of artistic facility and personal expression using paint as a medium. Prerequisite: ARS 375.

ARS 476 - PAINTING: CONTEMPORARY II

Semester Hours: 3

Continued exploration of contemporary painting approaches with an emphasis on portfolio development and professional practices. Students are guided in their development of artistic facility and a vocabulary of visual symbols for personal expression. Prerequisite: ARS 376.

ARS 477 - PAINTING: MIXED MEDIA II

Semester Hours: 3

Continued exploration of mixed and non-traditional media with an emphasis on portfolio development and professional practices. Students are guided in the development of artistic facility and a vocabulary of visual symbols for personal expression through the use of a variety of media. Prerequisite: ARS 377.

ARS 481 - PRINT: ETCHING & RELIEF II

Semester Hours: 3

This is an advanced course, where etching and relief are used to make an independent body of work. Students demonstrate how printmaking is a tool for conceptual exploration and expression. Through visual and written research students consider the hand-printed image within our culture. Prerequisite: ARS 381.

ARS 483 - PRINT: SCREENPRINT II

Semester Hours: 3

Studio practices in advanced screenprint methods are used to create an independent body of work. Students investigate how screenprinting is a tool for developing prints in an expanded way and explore the multiple through the concerns of analogue and digital possibilities. Prerequisite: ARS 383.

ARS 485 - PRINT: BOOK ARTS II

Semester Hours: 3

Students develop an advanced body of work in the book arts, by exploring structure and content. Content is developed through the student's independent investigation of text and image. Structure developed through the making of mockups. Honing technical skills in printing and binding is emphasized. Prerequisite: ARS 385.

ARS 487 - PRINT: MONOPRINT & LITHOGRAPHY II

Semester Hours: 3

Monoprint and lithography print processes are used to create an independent body of work in this advanced course. Students demonstrate how unique and multiple prints are tools for conceptual exploration and expression. Through research students consider the roll printed image within visual culture. Prerequisite: ARS 387.

ARS 490 - PORTFOLIO DEVELOPMENT II

Semester Hours: 3

This advanced portfolio development course allows students to work with and gain feedback from studio professors and students from different studio disciplines. Students will create a fully developed body of work that is aesthetically and/or conceptually linked. Prerequisite: ARS 390.

ARS 492 - ART INTERNSHIP

Semester Hours: 3

Student applies principles, theories, and skills learned in Art Studio and/or Art History courses to on-the-job experience in a professional environment. Internship host may be suggested by the student or assigned by advisor. 150 work hours required to complete 15-week internship. Prerequisite: Instructor Approval.

ARS 493 - MULTIMEDIA II

Semester Hours: 3

Continued exploration of multi-media art works with emphasis on increasing sophistication and portfolio development. Readings, written assignments, and presentations foster an understanding of the wide varieties of contemporary art practice. Prerequisite: ARS 393.

ARS 494 - PROFESSIONAL PRACTICES

Semester Hours: 3

Course is a requirement for students in the BFA program, and is open to BA students. Includes preparation for the senior exit show or design portfolio, developing written materials for careers in the visual arts, and learning how to install and manage an art exhibition. Prerequisites: ARS 123, ARS 140, ARS 160 ARS 260, plus a minimum of four 300- or 400- level studio courses.

ARS 495 - INDEPENDENT PROJECTS

Semester Hours: 3

Available for an advanced major when an appropriate course is not offered to facilitate progress to graduation. May be taken only one time. Prerequisite: Instructor Approval.

ARS 496 - PRINCIPLES FOR TEACHING ART

Semester Hours: 3

Focus on methods, materials and processes suitable for comprehensive art education content implementation. The course is a hands-on methods course in which students are required to design and implement art lessons to be taught to students in educational settings. Prerequisites: ED 410 and at least 4 300-level ARS courses, minimum gpa 2.75 or higher.

Astronomy (AST)

AST 100 - SURVEY OF ASTRONOMY

Semester Hours: 4

One semester survey of astronomy from visible phenomena in the sky to the latest astronomical discoveries. Topics include properties of solar system bodies, origin of the solar system, life cycles of stars and galaxies, exoplanets, cosmology, life in the universe. Includes laboratory. May not be taken in combination with AST 106 or AST 107.

AST 100L - SURVEY OF ASTRONOMY LAB

Semester Hours: 0

Laboratory instruction in support of material covered in AST 100.

AST 106 - EXPLORING THE COSMOS I

Semester Hours: 4

Introduces astronomy emphasizing quantitative aspects of physical phenomena in the universe. Motions of celestial bodies, development of astronomy, gravity and motion, light and telescopes, properties of gases and radiation, earth and moon, eclipses, survey of the solar system. Laboratory included.

AST 106L - ASTRONOMY LABORATORY

Semester Hours: 0

AST 107 - EXPLORING THE COSMOS II

Semester Hours: 4

Continuation of AST 106. The sun, stars and stellar evolution, white dwarfs, neutron stars, black holes, binary stars, the Milky Way galaxy, galaxies, quasars and other active galaxies, cosmology, life in the universe. Laboratory included. Offered Spring. Prerequisite: AST 106.

AST 107L - GEN ASTRONOMY II LAB

Semester Hours: 0

AST 210 - INTRO TO ASTROBIOLOGY

Semester Hours: 3

Studies the origin and search for life in the universe, including topics in astronomy, physics, biology, chemistry, and atmospheric science. Introduces research in astrobiology; known requirements for life, the origin and evolution of life of Earth, and the search for extraterrestrial life. Prerequisites: MA 171 and either PH 111, CH 121, or BYS 119.

AST 371 - INTRO TO ASTROPHYSICS

Semester Hours: 3

Gravitation: two-body problem, binary stars. Radiation theory. Spectral classification, Hertzsprung-Russell diagram, and introduction to stellar structure and evolution. Large-scale structure, and the evolution of the universe. Offered Spring. Prerequisites: PH 111 or PH 114, and MA 201.

AST 471 - ASTROPHYSICS

Semester Hours: 3

Structure and physical processes of stars from the interior to the atmosphere: energy production and transfer, atmospheric properties, and observed spectral features. Models for stellar structure. Star formation and evolution, including the effects of a companion. Offered Fall. Prerequisites: AST 371 and PH 351.

Atmospheric Science (ATS)

Note: The Atmospheric Science Department administers the Earth System Science degree programs for Undergraduate students. All major courses for these degrees use the ESS prefix.

ESS 100 - INTRODUCTION TO SPACE SCIENCE

Semester Hour: 1

Covers physiology in space, computer systems, and materials in space, robotics, thermodynamics, astrophysics, and solar physics. Laboratory experiments and simulated missions. Offered in cooperation with the U.S. Space & Rocket Center. Prerequisite: Available only to high school students with U.S. citizenship enrolled in Advanced Space Academy®.

ESS 101 - EXPLORING SPACE SC & ENGR

Semester Hour: 1

Exploring Space Science and Engineering courses 1-9. Each course examines an aspect of space exploration including but not limited to space science, human factors, medicine and engineering. Each course focuses on a single aspect. No more than three of the courses in the ESS 101 group may be taken for credit. The courses are offered through distance learning.

ESS 103 - ENVIRONMENTAL EARTH SCIENCE

Semester Hours: 4

Principles and foundations of Earth and environmental science with lectures and labs on concepts in Earth system science. Applied science labs use applications and real-world examples from ecosystems, geology, soil science, water, pollution, agriculture, population, natural disasters and energy.

ESS 103L - LABORATORY

Semester Hours: 0

ESS 104 - WEATHER & CLIMATE CHANGE

Semester Hours: 4

Intro to the atmosphere and climate system, including weather systems, climate extremes, and natural / human-induced changes in the atmosphere - climate systems. Major topics discussed include greenhouse effect, solar impacts on climate, El-Nino, climate change, atmospheric and ocean circulations, cyclones, hurricanes, thunderstorms and tornadoes.

ESS 104L - LABORATORY

Semester Hours: 0

ESS 105 - WORLD REGIONAL GEOGRAPHY

Semester Hours: 3

This course introduces the study of not only the location of places, but more importantly the physical and cultural features, economies, and population of the world's geographic regions. By exploring the interactions between people and their environment.

ESS 110 - PRINCIPLES OF HUMAN GEOGRAPHY

Semester Hours: 3

This course serves as an introduction to geography as the science of location, emphasis on spatial patterns of human activities. Location of economic activities, location of cities as market and production centers, movement networks, and images and perceptions of landscapes form the core of the course.

ESS 111 - WEATHER, CLIMATE & GLOBAL CHNG

Semester Hours: 4

Intro to the atmosphere and climate system, including weather systems, climate extremes, and natural / human-induced changes in the atmosphere - climate system. Major topics discussed include greenhouse effect, solar impacts on climate, El-Nino, climate change, atmospheric and ocean circulations, cyclones, hurricanes, thunderstorms, and tornadoes. Course changed to ESS 104 effective Fall 2020.

ESS 111L - LABORATORY

Semester Hours: 0

Course changed to ESS 104L effective Fall 2020.

ESS 209 - DATA ANALYSIS TOOLS

Semester Hours: 2

Introduction to methods and techniques in data analysis for atmospheric and Earth system sciences. Using case studies and experts from multiple disciplines, students are exposed to GIS, scientific programming principles, satellite image processing, radar data and meteorological software. Course is lab-based, focused on computer software.

ESS 210 - COLLAPSE OF CIVILIZATIONS

Semester Hours: 3

This course will investigate why some cultures succeed and others fail. From archeological and historical records of past civilizations we will examine the factors which lead to collapse in an attempt to determine the future of current societies.

ESS 212 - SEVERE WEATHER ANALYSIS

Semester Hours: 4

Meteorological analysis and beginning forecasting of weather systems, severe weather, snowstorms, hurricanes, and tornadoes through the interpretation of surface, upper air, satellite, and radar weather observations. Strong emphasis placed on unique observations of severe weather from UAH radar and profiling systems. Prerequisite: ESS 104 or ESS 111.

ESS 212L - LABORATORY

Semester Hours: 0

Laboratory. Prerequisite: ESS 104 or ESS 111.

ESS 301 - INTRO TO EARTH & ATMOSPHERIC PHYS

Semester Hours: 3

This course will provide a survey of earth and atmospheric science for undergraduate students. Topics that will be covered will focus on how the earth-atmosphere system works in an integrated fashion. Prerequisites: ESS 103, (ESS 104 or ESS 111), (MA 120 or MA 171), and (PH 101 or PH 111).

ESS 302 - PEOPLE, PLANTS, & ENVIRONMENT

Semester Hours: 3

This course is designed to introduce students from multiple departments to the vital roles that plants have in our ecosystems through the study of basic plant and soil science. Special attention is placed on the impact plants have on our technology-based society. Sophomore standing or above.

ESS 303 - CLASSICAL & PHYSICAL CAUSES CLIMATE

Semester Hours: 3

Basic atmospheric structure and physical processes, surface processes, climate history and climate change, land use and land change, microclimates, topoclimates, Ecoclimatology. Prerequisites: ESS 103, (ESS 104 or ESS 111), (MA 120 or MA 171), and (PH 101 or PH 111).

ESS 305 - HYDROLOGY

Semester Hours: 3

Introduction to hydrologic cycles and concepts of how water interacts with the environment. Covers water properties, precipitation, groundwater and runoff, currents, waves, sediment processes, and conservation strategies. Prerequisites: ESS 103, (ESS 104 or ESS 111), (MA 120 or MA 171), and (PH 101 or PH 111).

ESS 307 - ENVIRONMENTAL ARCHEOLOGY

Semester Hours: 3

Archeologists today need a wide range of scientific approaches in order to delineate and interpret the ecology of their sites. This approach is revolutionizing archeology making it relevant to the modern-day world. Investigated in this course includes climate modeling, remote sensing, and GIS. Prerequisite: ESS 103.

ESS 312 - PRINCIPLES OF ECOLOGY

Semester Hours: 4

Lecture/Lab One 3 hour lab a week. Ecological principles controlling plant and animal populations. Development of ecosystems, communities and habitats. Field trips required. Strongly recommend CH 101 or 121. Prerequisite: BYS 120.

ESS 313 - GEOGRAPHIC INFORMATION SYSTEMS

Semester Hours: 3

Introduction to scientific spatial analysis concepts and spatial data processing with focus on ESRI ArcGIS software. Basic concepts in GIS data management and creation, with topics including raster and vector data, projections, data query, data acquisition, and cartography. Prerequisites: ESS 103. Choose 1: CS 102, CS 103, or CS 104.

ESS 321 - POLLUTION PROBLEMS

Semester Hours: 3

Quantitative study of environmental conditions, processes, and problem-solving techniques related to specific pollution problems in air, water, and land. Prerequisites: ESS 103, (ESS 104 or ESS 111), (MA 120 or MA 171), (CH 101 or CH 121), and (PH 101 or PH 111).

ESS 341 - THERMODYNAMIC METEOROLOGY

Semester Hours: 3

Introduction to atmospheric thermodynamics with an emphasis on applications in meteorology, including the equation of state, Zeroth, First and Second Laws of Thermodynamics, adiabatic processes, moist processes, static stability, stability of moist air and severe weather applications. Prerequisites: ESS 301 and Choose 1: CS 102, CS 103, or CS 104. Prerequisites with concurrency: MA 201, PH 112.

ESS 351 - DYNAMIC METEOROLOGY

Semester Hours: 3

Dynamics and kinematics of atmospheric flow. Meteorological coordinate systems. Fundamental governing equations of atmospheric motion, circulation, and vorticity. Prerequisites: PH 111, ESS 301, (CS 102 or CS 103 or CS 104), and MA 201 (with concurrency).

ESS 352 - SYNOPTIC METEOROLOGY

Semester Hours: 3

Analysis, interpretation and forecasting synoptic-scale and mesoscale phenomena, including air masses, frontal systems, cyclones, anti-cyclones, tropical cyclones, and associated mesoscale phenomena. Emphasis is placed on the use of remote sensing data from satellites, radars, and profilers using state-of-the-art workstations. Prerequisite: ESS 212, ESS 341, ESS 351.

ESS 370 - INTRODUCTION TO REMOTE SENSING

Semester Hours: 3

This course introduces the fundamental physics of remote sensing systems and incorporates hands-on exercises of image processing, information extraction and interpretation, and basic applications of airborne and satellite data in Earth System Science and Atmospheric Science. Prerequisites: ESS 103, (ESS 104 or ESS 111), (MA 120 or MA 171), (PH 101 or PH 111), and (CS 102 or CS 103 or CS 104).

ESS 402 - SCI & SOC ASPTS NATRL DISASTER

Semester Hours: 3

Students will understand causes of major natural events and evaluate effects of disasters on populations and possible mitigation measures. GIS software will be used to show progression of events and/or their impacts, with course case studies. Prerequisites: ESS 103 and (ESS 104 or ESS 111).

ESS 407 - ENV THRTS, PUB POLY, & DEC MKG

Semester Hours: 3

Researchers, policymakers and environmental campaigners have identified 25 potential future threats to the global environment. This course examines the nature and consequences of these threats and their potential impacts for the survival of the human race. Prerequisite: ESS 103.

ESS 408 - PYTHON FOR GIS

Semester Hours: 3

Introduction to GIS model building, Python programming, and automation of scripts for ArcGIS. Techniques in Model Builder, Python, and the methods for automation will be taught using data from numerous available data sources across the internet with heavy emphasis on the Earth Sciences. Prerequisite: ESS 313.

ESS 409 - SCI PROGRMNG FOR EARTH & ATMOS

Semester Hours: 3

Survey of data types and languages commonly used in the meteorological community along with practical applications to meteorology. Course is designed to prepare students for graduate work and research in atmospheric science. Prerequisite: (CS 102 or CS 103 or CS 104); ESS 301; MA 172; (PH 112 and PH 115).

ESS 410 - OPERATIONAL WEATHER FORECAST'G

Semester Hours: 3

Subjective and objective methods of atmospheric prognosis. Techniques for forecasting critical weather elements. Interpretation, use and systematic errors of computer-generated products, human factors with forecasting, and application of meteorological theory in an operational setting. Prerequisites: ESS 341, ESS 351, ESS 352.

ESS 414 - GEOSPATIAL APPLICATIONS

Semester Hours: 3

An introductory look at the ways in which GIS can be put to use in different fields of study, drawing examples from Demography, Sociology, Archaeology, History, and Ecology. Focus on cartography and map creation principles and public geospatial data acquisition. Prerequisite: ESS 313.

ESS 415 - ADVANCED TOPICS IN GIS

Semester Hours: 3

Advanced continuation of concepts applied in Geospatial Applications. Students will learn through modules of real world scientific research how to use further tools in ArcGIS including: 3D Analyst, Spatial Analyst, Network Analyst. Topics include web data dissemination, spatiotemporal analysis and some basic spatial statistics measures. Prerequisite: ESS 414.

ESS 420 - INTRO ATMOSP CHEM & AIR POLLU

Semester Hours: 3

This self-contained introductory course in atmospheric chemistry and air pollution is designed to provide students the basics of atmospheric chemistry and air pollution concepts. Topics include air pollutants, air-pollution meteorology, atmospheric gases and aerosols, and atmospheric processes. Prerequisites: PH 112, PH 115, CH 121, ESS 301 and ESS 321.

ESS 441 - ATMOSP THERMODY & CLOUD PHYSIC

Semester Hours: 3

General aspects of thermodynamics and cloud physical processes occurring within the atmosphere; atmospheric statics and stability, saturation point analysis, aerosols, nucleation, and the behavior/growth of cloud particles and hydrometeors. Prerequisites: ESS 341, MA 238, PH 112 and PH 115.

ESS 451 - ATMOSPHERIC FLUID DYNAMICS I

Semester Hours: 3

Fluid dynamics in the atmosphere. Coriolis acceleration, scale analysis and appropriate approximations of the complete governing equations. Numerical analysis and interpretation of weather phenomena. Same as ATS 451. Prerequisites: ESS 351, MA 238, PH 112 and PH 115.

ESS 454 - FORECASTING MESOSCALE PROC

Semester Hours: 3

Detection and forecasting of atmospheric mesoscale phenomena including the structure and evolution of clouds, precipitation (including floods) thunderstorms and severe weather. Includes basics of instruments used to detect mesoscale phenomena, most notably satellite and radar. Prerequisite: ESS 352.

ESS 461 - ATMOSPHERIC RADIATION I

Semester Hours: 3

Fundamentals of terrestrial atmospheric radiation. Topics include: basic concepts, radiative transfer equation, gaseous absorption, scattering by molecules and particles, band models, transmittance along an inhomogeneous path. Prerequisite: ESS 301, MA 238, PH 112 and PH 115.

ESS 471 - RADAR METEOROLOGY

Semester Hours: 3

Introduction to principles of radar meteorology, including radar operations, hardware, interpretation and analysis. Doppler, dual-polarization and dual-wavelength radar theory, methods and applications are covered. Prerequisite: ESS 341, ESS 409.

ESS 472 - SATELLITE METEOROLOGY

Semester Hours: 3

The goal for this course is to provide students in undergraduate and graduate-level Earth and Atmospheric Science a background in satellite meteorology. During all components of the course there will be a heavy emphasis on practical meteorological satellite interpretation with respect to land surface and especially atmospheric features. Prerequisites: ESS 212 and ESS 370. Prerequisites with Concurrency: ESS 408 or ESS 409.

ESS 490 - SPEC TOPICS EARTH & ATMOSPH SC

Semester Hours: 1-3

Special offerings to students in areas of interest not covered in the present curriculum. Prerequisite: permission of instructor.

ESS 495 - DIRECTED STUDY

Semester Hours: 2-4

Supervised special study topics for undergraduates; often is offered to undergraduates who have senior standing. Individual students identify and obtain consent from a faculty mentor.

ESS 497 - UNDERGRADUATE INTERNSHIP

Semester Hours: 3

Individual internships in fields directly related to atmospheric or Earth system science. Student must show acceptance into a formal internship program, and the course requires approval by department chair and consent by the internship supervisor.

ESS 498 - RESEARCH & PROF DEV CAPSTONE

Semester Hour: 1

Applied concepts for professional and research development. Includes evaluation and discussion of published literature and department seminars, with focus on research synthesis and critique. Also includes development of professional and career skills focused on the Earth and Atmospheric Sciences. Junior or Senior Standing required.

ESS 499 - UNDERGRADUATE RESEARCH

Semester Hours: 2-4

For advanced Earth System Science students. Individual investigations into Earth systems science problems under direct supervision of a research mentor. Research is conducted and thesis-style paper is written and orally presented. Students identify and obtain consent from a faculty research mentor.

Biological Sciences (BYS)

BYS 100 - INTRO HEALTH PROFESSIONS

Semester Hour: 1

Career options for undergraduate students interested in health professions. Basics of health-care delivery systems and terminology of health care. No BYS major or minor credit. Primarily for freshman and sophomores.

BYS 109 - FUNDAMENTALS OF BIOLOGY

Semester Hours: 4

This course emphasizes an understanding of the living world through discussion of biological concepts and how they relate to social sciences and humanities. Biological concepts covered include the nature of science, cellular biology, biochemistry, heredity, evolution, biological diversity, ecology, anatomy, and physiology. Not intended for biology majors. Co-requisite: BYS 109L.

BYS 109L - LABORATORY

Semester Hours: 0

Laboratory Online Students will experience laboratory activities via interactive online software. Topics include experimental design, biology of a cell, genetics, diversity, evolution, and ecology. Co-requisite: BYS 109.

BYS 119 - PRINCIPLES OF BIOLOGY

Semester Hours: 4

Lecture/Lab/Recitation. Introduction to biological principles of cell structure, function, metabolism and reproduction. One two hour lab and a one hour recitation per week.

BYS 119L - LABORATORY

Semester Hours: 0

Laboratory exercised to introduce students to accurate measurement techniques, observation, and the development of relevant hypotheses. Several formal lab reports are required as an introduction to scientific writing.

BYS 119R - RECITATION

Semester Hours: 0

Homework turned in and discussed; exams discussed and further assistance with course material available.

BYS 120 - ORGANISMAL BIOLOGY

Semester Hours: 4

Lecture/Lab/Recitation. Discussion of biological function with special emphasis on contrasting strategies employed by organisms in meeting similar biological needs. One two-hour lab and a one hour recitation per week.

BYS 120L - ORGANISMAL BIOLOGY LAB

Semester Hours: 0

Introduction to the basic concepts of natural selection, population biology, and the biodiversity of animals and plants. Several formal lab reports are required as a further introduction to scientific writing, along with a lab practical on the biodiversity of animals and plants.

BYS 120R - RECITATION

Semester Hours: 0

Homework turned in and discussed; exams discussed and further assistance with course material available.

BYS 200 - DINOSAUR BIOLOGY

Semester Hours: 2

Introduction to the major areas of scientific interest in dinosaur biology; origin of the dinosaurs, their size, thermal biology, behavior and functional anatomy, relationships, and extinction. Lecture, discussion, and laboratory. Field trips may be required.

BYS 202 - HUMAN ANAT & PHYS II/CALHOUN

Semester Hours: 4

BYS 205 - CODING ALGORITHMS FOR BIOLOGY

Semester Hours: 3

Prerequisites: BYS 119, BYS 120, MA 112.

BYS 214 - INFECTION & IMMUNITY

Semester Hours: 4

Lecture/Lab. Two 2-hour labs a week. Principles of microbiology with emphasis on infectious disease of humans; epidemiological and immunological aspects. No credit for students who have credit for BYS 321 or advanced microbiology courses. Recommended for students in the College of Nursing.

Prerequisites: BYS 119 and either CH 101 or CH 121 or CH 151.

BYS 214L - LABORATORY

Semester Hours: 0

BYS 215 - HUMAN ANATOMY & PHYSIOLOGY I

Semester Hours: 4

BYS 215 (I) and laboratory (one 3-hour lab per week), is designed primarily for the Nursing and Kinesiology majors. Course and laboratory material focus on the use of anatomical terminology, major tissues of the body and in-depth study of skeletal, muscular and nervous system physiology. Basic pathology is also presented to prepare students for clinicals. Laboratory material reinforces the lecture content with detailed identification of bones, joints, surface markings and human musculature. Prerequisites: BYS 119, CH 101 and CH 105.

BYS 215L - HA&P I LABORATORY

Semester Hours: 0

An introduction to anatomical terminology; basic histology of normal tissues versus common pathologies. Focus on the human skeletal and muscular systems. Students are engaged in recognition of individual bones, surface markings and major muscles through dissection and use of muscular models.

BYS 216 - HUMAN ANATOMY & PHYSIOLOGY II

Semester Hours: 4

BYS 216 (II) and laboratory (one 3-hour lab per week) is designed as a continuum for the Nursing and Kinesiology majors. Course and laboratory material focus on the structures and organization of the central and peripheral nervous system, neurotransmitters, cardiovascular, renal, respiratory, digestive and detailed study of the endocrine systems. Basic pathology is also presented to prepare students for clinicals. Laboratory material reinforces the lecture content with dissections of key organs, study of blood flow, identification of major blood vessels and nerves and explanations of various diagnostic tests (EKG/ECG). Prerequisite: BYS 215.

BYS 216L - HA&P II LABORATORY

Semester Hours: 0

Study of the anatomy of the nervous, cardiovascular, respiratory, renal and digestive systems. Dissections of eye, brain, heart, lung and kidney. Basic EKG/ECG reading and a study of factors affecting blood pressure. Enzymatic action of the digestive system; basic urinalysis determinations.

BYS 219 - GENETICS AND EVOLUTION

Semester Hours: 4

Lecture/Lab/Recitation. Two labs and one recitation per week. Hereditary basis of organisms; genes as the discrete units of inheritance and genes in organisms and populations. Mendelian principles and evolutionary processes. Replication, transcription and translation of DNA, RNA, and proteins.

Prerequisites: BYS 120 and (CH 101 or CH 121) and (MA 107 or 112).

BYS 219L - LABORATORY

Semester Hours: 0

Laboratory activities include experiments to further students understanding in Mendelian genetics, molecular biology and Human genetic diseases. Counted as part of the overall grade for BYS 219.

BYS 219R - RECITATION

Semester Hours: 0

Homework turned in and discussed; exams discussed and further assistance with course material available.

BYS 292 - INTRO TO BIOLOGICAL RESEARCH

Semester Hours: 3

Introduction to the principles and practices of biological research. Covers experimental design, statistical analysis, critical review of journal articles, responsible conduct of research, and writing for the biological sciences. Recommended for students planning to do undergraduate research.

Prerequisites: BYS 119, MA 112, EH 101.

BYS 300 - CELL & DEVELOPMENTAL BIOLOGY

Semester Hours: 4

Lecture/Lab. One lab per week. Introduces the student to topics in cell and developmental biology. Subjects include cell structure, organelles, cytoskeleton, secretory pathway, cell division, cell cycle, cell interaction and control of differentiation. Prerequisites: BYS 219 (C- or better) and either CH 123 or 201.

BYS 300L - CELL & DEVELOPMENT BIO LAB

Semester Hours: 0

BYS 301 - ELEMENTARY BIOCHEMISTRY

Semester Hours: 3

Biochemistry and energetics of living cells, metabolism, structure and function of carbohydrates, lipids, proteins and nucleic acid. Enzymes, coenzymes, vitamins, blood, endocrine glands, DNA synthesis and gene expression. Same as CH 301. Prerequisites: BYS 119, BYS 120 and (CH 121 or CH 331).

BYS 302 - PEOPLE, PLANTS & ENVIRONMENT

Semester Hours: 3

This course is designed to introduce students from multiple departments to the vital roles that plants have in our ecosystems through the study of basic plant and soil science. Special attention is placed on the impact that plants have on our technology-based society.

BYS 311 - INTRO MOLECULAR UNDST BIO SYST

Semester Hours: 3

Introduction to a molecular understanding of genes, gene expression and genetic engineering in selected procaryotic and eucaryotic systems. Includes examples of biotechnology applications. Prerequisite: CH 331.

BYS 312 - PRINCIPLES OF ECOLOGY

Semester Hours: 4

Lecture/Lab. One lab a week. Population structure and growth, competition, predation, symbiosis, biogeochemical cycling and energy flow, disturbance and community dynamics, biodiversity and conservation. Field trips required. Prerequisites: BYS 120, and BYS 219.

BYS 313 - ANATOMY & PHYSIOLOGY I

Semester Hours: 4

Lecture/Lab. One lab a week. Structure and function of the human body. Anatomy of the skeletal and muscular systems, physiology of membranes, cellular and epithelial transport and nervous system function. Appropriate preparation for professional schools/graduate study in biological sciences. Prerequisite: BYS 119. Prerequisites with concurrency: BYS 300, and either CH 201 or 331.

BYS 313L - LABORATORY

Semester Hours: 0

Laboratory activities on the basic concept of system physiology including a rat dissection. Focuses on membrane transport and histology, and include gross anatomy and a study of the muscles and bones of the human body. Capstone student research project on electromyography of muscles.

BYS 314 - ANATOMY & PHYSIOLOGY II

Semester Hours: 4

Lecture and one lab a week. Continuation of BYS 313 stressing structural and functional relationships of major organ systems, focusing on heart, brain, lungs, kidney and the gastrointestinal tract. Appropriate for students preparing for professional schools or graduate study in biological sciences. Prerequisite: BYS 313 (C- or better).

BYS 314L - ANATOMY/PHYSIOLOGY II LAB

Semester Hours: 0

Research-intensive system based laboratory course. Includes brain dissection and student EEG project and a heart dissection and a cardiovascular physiology project. This is followed by a pulmonary function lab and a renal function lab where students calculate their own glomerular filtration rate.

BYS 315 - ICHTHYOLOGY

Semester Hours: 4

Classification, anatomy, physiology, and ecology of freshwater and marine fishes. Emphasis fishes of north Alabama. Laboratory and field trips required. Prerequisites: BYS 120 and BYS 219. Prerequisite with concurrency: BYS 300.

BYS 317 - VERTEBRATE ZOOLOGY

Semester Hours: 5

Lecture/Lab. Two three-hour labs a week. Morphology of vertebrate animals. Relationship of organs and systems and their phylogenetic significance. Prerequisites: BYS 120 and BYS 219. Prerequisite with concurrency: BYS 300.

BYS 318 - VERTEBRATE REPRODUCTION

Semester Hours: 3

General treatment of the major concepts and controversial areas of comparative vertebrate reproduction: ecological and evolutionary aspects, development of reproductive functions and sexual behavior, seasonal breeding and other topics of current interest. Prerequisites: BYS 120 and BYS 219. Prerequisite with concurrency: BYS 300.

BYS 320 - MEDICAL TERMINOLOGY

Semester Hours: 3

The meaning, spelling, etymology and pronunciation of major medical terms related to anatomy, pathology, medical professions, procedures and pharmaceuticals; body systems, their associated diseases and disorders. Correct usage of terms and interpretation of documents containing these terms. Hybrid course with online and in-class portions. Prerequisites: BYS 300 or BYS 215 and BYS 216.

BYS 321 - GENERAL MICROBIOLOGY I

Semester Hours: 4

Structure, biochemistry, and genetics of microorganisms, control of microbial growth, and microorganisms as pathogens. Lab covers basic and diagnostic methods in microbiology, environmental factors controlling microbial growth and survival, and characteristics of medically important microorganisms. Prerequisites: BYS 120, BYS 219. Prerequisite with concurrency: BYS 300.

BYS 321L - LABORATORY

Semester Hours: 0

BYS 322 - GENERAL MICROBIOLOGY II

Semester Hours: 4

Emphasizes diversity of microorganisms with respect to ecology, physiology, and phylogeny. Prerequisite: BYS 321.

BYS 322L - GENERAL MICROBIOLOGY II LAB

Semester Hours: 0

BYS 347 - BIOPHYSICAL CHEMISTRY I

Semester Hours: 3

First and second laws of thermodynamics. Free energy and equilibrium. Colligative properties of solutions. Ionic equilibria. Electrochemistry. Reaction kinetics. Enzyme catalysis. Adsorption and surface tension. Same as CH 347. Prerequisites: CH 332, PH 112, PH 115 and MA 172.

BYS 348 - BIOPHYSICAL CHEMISTRY II

Semester Hours: 3

Viscosity, diffusion, sedimentation, electrophoresis, determination of molecular weight by osmotic pressure. Light scattering and photochemistry. Elementary IR, UV-VIS, ESR, NMR spectroscopy. Fluorescence. Optical rotation. Same as CH 348. Prerequisites: BYS 347 or CH 347.

BYS 361 - GENERAL BIOCHEMISTRY

Semester Hours: 3

Biochemical structure and function of amino acids, proteins, carbohydrates, lipids, and nucleic acids; Enzyme catalysis and kinetics; major catabolic pathways, their integration and control mechanisms: Glycolysis, Citric Acid Cycle, Fatty Acid Oxidation and Oxidative Phosphorylation. Same as CH 361. Prerequisites: (BYS 119, BYS 120, CH 332 and CH 335) or (BYS 311, CH 332 and CH 335).

BYS 362 - GENERAL BIOCHEMISTRY LAB

Semester Hour: 1

One 3-hour lab a week. Practical experience in isolation, qualitative identification, and quantitative estimation of biomolecules. Same as CH 362. Prerequisites: CH 335 and CH 336. Prerequisite with concurrency: CH 361.

BYS 363 - GEN BIOCHEMISTRY II

Semester Hours: 3

A continuation of BYS 361 to include amino acid oxidation, biosynthesis of biomolecules, integration of metabolism, DNA and RNA metabolism, protein biosynthesis, and gene structure. Same as CH 363. Prerequisites: BYS 361 (C- or better).

BYS 364 - BIOGEOGRAPHY

Semester Hours: 3

Why plants and animals live where they do. Principles governing plant and animal distribution and dispersal, using the communities of North America as prime examples. Strongly recommended: BYS 312. Prerequisites: BYS 120, BYS 219. Prerequisite with concurrency: BYS 300.

BYS 365 - GEN BIOCHEMISTRY LAB II

Semester Hour: 1

Experimental course illustrating the topics in BYS 363. Prerequisites: BYS 361 and BYS 362. Prerequisite with concurrency: BYS 363.

BYS 403 - ADV EXERCISE PHYSIOLOGY

Semester Hours: 4

Lecture/Lab. One lab per week. Human physiology, addressing the effects of environmental variables such as altitude, thermal stress and terrain on the major physiological systems of the body; in-depth analysis of resistance training, aerobic and anaerobic training; integration of multiple systems. Prerequisites: BYS 401, and (BYS 301 or CH 301) or (BYS 361 or CH 361).

BYS 405 - PSYCHOPHARMACOLOGY

Semester Hours: 3

Introduction to drug classification and action with emphasis on physiological and psychological interactions.

BYS 417 - PRINCIPLES OF PLANT PHYSIOLOGY

Semester Hours: 4

The objectives in the development of this course is to provide students with an opportunity to: (1) study the principles of plant physiology (2) to gain an understanding of the complexity of plant genetics and stress response pathways (hormones) as well as (3) to appreciate how dependent we are on plants from those in our forests and environment to those in agricultural production and beyond. Laboratory experiments will provide an additional opportunity for students to take the lecture material and gain actual experience in the growth, nutritional requirements and maintenance of a wide variety of plants through the semester via work on campus as well as in the UAH Greenhouse. Prerequisites: BYS 120 and BYS 219.

BYS 419 - MICROBIAL GENETICS

Semester Hours: 3

Transmission, expression, and evolution of genes in microorganisms. Studies of chromosomes, plasmids, transposons, bacteriophages, and other genetic elements. Prerequisites: BYS 219, BYS 300 and BYS 321.

BYS 430 - IMMUNOLOGY

Semester Hours: 4

Lecture/Lab. One 3-hour lab per week. Innate, humoral and cell-mediated immunity. Immune deficiencies and hypersensitivities. Autoimmunity, transplantation, and tumor immunology. Prerequisites: BYS 219, BYS 300 and BYS 321. Prerequisite with concurrency: CH 361.

BYS 431 - BIOLOGICAL DATA SKILLS

Semester Hours: 3

This course covers a range of computational skills needed specifically for biologists who do not have any training in computer science. The course focuses on command line tools, basic programming in Python, and various aspects of data handling including, data curation, organization, storage, querying, and archiving. The course will include a project that ties together skills that are useful for individual students.

BYS 433 - RESEARCH SEMINAR ATTENDANCE

Semester Hour: 1

This course gives upper level biology majors a chance to gain exposure to research in biology. Students will attend seminars and learn about how research projects are planned, and interpreted. Additionally they will learn how scientists present their research. Prerequisite: BYS 300.

BYS 436 - BIOLOGICAL PSYCHOLOGY

Semester Hours: 3

Functional analysis of neural and endocrine systems underlying behavior. Same as PY 436. Prerequisites: (either a or b): (a) 15 hours of PY or approval of instructor; (b) BYS 120 or BYS 313, and 6 hours of PY.

BYS 437 - PSYCHOBIOLOGY STRESS & ILLNESS

Semester Hours: 3

Overview of psychological stress responses and their influence on health, behavior and illness. Same as PY 437. Prerequisites: approval of instructor.

BYS 461 - HERPETOLOGY

Semester Hours: 4

Classification, diversity, anatomy function, ecology, behavior, and evolution of amphibians and reptiles. Laboratory and field trips devoted to anatomy and identification, with an emphasis on Alabama and southeastern U.S. species. Prerequisites: BYS 120 and BYS 219.

BYS 464 - EVOLUTION

Semester Hours: 3

Principles of evolution and speciation. Nature of species, selection and adaptation, divergence and cladogenesis, isolation, hybridization, and phylogeny. Prerequisites: BYS 120, 219. Prerequisites with concurrency: BYS 300.

BYS 465 - MOLECULAR MTHDS ECLGY & EVOLU

Semester Hours: 4

This lecture and laboratory course is intended as an intense introduction to modern molecular methods in biological research. Topics include: genetic variation, evolutionary genetics, ecological genetics, genomics, gene expression, phylogenetics, and bioinformatics. Prerequisites: BYS 464.

BYS 490 - SENIOR CAPSTONE

Semester Hours: 2

Discussions, readings, and presentations of topical biological subjects using scientific literature. Capstone course emphasizing refinement of oral and written communication skills and critical thinking. All students will take ETS Major Field Test in Biology as part of the course grade. Prerequisites: BYS 119, 120, 219, and 300. Senior standing.

BYS 491 - SP TOPICS BIOLOGICAL SCI

Semester Hours: 1-4

Directed readings and/or written reports on topics of interest to individual students carried out under supervision of an instructor. Prerequisites: Permission of instructor required before registration.

BYS 492 - UNDERGRADUATE RESEARCH

Semester Hours: 2-4

For advanced-level biological sciences students with biological sciences GPA of 3.5 or above. Individual investigations into biological problems under direct supervision of instructor. May also be taken at the Marine Environmental Sciences Consortium, Dauphin Island, Alabama. Prerequisites: Permission of instructor required before registration.

BYS 499 - UNGRAD HONORS RES & THESIS

Semester Hours: 2-4

Individual investigations into biological problems under direct supervision of instructor. For honors students majoring in the biological sciences. Prerequisites: Approval of instructor, chair, and director of honors program; Senior Standing.

Business Legal Studies (BLS)

BLS 211 - LEGAL ENVIRON/BUSINESS

Semester Hours: 3

Legal environment of business including ethical, political and technological aspects of that environment.

BLS 400 - LAW, ETHICS & BUSINESS

Semester Hours: 3

An analytical review of corporate ethics addressed from a legal and business standpoint. Focus on codes of ethics, integration of integrity into corporate cultures, top management commitment to ethics, civics involvement, employer-employee relations, consumer protection, and international business.

BLS 406 - GOVMT CONTRACT LAW

Semester Hours: 3

Application of the legal principles governing government contracts as developed from common law, statutes, regulations, and court decisions. Includes requests for proposals, negotiation, inspection, acceptance, delivery, warranties, modification of contracts, equitable adjustment, and disputes. Prerequisite: BLS 211 and either MGT 401 or ACC 440.

BLS 410 - BUSINESS NEGOTIATIONS

Semester Hours: 3

This course is designed to familiarize students with the theories, basic skills and ethics involved in negotiation. Through a combination of readings, lectures, videotapes, role-play exercises and discussion, students will develop an understanding of the dynamics of negotiation and the approaches available to a wide variety of business leaders engaged in the negotiation process. The course will include sessions in which students will have the opportunity to gain experience through role playing of simulations taken from actual cases. Prerequisite: BLS 211.

BLS 411 - BUS LAW FOR ACCOUNTANTS

Semester Hours: 3

In-depth study of legal principles and problems encountered in practice by professional accountants. This course covers legal topics in a Uniform Commercial Code perspective. Prerequisite: BLS 211.

Chemical Engineering (CHE)

CHE 201 - INTRO CHEMICAL ENGR PROCESS

Semester Hours: 2

Introduction to industrial processes used in the production of commodity chemicals important to chemical engineers. Computer programming, spreadsheets, symbolic math, and drawing packages to model fundamental stages of these processes will be presented. Prerequisites with concurrency: ENG 101 and CH 123.

CHE 244 - INTRO TO CHEM ENGRG SYSTEMS

Semester Hours: 3

Introduction to basic analysis of chemical engineering systems, emphasizing material balances on physical and chemical process systems. Analysis includes single-component and multi-component systems, single-phase and multi-phase systems, single unit operations and complete flow sheet systems. Prerequisites: PH 111, CH 123, MA 201 and CHE 201.

CHE 294 - NATURE & PROPERTIES OF MATLS

Semester Hours: 3

Introduction to the fundamental nature and properties of materials including bonding, composition, and phase diagrams. Composite materials and aspects of materials processing, including diffusion, nucleation, and transformation diagrams, will be presented. Prerequisites: CH 121 and PH 111.

CHE 295 - NATURE & PROPERTIES MATLS LAB

Semester Hour: 1

Experiments include characterizing material structures, testing mechanical properties and mapping phase diagram boundaries. Emphasis on numerical and statistical analysis of the data. Written reports are required, and elements of materials design are presented.

CHE 299 - CHE MENTORING I

Semester Hours: 0

Yearly mentoring and advising from engineering faculty and staff. Prerequisite with concurrency: CHE 201.

CHE 342 - TRANSPORT PHENOMENA

Semester Hours: 3

Fundamental aspects of heat and mass transfer and the use of these basic principles in solving problems in transport operations. Heat transfer with phase change. Diffusive and convective mass transfer with applications. Prerequisites: CH 341 and CHE 244 and MAE 310 w/concurrency.

CHE 344 - CHEM ENGR THERMODYNAMICS

Semester Hours: 3

Thermodynamics of phase equilibria, chemical reactions and thermodynamic analysis of chemical processes, with emphasis on topics of special interest to chemical engineers. Prerequisites: CHE 244 and CH 341.

CHE 347 - QUANTITATIVE MODELING FOR CHE

Semester Hours: 3

Modeling and analysis of physical phenomena that arise in chemical engineering and an introduction to computer-aided design. Prerequisites: CHE 244, and MA 238.

CHE 359 - INDEPENDENT STUDIES IN CHE

Semester Hours: 1-3

Independent studies or research on a topic that requires the application of basic principles in chemical engineering. A written report, analytical or experimental analysis, and oral presentation will be required. Prerequisites: CHE 244 and CHE 294.

CHE 399 - CHE MENTORING II

Semester Hours: 0

Yearly mentoring and advising from engineering faculty and staff. Prerequisites: CHE 299 and CHE 244.

CHE 439 - UNIT OPERATIONS I

Semester Hours: 2

Experimental studies cover fluid mechanics and heat transfer in unit operations. Theoretical classes provide an introduction to engineering economy as well as standard laboratory practice, probability and statistical data analysis. Emphasis placed on written and oral laboratory report presentation techniques. Prerequisites: CHE 295, w/concurrency CHE 441.

CHE 440 - UNIT OPERATIONS II

Semester Hours: 2

Experimental studies covering reaction kinetics, mass separation, biotechnology, and special material properties. Applications of laboratory practices, probability and statistical data analysis, and ethics in professional practice. Emphasis placed on technical communications. Prerequisites: CHE 439, CHE 441, and w/concurrency CHE 443.

CHE 441 - CHEM KINETICS & REACTOR DESIGN

Semester Hours: 3

Fundamental principles of chemical kinetics and chemical reactor engineering along with the design of both thermal and catalytic reactors. (Same as CHE 541) Prerequisites: CHE 344 and CHE 347.

CHE 442L - LABORATORY

Semester Hours: 0

CHE 443 - MASS TRANSFER OPERATIONS

Semester Hours: 3

Theory of mass transfer phenomena, with applications to both stage-wise and diffusion controlled distillation, gas absorption/desorption, humidification, and extraction processes. Prerequisites: CHE 342, CHE 344, and MAE 310.

CHE 445 - CHEMICAL PROCESS CONTROL

Semester Hours: 3

Fundamental principles of chemical process control; control system design for chemical processes. Prerequisite: CHE 441 and CHE 446.

CHE 446 - ANAL & DESIGN TRANSPORT EQUIP

Semester Hours: 3

Theory of transport phenomena from a unified approach to momentum, heat and mass transfer. Application of theory to the design of various transport equipment. Prerequisites: CHE 342 and CHE 443.

CHE 448 - CHEMICAL ENGINEERING DESIGN

Semester Hours: 3

Capstone design course. Design of chemical engineering components, concluding with an overall team design effort using modern CAD techniques includes preliminary design, simulation, and economic evaluation of a chemical production flow sheet, and a study of ethical issues. Prerequisites: CHE 441, CHE 443, CHE 445, CHE 446 and CHE 399.

CHE 459 - ADVD INDEPENDENT STUD CHE

Semester Hours: 1-3

Independent studies or research on a topic that requires a solid background in the foundations of chemical engineering. A written report, analytical or experimental analysis, and oral presentation will be required. Prerequisites: CHE 347 and either CH 363 or CH 440.

CHE 460 - INTRO TO BIOPROCESS ENGRG

Semester Hours: 3

Application of engineering principles to analysis of and development and design of processes using biological catalysts including enzymes, plant and animal cells, and genetically engineered cells. Other topics include fermentation and biological mass transport processes. (Same as CHE 560). Prerequisite: CH 361.

CHE 461 - BIOSEPARATIONS

Semester Hours: 3

Characteristics of separation processes used in biotechnology industries including removal of insolubles, isolation and purification of thermally sensitive products, and preparation for customer use. Applications for biological separations, recombinant DNA techniques, and protein engineering. (Same as CHE 561). Prerequisite: CHE 460.

CHE 485 - PROCESS SAFETY & TOXICOLOGY

Semester Hours: 3

Fundamentals of process safety and aspects of toxicology. Requires the application of chemical engineering concepts to review and analyze case studies to learn from industrial accidents. Introduces regulatory and design concepts. Prerequisite: CHE 448.

CHE 494 - APPLIED MATERIALS ENGINEERING

Semester Hours: 3

Synthesis and processing methods of materials. Selection and use of materials performance factors for design of structural and functional components. Use of computational methods in solving open-ended design problems using nature and properties of materials will be emphasized. (Same as CHE 594) Prerequisites: CHE 294 and CHE 344.

CHE 495 - POLYMER ENGINEERING

Semester Hours: 3

Engineering principles of polymers and their role in manufacturing processes. Aspects of polymer phenomena and their relationship to processing of structural and functional components. (Same as CHE 595) Prerequisites: CH 341 and CH 440.

Chemistry (CH)

CH 101 - INTRO TO CHEMISTRY

Semester Hours: 3

Properties of solids, liquids, gases, and solutions, atomic theory and bonding, concentration concepts, and physical and chemical properties of the more common elements and their compounds. No placement examination is required. Prerequisite: MA 110 or prerequisites with concurrency MA 112 or higher and CH 105.

CH 101R - RECITATION

Semester Hours: 0

CH 105 - INTRO CHEMISTRY LAB

Semester Hour: 1

Complements the lecture material for CH 101. Laboratory fundamentals and basic chemical principles. Prerequisite with concurrency: CH 101.

CH 121 - GENERAL CHEMISTRY I

Semester Hours: 3

For science and engineering majors. Chemical properties of elements, their periodic groups, and their compounds. Reactions and stoichiometry. Nature of the chemical bond, molecular structure, thermochemistry. Properties of gases, liquids, and solids. Prerequisite: CH 101 or placement test. Prerequisites with concurrency: MA 113 or higher, and CH 125.

CH 121R - RECITATION

Semester Hours: 0

CH 122 - GENERAL CHEMISTRY ENGINEERS

Semester Hours: 3

This course is designed as a one semester presentation of key aspects in general chemistry and is recommended for all engineering majors except chemical engineers. Covers topic on atoms and molecules: reactions and stoichiometry; gases; the periodic table; atomic structure, chemical bonding and molecular structure; materials; energy, entropy, and free energy; kinetics and equilibrium; and electrochemistry. Substitutes for CH 121 when transferred to any other curriculum.

CH 123 - GENERAL CHEMISTRY II

Semester Hours: 3

Continuation of CH 121 with in-depth study of topics listed. To be taken concurrently with CH 126. Prerequisite: CH 121.

CH 123R - RECITATION

Semester Hours: 0

CH 125 - GENERAL CHEMISTRY LAB I

Semester Hour: 1

Complements the lecture material for CH 121. Includes the determination of chemical and physical properties of materials, synthesis and characterization, and introduction to spectroscopy. Prerequisite with concurrency: CH 121.

CH 126 - GENERAL CHEMISTRY LAB II

Semester Hour: 1

Complements the lecture material of CH 123. Includes an introduction to qualitative and quantitative analytical techniques. Prerequisite with concurrency: CH 123.

CH 151 - GENERAL, ORGANIC, BIOCHEMISTRY

Semester Hours: 3

Explore forms and behaviors of matter, composition of atoms with inorganic, nuclear, organic and biochemical reactions. Use bonding and nonbonding interactions to predict physical and chemical properties of atoms and compounds. Apply these concepts to nomenclature, reactivity, biological activity. Prerequisite: MA 112 with concurrency Co-requisite: CH 155.

CH 155 - GENORGBIOCHEM LAB

Semester Hour: 1

Complements the lecture material for CH 151. Laboratory fundamentals and basic chemical principles. Introduction to laboratory safety, practices, equipment and principles. This will include exploration of chemical bonding, gas laws, preparation of solutions, organic and biochemical concepts such as carbohydrates, lipids, and protein synthesis. Prerequisite with concurrency: CH 151.

CH 191 - FUNDAMENTALS OF CHEMICAL RES

Semester Hour: 1

Personalized programs to introduce beginning students to undergraduate research. Introduction to laboratory research techniques. Approval of supervising faculty member and chemistry chair required. Registration utilizes last digit of course number to designate semester-hour credit.

CH 192 - FUNDAMENTALS OF CHEMICAL RES

Semester Hours: 2

Personalized programs to introduce beginning students to undergraduate research. Introduction to laboratory research techniques. Approval of supervising faculty member and chemistry chair required. Registration utilizes last digit of course number to designate semester-hour credit.

CH 193 - FUNDAMENTALS OF CHEMICAL RES

Semester Hours: 3

Personalized programs to introduce beginning students to undergraduate research. Introduction to laboratory research techniques. Approval of supervising faculty member and chemistry chair required. Registration utilizes last digit of course number to designate semester-hour credit.

CH 201 - ELEM ORGANIC CHEMISTRY

Semester Hours: 3

Survey of nomenclature, structure, functional groups, properties and reactions of organic compounds. Prerequisites: CH 101 and 105 OR CH 121 and 125. Prerequisite with concurrency: CH 205.

CH 205 - ELEM ORGANIC CHEMISTRY LAB

Semester Hour: 1

Laboratory component of CH 201. Includes reactions of organic compounds and functional group modifications. Prerequisite with concurrency: CH 201. Prerequisites: (CH 101 and CH 105) or CH 201 and CH 205).

CH 223 - QUANTITATIVE ANALYSIS

Semester Hours: 3

Introduction to quantitative analytical chemistry including instrumentation. Data treatment, ionic equilibria, elementary electrochemical, spectrochemical, gravimetric, and volumetric techniques. Prerequisite: CH 126. Prerequisite with concurrency: CH 224.

CH 224 - QUANTITATIVE ANALYSIS LAB

Semester Hour: 1

Introduction to quantitative analytical chemistry laboratory. Experiments include pH measurements, spectrochemical, gravimetric, and volumetric titrations. Prerequisite: CH 126. Prerequisite with concurrency: CH 223.

CH 301 - ELEMENTARY BIOCHEMISTRY

Semester Hours: 3

Survey of structure and function of carbohydrates, lipids, proteins and nucleic acids. Enzyme properties and functions. Major metabolic pathways, interactions, and regulation. No credit given to chemistry majors or minors. Credit in CH 361 precludes credit in CH 301. Same as BYS 301. Prerequisites: BYS 120 and either CH 201 or 331.

CH 311L - ORGANIC CHEM I LAB/OAKWOOD

Semester Hour: 1

CH 315 - CHEMISTRY TEACHING METHODS

Semester Hours: 3

Designed for students pursuing a Class B High School Teacher's Certificate. The course explores methods of presentation of chemical principles, including chemical demonstrations. Prerequisites: CH 201 or 223. Permission of instructor.

CH 331 - ORGANIC CHEMISTRY I

Semester Hours: 3

Lecture/Lab includes one two-hour recitation per week. Chemistry of organic compounds. Synthetic methods, theory, and reaction mechanisms.

Prerequisite: CH 123.

CH 331R - ORGANIC CHEM I RECITATION

Semester Hours: 0

To be taken as a co-requisite with CH 331. Organic chemistry problem solving, including nomenclature, reactions, mechanisms, spectroscopy, and test-taking strategy.

CH 332 - ORGANIC CHEMISTRY II

Semester Hours: 3

Lecture/Lab Includes one two-hour recitation per week. Continuation of CH 331. Prerequisite: CH 331.

CH 332R - ORGANIC CHEM II RECITATION

Semester Hours: 0

To be taken as a co-requisite with CH 332. Organic chemistry problem solving, including nomenclature, reactions, mechanisms, spectroscopy, and test-taking strategy.

CH 335 - ORGANIC CHEMISTRY LAB I

Semester Hour: 1

Techniques of organic chemistry including synthesis, separation, and identification of organic compounds with use of chemical and spectroscopic methods. Prerequisite with concurrency: CH 331. Prerequisite: CH 126.

CH 336 - ORGANIC CHEMISTRY LAB II

Semester Hour: 1

Continuation of CH 335. Prerequisite: CH 335. Prerequisite with concurrency: CH 332.

CH 337 - ORGANIC CHEMISTRY LAB III

Semester Hours: 2

Advanced organic chemistry laboratory treating reactions and techniques not covered in CH 335 and 336. Pursuit of a special open-ended problem by each student. Prerequisite: CH 336 and approval of instructor.

CH 341 - PHYSICAL CHEMISTRY I

Semester Hours: 3

An introduction to physical chemistry encompassing: the kinetic theory of gases, the laws of thermodynamics, chemical equilibrium, phase equilibria, electrolyte solutions, electrochemistry and elementary theories of statistical thermodynamics. Credit in CH 341 precludes credit in CH 347. Prerequisites: CH 123, PH 112, MA 201, PH 115.

CH 342 - PHYSICAL CHEMISTRY II

Semester Hours: 3

A survey of additional fundamental concepts of physical chemistry including: chemical kinetics, quantum chemistry, atomic structure, group theory, spectroscopy (i.e. IR, Raman, NMR, EMR, etc.), and surface and colloid chemistry. Credit in 342 precludes credit in CH 348. Prerequisite: CH 341.

CH 343 - INTRO TO QUANTUM CHEM

Semester Hours: 3

Quantum mechanical treatment of atoms, molecules, and spectroscopy. Prerequisites: CH 341 and MA 238.

CH 345 - EXPERIMENTAL PHYSICAL CHEM I

Semester Hour: 1

Laboratory and computer investigation into topics covered in physical chemistry CH 341. Includes thermodynamics, chemical equilibria and electrochemistry. The lab involves report writing, data and error analysis, error propagation and linear and nonlinear regression using appropriate software. Prerequisites: CH 223 and 224. Prerequisite with concurrency: CH 341 or 347.

CH 346 - EXPERIMENTAL PHYSICAL CHEM II

Semester Hour: 1

Laboratory and computer investigations into topics covered in physical chemistry CH 342. Includes kinetics, quantum mechanics and spectroscopy. The lab involves report writing, data and error analysis, error propagation and linear and nonlinear regression using appropriate software. Prerequisite: CH 345. Prerequisite with concurrency: CH 342 or 348.

CH 347 - BIOPHYSICAL CHEMISTRY I

Semester Hours: 3

Computers for data analysis and simulations. First and second laws of thermodynamics. Free energy and equilibrium. Calorimetry. Protein stability. Binding and Interactions. Solution thermodynamics. Electrolytes. Electrochemistry. Biochemical reaction kinetics. Enzyme catalysis. Same as BYS 347. Prerequisites: CH 332, PH 112 and MA 172, PH 115.

CH 348 - BIOPHYSICAL CHEMISTRY II

Semester Hours: 3

Quantum mechanics. Statistical thermodynamics. Spectroscopy, including UV-VIS, Fluorescence. Circular dichroism, NMR. Structure determinations. Same as BYS 348. Prerequisite: CH 347.

CH 351 - PHYS CHEM IN PRACTICE

Semester Hours: 3

Fundamental concepts and principles from chemical thermodynamics and reaction dynamics in practice. States of matter; energy and entropy; thermodynamic laws; chemical and phase equilibria; mixtures; and reaction rates, kinetics, and mechanisms. Derivations and computer applications of formula. Restricted to Chemical Engineering major only. Prerequisites: ENG 101 and CH 123 and MA 201 and either PH 112 or CHE 201.

CH 361 - GENERAL BIOCHEMISTRY

Semester Hours: 3

Nomenclature, structure, function, properties, and metabolism of amino acids, carbohydrates, lipids, and nucleic acids. Enzyme function, major catabolic pathways, their interrelations and control mechanisms. Glycolysis, Citric Acid Cycle, and oxidative phosphorylation. Same as BYS 361. Prerequisites: (BYS 120, CH 332 and CH 335) or (BYS 311, CH 332 and CH 335).

CH 362 - GENERAL BIOCHEMISTRY LAB

Semester Hour: 1

Lecture/Lab One 3-hour lab a week. Practical experience in isolation, qualitative identification, and quantitative estimation of biomolecules. Same as BYS 362. Prerequisites: CH 335 and 336. Prerequisite with concurrency: CH 361.

CH 363 - GEN BIOCHEMISTRY II

Semester Hours: 3

A continuation of CH 361 to include fatty acid and amino acid oxidation, enzymatic synthesis of biomolecules, integration of metabolic processes, DNA and RNA metabolism including replication and transcription, translation and protein synthesis, and regulation of gene expression. Same as BYS 363. Prerequisite: CH 361.

CH 364 - GEN BIOCHEMISTRY LAB II

Semester Hour: 1

Experimental course illustrating the topics in CH 363. Prerequisites: CH 361 and 362. Prerequisite with concurrency: CH 363.

CH 401 - INORGANIC CHEMISTRY

Semester Hours: 3

Fundamental topics in inorganic chemistry. Atomic structure, chemical bonding, symmetry, acid-base theories, non-aqueous solvents, coordination chemistry, crystal field and ligand field theory, main group and transition metal chemistry, organometallics, catalysis, and bioinorganic chemistry. Prerequisite: CH 332.

CH 402 - INORGANIC CHEMISTRY LAB

Semester Hour: 1

Laboratory techniques of inorganic chemistry including synthesis, purification, isolation, and identification of inorganic compounds. Prerequisite with concurrency: CH 401.

CH 421 - INSTRUMENTAL ANALYSIS

Semester Hours: 4

Introduction to modern analytical instrumentation including IR, UV and atomic absorption spectrophotometers, nuclear magnetic resonance, electroanalytical equipment, and gas and liquid chromatographs. Lecture and laboratory. Prerequisite with concurrency: CH 347, or BYS 347, or CH 341.

CH 435 - CHEMICAL TOXICOLOGY

Semester Hours: 3

An introduction to the principles of chemical toxicology, including the effects of drugs, environmental pollutants, natural toxins and venoms, and other potentially hazardous chemicals, at the physiological, cellular, and molecular level. Prerequisites: CH 332 and CH 361.

CH 440 - POLYMER SYNTHESIS & CHARACTERI

Semester Hours: 3

Synthesis of commercially relevant and novel polymers. Polymer characteristics and a discussion of the structural dependence of polymer properties. Course completion and/or grade requirements for undergraduate credit will differ from those for graduate credit. Prerequisites: CH 331 and CH 332.

CH 480 - SELECTED TOPICS IN CHEM

Semester Hours: 1-3

Special offerings to students in areas of interest not covered in present curriculum. Prerequisites: senior standing and approval of instructor.

CH 491 - INTRO TO CHEMICAL RESEARCH

Semester Hour: 1

Personalized programs to round out the undergraduate curriculum of students with various goals. Registration utilizes last digit of course number to designate semester hour credit. Student normally may elect only up to 6 hours. Prerequisites: Senior standing. Approval of supervising faculty member and chemistry chair required.

CH 492 - INTRO TO CHEMICAL RESEARCH

Semester Hours: 2

Personalized programs to round out the undergraduate curriculum of students with various goals. Registration utilizes last digit of course number to designate semester hour credit. Student normally may elect only up to 6 hours. Prerequisites: Senior standing. Approval of supervising faculty member and chemistry chair required.

CH 493 - INTRO TO CHEMICAL RESEARCH

Semester Hours: 3

Personalized programs to round out the undergraduate curriculum of students with various goals. Registration utilizes last digit of course number to designate semester hour credit. Student normally may elect only up to 6 hours. Prerequisites: Senior standing. Approval of supervising faculty member and chemistry chair required.

Civil Engineering (CE)

CE 211 - CIVIL ENGINEERING GRAPHICS

Semester Hours: 2

Fundamental concepts in computer-aided graphics as they apply to civil engineering. Topics include lettering, sketching, manipulation of elements, rotation of views and input of data. Students will gain engineering practice through AutoCad laboratory exercises. Prerequisite: ENG 101 with minimum grade of C-.

CE 271 - STATICS

Semester Hours: 3

Topics include: forces, resultant forces, moments, couples, equivalent forces systems, equilibrium, distributed loads, two force members, trusses, centroids, moments of inertia, shear and bending moment diagrams, static and kinematic friction. (Same as MAE 271). Prerequisite: ENG 101, PH 111 and MA 201 w/concurrency.

CE 272 - DYNAMICS

Semester Hours: 3

Kinematics and kinetics of a particle and systems of particles with applications to central force motion, impact, relative motion, vibrations, and variable mass systems. Dynamics of rigid body in plane motion, relative motion in rotating coordinates, and gyroscopic motion. (Same as MAE 272). Prerequisites: MA 201 and (CE 271 or MAE 271).

CE 284 - SURVEYING

Semester Hours: 2

Basic theory and practical field methods for engineering applications. Measurements and errors in surveying. Leveling, traversing, stadia, topographic surveys, mapping, and circular curves. 1.5 hour lecture and 2 hour lab. Consent of instructor/advisor. Prerequisite: CE 211.

CE 284L - SURVEYING LAB

Semester Hours: 0

CE 299 - CE MENTORING I

Semester Hours: 0

Yearly mentoring and advising from engineering faculty and staff. Prerequisite with concurrency: CE 271.

CE 307 - SYSTOLIC ARRAY PROCESSING

Semester Hours: 3

CE 321 - INTRO TO TRANSPORTATION ENG

Semester Hours: 3

Theory, design, and operation of various modes of transportation with emphasis on traffic flow. Prerequisites: CE 284 and MA 171.

CE 370 - MECHANICS OF MATERIALS

Semester Hours: 3

Design and analysis of simple structures for predetermined strength and deformation requirements. Topics include: theory of stress-strain, Hooke's Law, analysis of stresses and deformations in bodies loaded by axial, torsional, bending, and combined loads, and analysis of statically indeterminate systems. Same as MAE 370. Prerequisites: (CPE 211 or MAE 211) and (MAE 271 or CE 271) and MA 244, corequisite CE 375.

CE 370L - LABORATORY

Semester Hours: 0

CE 372 - SOIL MECHANICS & FOUNDATION

Semester Hours: 3

Index properties and characteristics of soils. Compaction shear, compressibility and permeability. Application to analysis and design of foundation elements. Laboratory included. Prerequisites: (CE 370 or MAE 370) and MAE 310.

CE 373 - SOIL MECHANICS LAB

Semester Hour: 1

Laboratory classification of soils. Determinations of soil properties.

CE 375 - MECHANICS OF MATERIALS LAB

Semester Hour: 1

Experimental verification of material properties and structural deformation under axial, torsional, and bending loads. Test procedures, use of instrumentation, interpretation of experimental results and comparison to theory. (Same as MAE 375). Corequisites: CE 370.

CE 380 - CIVIL ENGINEERING MATERIALS

Semester Hours: 3

Performance properties and selection criteria of various materials used in the practice of civil engineering including aggregates, Portland cement, concrete, bituminous materials, and timber. Emphasis will be placed on standard methods of testing and characterization. Includes a weekly lab. Prerequisites: CE 370 or MAE 370.

CE 380L - CE MATERIALS LAB

Semester Hours: 0

Standard methods of testing and characterization of various materials used in the practice of civil engineering. Determination of civil engineering materials properties.

CE 381 - STRUCTURAL ANALYSIS I

Semester Hours: 3

Reactions, shears, moments in determinate structures. Influence lines, energy methods in computing deformations. Introduction to indeterminate structures. Prerequisites: (CE 272 or MAE 272) and (CE 370 or MAE 370).

CE 399 - CE MENTORING II

Semester Hours: 0

Yearly mentoring and advising from engineering faculty and staff. Prerequisites: CE 299 and CE 272.

CE 411 - INTRO GEOGRAPHICAL INFO SYS

Semester Hours: 3

Introduces vector, raster, and tabular concepts. Topics include spatial relationships, map features, attributes, relational database, layers of data, data ingesting, digitizing from maps, projections, output, and availability of public data sets. Same as CE 511.

CE 412 - ADVANCED CE GRAPHICS

Semester Hours: 3

Trending geospatial and graphics technologies including 3-D land development workflows, GPS data acquisition and processing of aerial, lidar, and topographical surveys, terrain modeling, earthwork, sanitary, drainage, and transportation design methodologies within the graphical CAD environment. Prerequisite: CE 211.

CE 420 - URBAN TRANSPORTATION PLANNING

Semester Hours: 3

Planning of highways systems and terminals as part of a complete planning approach; public transportation system planning; transportation planning studies, projection analysis, plan formulation, and programming. Same as CE 520. Prerequisite: CE 321.

CE 422 - TRAFFIC ENGINEERING DESIGN

Semester Hours: 3

Driver, pedestrian and vehicle characteristics. Principles of traffic flow for improved highway traffic service and safety. Design freeways, rural roads, urban streets, traffic signals, signs, channelization, and other traffic control measures. Prerequisite: CE 321.

CE 441 - HYDRAULIC ENGINEERING DESIGN

Semester Hours: 3

Water-hammer analysis, open channel flow, hydraulic structures such as dams, spillways, stilling basins, flood control devices, locks, pipe-flow systems and water-supply facilities, computational methods. Prerequisite: MAE 310.

CE 449 - INTRO ENVIRONMENTAL ENGR

Semester Hours: 3

Engineering aspects of air, water, and thermal pollution. Hydrologic cycle, water sources and uses; industrial and other sources of primary and secondary pollutants. Transport process in environmental problems and their control. (Same as CE 549 and CHE 549) Prerequisites: MAE 310 and MAE 341.

CE 452 - CREDIT EXPERIENTIAL LEARNING

Semester Hours: 1-3

Students are engaged in research and creative projects as meaningful experiential learning opportunities. The course fosters cooperation between students and faculty in a research or creative endeavor, and enhances the students' education via active participation in a research, creative or scholarly project.

CE 456 - WATER QUALITY CONTROL PROC

Semester Hours: 3

Principles of public water-supply design. Source selection, collection, purification, and distribution for municipal use. Collection of waste waters, their treatment and disposal. (Same as CE 556). Prerequisite: CE 449.

CE 457 - HYDROLOGY

Semester Hours: 3

Occurrence and movements of water over the earth's surface for engineering planning and design. Relationship of precipitation to stream-flow with frequency analysis, flood routing, and unit hydrograph theory. (Same as CE 557) Prerequisite: MAE 310.

CE 458 - ENVIRONMENTAL ENGR DESIGN

Semester Hours: 3

Engineering design and project management of environmental quality/restoration systems. Design project focusing on: sanitary landfill, municipal incinerator, or groundwater/site remediation. Develops skills for technical communications, process design and decision making. (Same as CE 558) Prerequisite: CE 449.

CE 459 - SEL TOP IN CIVIL ENGR

Semester Hours: 1-6

Special topics in Civil Engineering.

CE 471 - ADVANCED SOIL MECHANICS

Semester Hours: 3

Continuum mechanics applied to soil behavior. Theoretical approaches to consolidation, shear strength, slope stability and soil stabilization. Prerequisite: CE 372.

CE 472 - SOIL DYNAMICS

Semester Hours: 3

Behavior of soils under dynamic, earthquake and blast loading. Analysis of foundation vibration and isolation. Prerequisite: CE 372.

CE 473 - EARTH STRUCTURES ENGRG

Semester Hours: 3

Earth structure design. Theories of earth pressures and the design of retaining wall systems including gravity, cantilever, mechanically stabilized earth, flexible-sheet pile, and anchored wall systems. Stability analyses for retaining walls, earth slopes, and embankment designs. (Same as CE 573) Prerequisites: CE 372 and CE 373.

CE 474 - APP MECHANICS OF SOLIDS

Semester Hours: 3

Stresses and strains at a point, theories of failures, stress concentration factors, thick-walled cylinders, torsion of noncircular members, curved beams, unsymmetrical bending and shear center. (Same as CE 574 and MAE 474 or MAE 574) Prerequisites: CE 370 or MAE 370.

CE 481 - STRUCTURAL ANALYSIS II

Semester Hours: 3

Reactions, shears, moments and deformations in complex structural systems. Statically indeterminate systems, advanced geometric and energy methods. Prerequisite: CE 381.

CE 483 - REINFORCED CONCRETE DESIGN

Semester Hours: 3

Theory and practice of reinforced concrete design. Theory and design of high strength concrete mixtures. Design of reinforced concrete beams, slabs, and columns using the ultimate strength design code of the American Concrete Institute. Same as CE 583. Prerequisites: CE 380 and CE 381.

CE 484 - STEEL DESIGN

Semester Hours: 3

Principles of design of steel structures using ASD methods. Analysis and design of structural elements using beams, columns, connection details. (Same as CE 584). Prerequisites: CE 381 and MA 244.

CE 485 - FOUNDATION ENGINEERING

Semester Hours: 3

Design of foundations with emphasis on reinforced concrete, footings, caissons, piles retaining walls, and mat foundations. Effect of bearing pressure on foundations. (Same as CE 585) Prerequisites: CE 372 and CE 483.

CE 487 - BRIDGE DESIGN

Semester Hours: 3

Bridge loads, load distribution, composite beam bridges, bridge bearings, reinforced and prestressed concrete slab and T-beam bridges, bridge evaluations and ratings, and upgrade methodology. (Same as CE 583) Prerequisite: CE 483.

CE 498 - CIVIL ENGINEERING DESIGN I

Semester Hour: 1

Planning and analysis for a preliminary civil engineering design project. Topics include fundamentals of management, public policy, cost estimation, environmental impacts, soils analysis, and ethical considerations. Part 1 of a 2-part course. Prerequisites: CE 321, CE 372, CE 483, and CE 399.

CE 499 - CIVIL ENGINEERING DESIGN II

Semester Hours: 2

Analysis and design of a complete civil engineering project including establishment of design criteria, cost estimates, specifications, and plans. Topics include ethical considerations in engineering design and practice. Emphasis on developing written and oral communication skills. Prerequisites: CE 483 and CE 498.

CE 499L - DESIGN II LABORATORY

Semester Hours: 0

Communication Arts (CM)

CM 113 - Intro to Rhetorical Communication

Semester Hours: 3

Develops public speaking skills through an examination of rhetorical theory, training, and practice. Includes informative, persuasive, and other forms of speeches to prepare students for oral presentations in college and post-college ('real world') settings.

CM 205 - INTRO TO JOURNALISM

Semester Hours: 3

Focuses on basic news writing skills specific to print journalism. Students will learn to identify new based on news values, develop leads, organize information, write stories in the inverted pyramid style, revise drafts, and copy-edit articles, all while working under simulated deadline pressure.

CM 220 - INTRO PUBLIC RELATIONS

Semester Hours: 3

This course is designed to introduce students to the public relations profession. Through study of rhetorical and communication strategies, individual and group projects, as well as speaking and writing experiences, students gain the knowledge necessary to actively participate as effective public relation professionals.

CM 231 - FOUNDATIONS OF HUMAN COMMUNICA

Semester Hours: 3

Examines how human communication shapes and adapts to a variety of practical settings public, interpersonal, organizational, mass, and technical. It prepares students for effective work in various communication contexts.

CM 251 - DECISION-MAKING IN SMALL GROUP

Semester Hours: 3

Provides working knowledge of how small groups communicate in the decision-making process. Students put theory into practice by functioning as group participants, observers, and consultants. Emphasis is placed on leadership, theoretical application, group participation, and oral presentation.

CM 310 - PERSUASION

Semester Hours: 3

Provides foundation in the theories, principles, and strategies of social influence through theory and application. Students explore persuasive communication, social influence, and compliance-gaining from a social-scientific level and examine the production and consumption of persuasive messages.

CM 313 - BUSINESS & PROFESSIONAL COMM

Semester Hours: 3

Examines communication theories and practices relevant to the business context with a focus on oral presentations, interviewing, group leadership, and face-to-face communication. Develops knowledge and skills necessary for effective communication within business environments. (Prepare business administration students to meet the oral communication requirement in upper division and graduate business courses).

CM 320 - PRACTICUM IN WRITING

Semester Hours: 1-3

Writing and editing under the supervision of professionals. May be repeated up to 3 times for no more than 3 hours total credit. Enrollment requires advance planning. Prerequisites: CM 301, CM 302, enrollment in the Technical Writing Track, and a successful interview with the participating technical supervisor.

CM 330 - NONVERBAL COMMUNICATION

Semester Hours: 3

Examines the diversity of human nonverbal behavior and its influences on everyday communication experiences. Same as PY 330.

CM 331 - COMMUNICATION THEORY

Semester Hours: 3

Examines significant theoretical frameworks for the study of human communication and mass communication. Develops knowledge of communication processes and social influence. Provides preparation for senior seminar in communication theory and research. Prerequisite: CM 231.

CM 333 - INTERPERSONAL COMMUNICATION

Semester Hours: 3

Examines the process of communication between individuals. Prerequisite: CM 231 or permission of instructor.

CM 340 - SPEC TOPICS IN COMM ARTS

Semester Hours: 3

Topics announced in advance. Representative topics include rhetoric and war, technical theatre, and culture and communication. May be repeated twice for credit.

CM 370 - COMM RESEARCH METHODS

Semester Hours: 3

Examines social scientific concepts, theories and designs commonly used interpersonal communication research. Develops knowledge and skills necessary for employment in fields involving the study of communication behavior and perception. Provides preparation for senior seminar in communication theory and research. Prerequisite: MA 107 or 110 or 112 or 113 or 115 or 120 or 171.

CM 375 - RHETORICAL CRITICISM

Semester Hours: 3

This course is an introduction to the critical analysis of public discourse. Specifically, it focuses on understanding how the variables of situation, audience, and rhetoric influence the production and reception of public messages. Teaching students to understand the persuasive potential of messages prepares them as critical consumers, analysts, and potential creators of such messages. Prerequisite: CM 113 or approval of instructor.

CM 400 - INTERNSHIP

Semester Hours: 1-6

Practical experience in the workplace allows the student to apply principles, theories, and skills learned in communication arts courses. Arranged by the student with consent of the chair, the student meets regularly with a faculty advisor, keeps a log of activities, and submits a report on the internship. Prerequisite: Senior Standing with CM major, and permission of instructor.

CM 405 - ADVANCED MEDIA WRITING

Semester Hours: 3

An upper level course that offers an overview of various media writing genres, including Broadcast, Advertising and Public Relations. Students complete a mix of timed assignments within each context to acquire a more complete survey of media writing and prepare for a career within the mass media. Prerequisite: CM 205.

CM 408 - CLASSICAL RHET THEORY

Semester Hours: 3

This course surveys the early development of rhetorical theory in the Western world, from its sophistic origins in the 5th century BCE, through the Greek philosophers and educators, to the Romans and early Christians. Prerequisites: CM 113.

CM 409 - CONTEMPORARY RHETORICAL THEORY

Semester Hours: 3

This course surveys contemporary rhetorical thought, including modern and postmodern theories. The course requires rigorous academic analysis and critique as students explore historical and current rhetorical concepts. Prerequisite: CM 113.

CM 414 - CREATIVE NONFICTION WRITING

Semester Hours: 3

This course introduces students to the genre of creative non-fiction. Undergraduate students will write five essays and revise toward a final writing portfolio.

CM 416 - WOMEN ORATORS

Semester Hours: 3

Critical examination of women's public address as it has developed through women's participation in movements for abolition, temperance, women's suffrage, and equal rights.

CM 418 - LEGAL ARGUMENT

Semester Hours: 3

Examines argumentation in legal communities, that is, the way lawyers and judges provide reasoned support for the positions they defend concerning what the law requires in a given case. It considers common forms of legal argument, sources and forms of evidence, and legal values that underlie legal argument. It provides students with a critical perspective from which to judge legal arguments and a basic set of tools for developing legal arguments.

CM 420 - PUBLIC RELATIONS WRITING

Semester Hours: 3

This course provides students with professionalization in their writing and editorial skills in public relations. By emphasizing different audiences and various media, students will find and hone their public relations voice. Students will gain experience with instant responses, making ethical and legal decisions, and practicing a wide range of PR writing and design including the development of media kits, pitches, backgrounders, press releases, memos, newsletters, radio announcements, and brochures. Prerequisite: CM 220 (C or better).

CM 426 - BURKEIAN THEORY & CRITICISM

Semester Hours: 3

This course surveys key concepts in the theory of Kenneth Burke and their discussion and application by rhetorical scholars. Through readings, lectures, and class discussions students will gain insight into this, the most important rhetorical theorist of the 20th century. Prerequisite: Junior standing.

CM 430 - MASS MEDIA IN AMERICA

Semester Hours: 3

This course provides an overview of major forms of mass media communication. It focuses on both print and electronic media, its history and structure as well as on theories of mass communication. Students will become familiar with the current role and influence of media in society.

CM 431 - SENIOR SEMINAR

Semester Hours: 3

Senior capstone course involving either a scholarly project or an approved communication-intensive internship. Prerequisites: CM 370 and CM 375, and senior standing.

CM 433 - DARK SIDE INTERPERSONAL COMM

Semester Hours: 3

Traditional Interpersonal Communication pedagogy focuses on more of the positive aspects of relationship formation and maintenance. This course offers a more complete view of human relationships by exploring a variety of topics related to the 'darker' side of relationships situated in the contexts of friendships, family members, and intimates. By exploring issues such as deception, fatal attraction, jealousy and envy, conflict, stalking, abuse, and many others, students acquire a more complete view of human relationships. Prerequisite: CM 231.

CM 435 - SOCIAL MEDIA

Semester Hours: 3

This course focuses on uses and effects of social media in interpersonal, organizational, mass mediated, health, and political settings. Social media technologies take on many different forms including social networking sites, micro-blogging, wikis, online videos, and blogs. Following questions are discussed in class: Who uses social media? How do people use social media to develop relationships, get social support, and evoke political change? Is privacy dead? How do employers use social media to check on employees?.

CM 440 - PUBLIC RELATIONS CAMPAIGN

Semester Hours: 3

This course provides professionalization and team work experience for students in the public relations track. Students practice the research, planning, implementation, and evaluation of strategic communication plans for various public relations contexts. Prerequisite: CM 220 (C-or better).

CM 444 - ADVERTISING

Semester Hours: 3

This course will examine the emergence of advertising as a form of communication, its influence upon other forms of mediated communications and its impact upon culture and society. Students will learn how to develop and present an advertising strategy for an actual brand. Prerequisite: Junior standing.

CM 451 - ORGANIZATIONAL TRNG & DEVELOP

Semester Hours: 3

Provides upper-level undergraduates with the opportunity to learn how to design organizational training programs beginning with the needs assessment and continuing through the evaluation and implementation phases. Prerequisite: Junior standing.

CM 452 - USER CENTERED DESIGN

Semester Hours: 3

Introduces students to user-centered design principles that inform the practice of user experience design. Students will use visual thinking as they complete contextual inquiries and mapping exercises.

CM 454 - NEW MEDIA WRITING & RHETORIC

Semester Hours: 3

This course teaches students to apply rhetorical principles across a variety of media and includes an examination of communication strategies used widely in academic and industry settings. The course focuses on new media through an exploration of digital technologies and the way digital culture and new media have dramatically impacted reading, writing, and research practices. Prerequisites: EH 101 and EH 102.

CM 455 - COMMUNICATION & CULTURE

Semester Hours: 3

This course focuses on the application of theory and research to intercultural communication. Topics and activities assist the students in developing communication skills that improve their competence in intercultural situations. By addressing the different world views that shape our perceptions, values, attitudes, and beliefs of different people, the Culture and Communication course challenges students to become aware of cultural differences, avoid ethnocentrism, and work toward effective communication with unlike others. Prerequisite: Junior standing.

CM 460 - CRISIS COMMUNICATION

Semester Hours: 3

During a time where companies face instant and intense scrutiny. It is imperative to know how to use effective crisis management. This course focuses on the steps of crisis and issue management. It also includes in-depth analysis of current crisis situations.

CM 499 - INDEPENDENT STUDY

Semester Hours: 3

Directed, independent study allows a student to explore an approved scholarly inquiry within Communication Arts, and under the direction of a CM faculty member, resulting in a research paper or project. Student must present a project prospectus, or detailed syllabus, for approval of the faculty member and the department chair. JR or SR standing required.

Computer Engineering (CPE)

CPE 211 - INTRO COMPUTER PROG FOR ENGR

Semester Hours: 3

Advanced programming in a high level language such as C++ with an emphasis on practice in solving engineering problems using top-down design and algorithms. Prerequisites: ENG 101 and MA 171 with concurrency.

CPE 211L - LABORATORY

Semester Hours: 0

This lab is the 0-credit lab component of the 3 credit course.

CPE 212 - FUNDAMENTALS SOFTWARE ENGRG

Semester Hours: 3

Introduction to structured programming using C++. Search and sort algorithms. Introduction to data structures. Applications to engineering related problems. Prerequisite: CPE 211.

CPE 221 - COMPUTER ORGANIZATION

Semester Hours: 3

Functional organization of stored-program digital computers including number representation, assembly language programming, computer hardware, micro-operations, and control logic; microprocessor architecture. Prerequisite: CPE 211 and EE 202 w/concurrency.

CPE 299 - CPE MENTORING I

Semester Hours: 0

Yearly mentoring and advising from engineering faculty and staff. Prerequisite w/ concurrency: CPE 211.

CPE 322 - DIGITAL HDWR DESIGN FUNDMNTLS

Semester Hours: 3

Advanced concepts in Boolean algebra, use of hardware description languages as a practical means to implement hybrid sequential and combinational designs, digital logic simulation, rapid prototyping techniques, and design for testability concepts. Focuses on the actual design and implementation of sizeable digital design problems using representative Computer Aided Design (CAD) tools. Laboratory required. Prerequisite: CPE 221.

CPE 323 - INTRO TO EMBEDDED COMPUTER SYS

Semester Hours: 3

Hardware and software aspects in building embedded computer systems. Includes methods to evaluate design tradeoffs of different technology choices and technology capabilities and limitations of system components necessary to design and implement an embedded system and interface it to the outside world. Laboratory required. Prerequisite: CPE 221.

CPE 324 - ADV LOGIC DESIGN LABORATORY

Semester Hour: 1

Laboratory component of CPE 322 includes experimentation of fundamental concepts in digital logic design. Use of hardware description languages as a practical means to implement hybrid sequential and combinational digital designs, digital logic simulation, and rapid prototyping techniques. Prerequisite: CPE 322.

CPE 325 - EMBEDDED SYSTEMS LAB

Semester Hour: 1

Laboratory component of CPE 323 includes experience working with modern integrated software development environments and hardware platforms to solve practical problems.

CPE 348 - INTRO TO COMPUTER NETWORKS

Semester Hours: 3

Introduction to the concepts and architecture of computer networks. Review of communication protocols using the Internet and the TCP/IP model as major examples. High-speed networking, congestion control, data compression, security and distributed processing. Prerequisites: CPE 211 and CPE 221.

CPE 353 - SOFTWARE DESIGN & ENGINEERING

Semester Hours: 3

Hands-on experience developing a substantial software project using software design tools such as SQL database system and the Qt graphical interface development environment. Introduction to a software process including requirements elicitation and testing techniques. Prerequisites CPE 212 and CS 317 (with concurrency).

CPE 381 - FUND SIGNALS & SYS FOR COMP EN

Semester Hours: 3

Introduction to the fundamental concepts in continuous and discrete signals and systems, and methods of signal and system analysis for computer engineers. No credit for EE or OPE students. Prerequisites: EE 213 and MA 238.

CPE 399 - CPE MENTORING II

Semester Hours: 0

Yearly mentoring and advising from engineering faculty and staff. Prerequisites: CPE 299 and CPE 212.

CPE 412 - INTRO TO PARALLEL PROGRAMMING

Semester Hours: 3

Introduction to processing in parallel and distributed computing environments. Design and analysis of parallel algorithms. Parallel programming environments: Pthreads for shared memory multiprocessor systems and PVM/MPI for distributed networked computers. (Same as CPE 512) Prerequisites: CPE 212 and CS 317.

CPE 423 - HARDWARE/SOFTWARE CO-DESIGN

Semester Hours: 3

Study and design of Systems On A Chip (SOC). Emphasis on Field Programmable realizations of SOC systems. (Same as CPE 523) Prerequisites: CPE 322 and CPE 426.

CPE 426 - VLSI HARDWARE DESC LANG/MODL/S

Semester Hours: 3

Modern VLSI design techniques and tools, such as silicon compilers, (V)HDL modeling languages, placement and routing tools, synthesis tools, and simulators. Students will design, simulate, and layout using both programmable logic families and ASIC libraries. (Same as CPE 526) Prerequisites: EE 202 and EE 315.

CPE 427 - VLSI DESIGN I

Semester Hours: 3

Introduction to VLSI design using CAD tools, CMOS logic, switch level modeling, circuit characterization, logic design in CMOS, systems design methods, test subsystem design, design examples, student design project. Laboratory required. (Same as CPE 527) Prerequisites: EE 202 and EE 315.

CPE 427L - LABORATORY

Semester Hours: 0

Students enrolling in CPE 427L must enroll concurrently in CPE 427.

CPE 431 - INTRO COMPUTER ARCHITECTURE

Semester Hours: 3

Study of existing computer structures. Computer organization with emphasis on busing systems, storage systems, and instruction sets. Performance models and measures, pipelining, cache and virtual memory, introduction to parallel processing. (Same as CPE 531) Prerequisites: CPE 322 and CPE 323.

CPE 434 - OPERATING SYSTEMS

Semester Hours: 3

Study of the fundamentals of operating systems. Emphasis on processes, file management, interprocess communication, input-output, virtual memory, networking and security. Course must be taken concurrently with CPE 435. Prerequisites: CPE 221 and CPE 353/.

CPE 435 - OPERATING SYSTEMS LABORATORY

Semester Hour: 1

Laboratory component of Operating Systems course. Experiments include implementation of device drivers, process and thread management, virtual memory management, dynamic memory management, file-systems. Students must take this course concurrently with CPE 434.

CPE 436 - INTERNALS OF MODERN OPER SYS

Semester Hours: 3

In-depth study of the design of modern operating systems such as Unix, NT and Linux. Emphasis on the internals and implementation details of interrupt processing, real-time clocks, device independent I/O, process management, memory management, file management. (Same as CPE 536) Prerequisite: CPE 434.

CPE 449 - INTRO TO CYBERSECURITY ENGINRG

Semester Hours: 3

Introduction to cryptography and computer security through hardware and physical security to a knowledge of audit methods, security management, and public law. Includes skills such as business process analysis, software security, IAE evaluation, and IAE testing. (Same as CPE 549) Prerequisite: CPE 348 or CPE 448.

CPE 449L - INTRO CYBERSECURITY ENG LAB

Semester Hours: 0

Students enrolling in CPE 449 must enroll concurrently in CPE 449L.

CPE 453 - SENIOR SOFTWARE STUDIO

Semester Hours: 3

Basic concepts of software engineering. Software project management including specifications, design, implementation, testing and documentation. Software design and management tools. Includes a multi-student software project. Prerequisites: CPE 353 and CS 317.

CPE 455 - SECURE SOFTWARE DEVELOPMENT

Semester Hours: 3

Overview of methodologies for development of high-assurance software. Major topics include analysis of security and safety risks, software certification criteria, the software development lifecycle, risk mitigation, design and coding best practices, verification techniques, and auditing of software for insecure and unsafe coding constructs. Prerequisites: CPE 353 or CS 307.

CPE 457 - SOFTWARE REVERSE ENGINEERING

Semester Hours: 3

This course provides fundamental knowledge of software reverse engineering. The course provides the ability (a) to understand software of unknown origin or software for which source code is unavailable, (b) to determine how something works, (c) to discover data used by software, and (d) to aid in the analysis of software. The course introduces tools for reverse engineering, including disassemblers, debuggers, monitors, virtual machines and modern tools for software analysis. Prerequisites: CPE 353 and CS 307.

CPE 459 - SYSTEMS SECURITY

Semester Hours: 3

This course (1) introduces cyber physical, industrial control, embedded, and Supervisory Control and Data Acquisition (SCADA) control systems, (2) examines common vulnerabilities and threats associated with these systems, and (3) examine techniques to defend these systems from cyber-attacks. Prerequisite: CPE 348.

CPE 490 - SPECIAL TOPICS IN COMP ENGR

Semester Hours: 1-3

Topics will vary. The course may be repeated when topics vary. Consent of advisor.

CPE 490L - SPECIAL TOPICS LABORATORY

Semester Hours: 0

CPE 495 - COMPUTER ENGINEERING DESIGN I

Semester Hours: 3

First course in the senior capstone design sequence. Application of techniques to the design of electronic systems that have digital hardware and software components. Application of engineering courses to solve real-world design problems. Must be taken in the same academic year as CPE 496.

Prerequisites: CPE 323, CPE 353, EE 315, EE 322 and EE 399.

CPE 496 - COMPUTER ENGINEERING DESIGN II

Semester Hours: 3

Second course in the senior capstone design sequence. Must be taken in the same academic year as CPE 495. Prerequisite: CPE 495.

CPE 497 - COMPUTER ENGR INTERNSHIP

Semester Hours: 1-3

Active involvement in an engineering project in an engineering enterprise, professional organization, or government agency that has particular interest and relevance to the student. Junior/senior standing and approval from Engineering Faculty advisor.

CPE 498 - CYBERSECURITY CAPSTONE

Semester Hours: 3

Students will participate in a team based cybersecurity project which is a culminating experience for the cybersecurity degree. For a target system, student teams will conduct and document a risk assessment, then design, implement, and test cybersecurity controls to mitigate threats to the system.

Prerequisites: CS 465, CE 440, IS 450 and CPE 399.

CPE 499 - PROJECT IN COMPUTER ENGRG

Semester Hours: 3

Individual design project under the direction of an ECE faculty member. Senior standing and permission of instructor required.

Computer Science (CS)

CS 100 - INTRO COMPUTERS & PROGRAM

Semester Hours: 3

Introduction to program design and implementation in the Visual Basic programming language, using hands-on programming assignments, class demonstrations and lectures. Problem analysis and some testing techniques. Basic program structure, data types, control structures, and file organization.

CS 102 - INTRO TO C PROGRAMMING

Semester Hours: 3

Introduction to program design and implementation in the C programming language, using hands-on programming assignments, class demonstrations and lectures. Problem analysis and some testing techniques. Basic program structure, and file organization.

CS 103 - INTRO PROGRAMMING USING JAVA

Semester Hours: 3

Introduction to program design and implementation in the Java programming language, using hands-on programming assignments, class demonstrations and lectures. Problem analysis and some testing techniques. Basic program structure, data types, control structures, methods and file organization.

CS 104 - INTRO TO CS USING PYTHON

Semester Hours: 3

Introduction to program design and implementation in the Python programming language, using hands-on programming assignments, class demonstrations and lectures. Problem analysis and some testing techniques. Basic program structure, and file organization.

CS 105 - COMP SCI SEM:ETH/PROFESS

Semester Hour: 1

Issues associated with the ethical use of computers in the information age. Ethics, professionalism, software piracy, copyrighting software, ethical standards and the impact of computers on society will be covered. Familiarization with the local computing environment will also be covered.

CS 121 - COMPUTER SCIENCE I

Semester Hours: 3

Review of problem solving techniques, algorithm development, and fundamental language features; e.g., loops, decisions. In depth coverage of functions, arrays, I/O. Principles of software design, implementation, and testing. Introduction to object oriented design and the C++ programming language. Prerequisites: CS 102 or 103 or 104, and either MA 113, 115, 120, 171, 172, 201, 238, or 244 (with concurrency).

CS 143 - INTRO TECH MULTIMEDIA & GAMING

Semester Hours: 3

Introduction to terminology, technologies and tools for multimedia and gaming. Elements such as text, sound, images, animation, video, and how they are represented, captured, edited, stored, and published. Overview of multimedia and gaming technologies, multimedia authoring, publishing on the web.

CS 214 - INTRO DISCRETE STRUCTURE

Semester Hours: 3

Review of set algebra including mappings and relations. Algebraic structures including semigroups and groups. Elements of theory of directed and undirected graphs; Boolean algebra and propositional logic and applications of these structures to various areas of computer science. Prerequisites: MA 171 and either CS 121 or CPE 211.

CS 217 - ANALYTIC TECH GAMING

Semester Hours: 3

Mathematics for understanding & implementing 3-dimensional graphics & interactive physical modeling in computer games. Topics: coordinate systems, vectors, matrices, transformations, kinematics, dynamics, automata, and probability. Focused on practical mathematics rather than theoretical derivations. Prerequisites: MA 120 or MA 171.

CS 221 - COMP SCI II: DATA STRUCTURES

Semester Hours: 3

Advanced features of the C++ programming language, including pointers, recursion, classes, and inheritance. Fundamental data structures including linked lists, stacks, queues, binary search trees. Basic sort and search algorithms. Design, development, and documentation of object-oriented programs. Prerequisites: CS 121 and either MA 113, or 115. Prerequisites with concurrency: MA 171 or CS 217.

CS 307 - OBJECT ORIENT/PROG C++

Semester Hours: 3

Emphasis on principles of software engineering and object-oriented design. Practical experience using the standard C++ library, the standard template library, and design patterns. Introduction to and experience with graphical user interface applications. Prerequisite: CS 221.

CS 308 - ASSEMBLY LANGUAGE PROGRAMMING

Semester Hours: 3

Programming in a representative assembly language, including floating point programming. Overview of software systems: loaders, assemblers, compiler, interpreters, operating systems. Prerequisite: CS 309.

CS 309 - COMPUTER ORG & SWTCHNG THRY

Semester Hours: 3

Boolean algebra, Boolean function minimization techniques, design and analysis of combinational circuits, design and analysis of sequential circuits. Computer hardware organization, including CPU, instruction representation and executive. Programing in a representative assembly language, including floating point programming. Overview of software systems: loaders, assembler, compiler, interpreters, operating systems. A lab section must be scheduled for this course. Prerequisite: CS 214.

CS 309L - LABORATORY

Semester Hours: 0

Lecture/Lab 3. Students enrolling in CS 309L must enroll concurrently in CS 309.

CS 317 - INTRO DESIGN/ANALYSIS OF ALG

Semester Hours: 3

Introduction to complexity analysis of algorithms; emphasis on searching, sorting, finding spanning trees and shortest paths in graphs. Design techniques such as divide & conquer, dynamic programming, and backtracking. Introduction to problem classification; i.e. NP, intractable, and unsolvable. Prerequisites: MA 244 and CS 214, and either CS 221 or CPE 212.

CS 321 - INTRO OBJECT-ORIENTED PROG JAV

Semester Hours: 3

Writing substantial object-oriented programs in Java, including design, documentation and testing. Advanced data structures (e.g., balanced trees, hash tables). Graphical interface programming using the Java abstract windowing toolkit. Comparison with other object-oriented languages, notably C++.

Prerequisite: CS 221.

CS 325 - PROFESSIONAL & COMPUTG ETHICS

Semester Hours: 3

The course focuses on two major aspects of professionalism and computer ethics. The first concerns the role of values and normative principles in the practice of computing or more specifically software development. The second concerns the impacts of computer technologies on society. Prerequisite with concurrency: CS 321.

CS 330 - ARTFCL INTEL & GAME DEV

Semester Hours: 3

Techniques and concepts of artificial intelligence applied game development and production. Topics: path planning, decision making, tactics, and non-rational behaviors. Prerequisite: CS 221.

CS 347 - INTRO VIDEO GAME DESGN & PROGM

Semester Hours: 3

Provides students with an overview of the video game production process. Covers both theory and practice of game design and programming. Students produce 2D and 3D games from beginning to end using existing game engines. Hands-on focus and project-oriented. CS 143 is highly recommended.

Prerequisite: CS 221.

CS 370 - INTRO COMPUTER NETWORKS

Semester Hours: 3

Introduction to the organization and operation of computer networks. Physical, Data Link, Network, Transport, and Application-layer protocols and algorithms; LAN and WAN systems; TCP/IP; wired and wireless organizations; security approaches. Prerequisite: CS 309.

CS 371 - MOBILE COMPUTING APP INCT & D

Semester Hours: 3

Considers application design for the mobile space with emphasis on mobile computer interfaces, including GUI for mobile environments, entertainment computing, and cross-platform development. This course is also a component of the Entertainment Computing Track. Prerequisites: CS 221 or CPE 212.

CS 390 - UNIX/LINUX PROGRAMMING

Semester Hours: 3

Design and development of systems and programs in the UNIX environment. File and terminal I/O, processes, inter-process communication, signals. Pattern searching, filters, pipes. Shell programming. Program and system development tools such as awk, C, make, sed, and yacc. Prerequisite: CS 221.

CS 391 - INT NETWORK ADMIN PRINC WINDOW

Semester Hours: 3

Network administration principles for installing and administering Windows networks. OS installation, general network topologies and protocols, and Windows client-server architecture. User management, network file and security systems, and disaster-recovery are also covered. Prerequisite: CS 221.

CS 392 - INT NETWORK ADMIN PRINC FOR UN

Semester Hours: 3

Linux OS installation, network topologies and protocols, and UNIX client-server architecture. User management, network file and security systems, kernel configuration, print servers, domain name service, mail servers, Web and ftp servers are included. Design and implementation of a UNIX domain. Prerequisite: CS 390.

CS 396 - SPECIAL TOPICS

Semester Hours: 3

Course offered by an instructor in a specialized area of computer science. Must have approval of instructor.

CS 397 - SPECIAL TOPICS

Semester Hours: 3

Course offered by an instructor in a specialized area of computer science. Must have approval of instructor.

CS 398 - SPECIAL TOPICS

Semester Hours: 3

Course offered by an instructor in a specialized area of computer science. Must have approval of instructor.

CS 403 - INT FORML LANG AUTO THRY

Semester Hours: 3

Introduction to concepts and formalisms of formal languages and automata theory. Includes fundamental mathematical concepts, grammars and corresponding automata, and deterministic parsing of programming languages. Prerequisite: CS 317.

CS 413 - INTRO DIGITAL COMP ARCHITECTUR

Semester Hours: 3

Design of computer systems and subsystems, including register transfer, bus structure, timing and control. Pipelining, memory systems including cache and cache coherence, arithmetic, and I/O units. Interrupt handling. A lab section must be scheduled for this course. Prerequisite: CS 309.

CS 413L - LABORATORY

Semester Hours: 0

Lecture/Lab 3. Students enrolling in CS 413L must enroll concurrently in CS 413.

CS 424 - PRINCIPLES PROGRAMMING LANG

Semester Hours: 3

Comparison of principles and paradigms of modern programming languages. How different programming languages implement lexical, syntax, and semantic analysis, including the design of compilers. Formal grammars, BNF notation, parse trees, abstract data types. Prerequisite: CS 317.

CS 430 - SURVEY ARTIFICIAL INTELLIGENCE

Semester Hours: 3

Survey of Artificial Intelligence (AI). AI crosses many disciplines, to make computational systems behave intelligently. This course provides a broad intro of AI sub-domains, including search, knowledge representation, reasoning, and machine learning. Prerequisite: CS 317.

CS 443 - INTRO TO MULTIMEDIA SYSTEMS

Semester Hours: 3

Multimedia authoring, color models for image and video, introduction to image and video compression, digital audio, multimedia networks, multimedia synchronization, multimedia retrieval. Taught as CS 443, 543. Prerequisite: CS 317.

CS 445 - INTRO COMPUTER GRAPHICS

Semester Hours: 3

Introduces underlying theory and mechanics of interactive computer graphics. Basic modeling, rasterization, 2D/3D transformations, and viewing. 3D graphics rudiments. Some hardware and historical perspectives. Many programs. Same as CS 545; take only one! Prerequisites: CS 221 and MA 244 or CS 217.

CS 446 - ADVANCED COMPUTER GRAPHICS

Semester Hours: 3

High resolution 3D graphics. Advanced topics in viewing, vertex &, fragment processing, illumination & shading, 3D modeling (curve & surface representation, texture mapping. Some coverage of solid modeling and color theory. Game production pipeline. Many programming projects. Taught as CS 446, 546. Prerequisites: CS 445 and at least junior standing.

CS 447 - GAME ENGINES & LEVEL DEVELPMNT

Semester Hours: 3

Students produce fully functional games from beginning to end with team members. Focused on engineering development and art asset generation and management. Examines the design, development, and distribution of computer games using game engines for cross-platform implementation. Taught as CS 447/547. Prerequisites: CS 330 and CS 445.

CS 453 - CLIENT/SERVER ARCHITECTURES

Semester Hours: 3

Client/server distributed computing. Web based applications. Students will practice concepts in programs involving leading edge technologies such as AJAX, RESTful and WS-* web services. Enterprise Java Beans, .Net. Prerequisites: CS 307 or CS 321. CS 470 is recommended.

CS 454 - INTRO TO CLOUD COMPUTING

Semester Hours: 3

Different cloud computing paradigms: IaaS, SaaS, PaaS. Open Source cloud software (for ex., OpenStack, CloudStack). RESTful interfaces, AWS interface. Cloud Security. Taught as CS 454, 554. Prerequisites: CS 307 or CS 321 AND CS 370 or CPE 348.

CS 465 - NETWORK SECURITY

Semester Hours: 3

Introduction to Network Security: Fundamentals of network security and cryptography. Examines security at different network layers. Wireless security. Firewalls. Intrusion detection and penetration analysis. Prerequisites: CS 121, and (CS 221 or CPE 221), and (CS 370 or CPE 348).

CS 480 - MOBILE DIGITAL FORENSICS

Semester Hours: 3

This course examines digital forensics of mobile devices such as smart phones and tablets in a law enforcement context. Mobile device characteristics that make forensics examinations difficult are discussed. Various forensic tools are critically examined with an eye toward improved tool development. Prerequisites: CS 413 or CPE 323.

CS 481 - MODELING & SIMULATION I

Semester Hours: 3

Discrete event simulation from a computer science perspective. Mathematics of probability distributions applied to simulation. Design, implementation, and application of discrete event simulation software. Application to computer and network system design. Prerequisites: CS 221 and (MA 385 or ISE 390).

CS 482 - MODELING & SIMULATION II

Semester Hours: 3

Advanced modeling methods, including Monte Carlo simulation, agent-based modeling, and mathematical modeling, from a Computer Science perspective. Emphasis on implementation, execution, and validation of working computer models using different modeling methods. Prerequisite: CS 481.

CS 485 - COMPUTER & SOFTWARE SECURITY

Semester Hours: 3

This course examines the issues related to security policies, models and mechanisms applicable to providing security for computer-based systems including operating systems, database management systems, and networks. Corequisite: CS 490.

CS 487 - DATABASE SYSTEMS

Semester Hours: 3

Basic concepts of database management systems with a focus on relational and object-oriented systems. Database design including semantic models and normalization. Design issues including query languages, internal storage, recovery, concurrency, security, integrity, and query optimization. Senior standing required.

CS 488 - INTRO TO BIG DATA COMPUTING

Semester Hours: 3

Provides big data concepts and characteristics; big data architectural concepts; big data ecosystem. Includes MapReduce framework and programming and coverage of big data applications. Prerequisite: CS 317.

CS 490 - INTRO TO OPERATING SYSTEMS

Semester Hours: 3

Principles of operating systems. Process management, memory management, I/O management, and file systems. Specific topics include process states, threads, CPU scheduling, concurrent processing, virtual memory. Contemporary operating systems will be used as examples. Prerequisite: CS 413.

CS 495 - SEL TOPICS: UNDERGRAD CS

Semester Hours: 3

Individual directed study under the supervision of an instructor. Instructor approval required.

CS 496 - SPECIAL TOPICS

Semester Hours: 3

Course offered by an instructor in a specialized area of computer science. Instructor approval required.

CS 497 - SPECIAL TOPICS

Semester Hours: 3

Course offered by an instructor in a specialized area of computer science. Instructor approval required.

CS 498 - SPECIAL TOPICS

Semester Hours: 3

Course offered by an instructor in a specialized area of computer science. Instructor approval required.

CS 499 - SR PROJ:TEAM SOFTWARE DESIGN

Semester Hours: 3

A combination of lectures on proven software engineering approaches, and team working sessions. Each student will participate in a sizable, complex, software development project based on a team approach. Each team will be required to provide oral and written documentation of their work.

Prerequisite: CS 317.

Early Childhood Education (ECH)

ECH 306 - PRINCPLS OF EARLY CHILDHOOD ED

Semester Hours: 3

This introductory course will provide preservice early childhood educators with basic knowledge of the core principles and foundations of early childhood education. The course introduces students to the historical and sociocultural forces that have impacted the field along with contemporary early childhood programs and models, recent trends and issues, and theories of play. Admission to teacher education program required.

ECH 320 - DIFF INSTR FOR EARLY LEARNERS

Semester Hours: 3

An early childhood education curriculum course designed to provide practical knowledge for blending content areas to maximize children's learning and prepare teacher candidates to meet the needs of children across the curriculum. Focus is on the implementation of a curriculum designed to promote learning and development in the social, emotional, physical, language and cognitive domains. Additionally, the course will emphasize developmentally, culturally, and linguistically appropriate and effective teaching approaches to enhance each child's learning and development. Admission to teacher education program required.

ECH 330 - ASSESSMENT OF YOUNG LEARNERS

Semester Hours: 3

This course provides candidates with an understanding of the forms, functions, methods, and roles of assessment for planning and implementing effective early childhood programs for young children, ages birth to five, from diverse cultures and with varied learning needs. Candidates will explore both quantitative and qualitative approaches to evaluation and assessment. They will learn about technological adaptations to enhance the assessment process. Students will gain an understanding of appropriate strategies for conducting, reporting, and decision making related to specific functions of assessment. They will learn about assessment strategies necessary for second language learners and about adaptations for children with disabilities. They will use selected assessment strategies with young children in their field placements and are expected to become competent in the use of authentic assessment strategies to describe a child's learning strengths and instructional needs. Admission to teacher education program required.

ECH 340 - LANGUAGE, SPEECH & LITERCY DEV

Semester Hours: 3

This course provides an introductory examination of the development of language, speech, and literacy in young learners. Pragmatic syntactic, and phonological analyses of children's language and speech development are required. The connections of oral communication and written communication (literacy) are explored.

ECH 490 - EARLY CHILDHOOD INTERNSHIP

Semester Hours: 12

Observation, participation and teaching in at least two early childhood settings with children ranging from infancy to grade 3 (full time, 15 week semesters). Students will also attend campus-based seminars designed to meet specific needs of the interns. Admission to the teacher education program required.

Earth System Science (ESS)

ESS 100 - INTRODUCTION TO SPACE SCIENCE

Semester Hour: 1

Covers physiology in space, computer systems, and materials in space, robotics, thermodynamics, astrophysics, and solar physics. Laboratory experiments and simulated missions. Offered in cooperation with the U.S. Space & Rocket Center. Prerequisite: Available only to high school students with U.S. citizenship enrolled in Advanced Space Academy®.

ESS 101 - EXPLORING SPACE SC & ENGR

Semester Hour: 1

Exploring Space Science and Engineering courses 1-9. Each course examines an aspect of space exploration including but not limited to space science, human factors, medicine and engineering. Each course focuses on a single aspect. No more than three of the courses in the ESS 101 group may be taken for credit. The courses are offered through distance learning.

ESS 103 - ENVIRONMENTAL EARTH SCIENCE

Semester Hours: 4

Principles and foundations of Earth and environmental science with lectures and labs on concepts in Earth system science. Applied science labs use applications and real-world examples from ecosystems, geology, soil science, water, pollution, agriculture, population, natural disasters and energy.

ESS 103L - LABORATORY

Semester Hours: 0

ESS 104 - WEATHER & CLIMATE CHANGE

Semester Hours: 4

Intro to the atmosphere and climate system, including weather systems, climate extremes, and natural / human-induced changes in the atmosphere - climate systems. Major topics discussed include greenhouse effect, solar impacts on climate, El-Nino, climate change, atmospheric and ocean circulations, cyclones, hurricanes, thunderstorms and tornadoes.

ESS 104L - LABORATORY

Semester Hours: 0

ESS 105 - WORLD REGIONAL GEOGRAPHY

Semester Hours: 3

This course introduces the study of not only the location of places, but more importantly the physical and cultural features, economies, and population of the world's geographic regions. By exploring the interactions between people and their environment.

ESS 110 - PRINCIPLES OF HUMAN GEOGRAPHY

Semester Hours: 3

This course serves as an introduction to geography as the science of location, emphasis on spatial patterns of human activities. Location of economic activities, location of cities as market and production centers, movement networks, and images and perceptions of landscapes form the core of the course.

ESS 111 - WEATHER, CLIMATE & GLOBAL CHNG

Semester Hours: 4

Intro to the atmosphere and climate system, including weather systems, climate extremes, and natural / human-induced changes in the atmosphere - climate system. Major topics discussed include greenhouse effect, solar impacts on climate, El-Nino, climate change, atmospheric and ocean circulations, cyclones, hurricanes, thunderstorms, and tornadoes. Course changed to ESS 104 effective Fall 2020.

ESS 111L - LABORATORY

Semester Hours: 0

Course changed to ESS 104L effective Fall 2020.

ESS 209 - DATA ANALYSIS TOOLS

Semester Hours: 2

Introduction to methods and techniques in data analysis for atmospheric and Earth system sciences. Using case studies and experts from multiple disciplines, students are exposed to GIS, scientific programming principles, satellite image processing, radar data and meteorological software. Course is lab-based, focused on computer software.

ESS 210 - COLLAPSE OF CIVILIZATIONS

Semester Hours: 3

This course will investigate why some cultures succeed and others fail. From archeological and historical records of past civilizations we will examine the factors which lead to collapse in an attempt to determine the future of current societies.

ESS 212 - SEVERE WEATHER ANALYSIS

Semester Hours: 4

Meteorological analysis and beginning forecasting of weather systems, severe weather, snowstorms, hurricanes, and tornadoes through the interpretation of surface, upper air, satellite, and radar weather observations. Strong emphasis placed on unique observations of severe weather from UAH radar and profiling systems. Prerequisite: ESS 104 or ESS 111.

ESS 212L - LABORATORY

Semester Hours: 0

Laboratory. Prerequisite: ESS 104 or ESS 111.

ESS 301 - INTRO TO EARTH & ATMOSPHERIC PHYS

Semester Hours: 3

This course will provide a survey of earth and atmospheric science for undergraduate students. Topics that will be covered will focus on how the earth-atmosphere system works in an integrated fashion. Prerequisites: ESS 103, (ESS 104 or ESS 111), (MA 120 or MA 171), and (PH 101 or PH 111).

ESS 302 - PEOPLE, PLANTS, & ENVIRONMENT

Semester Hours: 3

This course is designed to introduce students from multiple departments to the vital roles that plants have in our ecosystems through the study of basic plant and soil science. Special attention is placed on the impact plants have on our technology-based society. Sophomore standing or above.

ESS 303 - CLASSICAL & PHYSICAL CAUSES CLIMATE

Semester Hours: 3

Basic atmospheric structure and physical processes, surface processes, climate history and climate change, land use and land change, microclimates, topoclimate, Ecoclimatology. Prerequisites: ESS 103, (ESS 104 or ESS 111), (MA 120 or MA 171), and (PH 101 or PH 111).

ESS 305 - HYDROLOGY

Semester Hours: 3

Introduction to hydrologic cycles and concepts of how water interacts with the environment. Covers water properties, precipitation, groundwater and runoff, currents, waves, sediment processes, and conservation strategies. Prerequisites: ESS 103, (ESS 104 or ESS 111), (MA 120 or MA 171), and (PH 101 or PH 111).

ESS 307 - ENVIRONMENTAL ARCHEOLOGY

Semester Hours: 3

Archaeologists today need a wide range of scientific approaches in order to delineate and interpret the ecology of their sites. This approach is revolutionizing archaeology making it relevant to the modern-day world. Investigated in this course includes climate modeling, remote sensing, and GIS. Prerequisite: ESS 103.

ESS 312 - PRINCIPLES OF ECOLOGY

Semester Hours: 4

Lecture/Lab One 3 hour lab a week. Ecological principles controlling plant and animal populations. Development of ecosystems, communities and habitats. Field trips required. Strongly recommend CH 101 or 121. Prerequisite: BYS 120.

ESS 313 - GEOGRAPHIC INFORMATION SYSTEMS

Semester Hours: 3

Introduction to scientific spatial analysis concepts and spatial data processing with focus on ESRI ArcGIS software. Basic concepts in GIS data management and creation, with topics including raster and vector data, projections, data query, data acquisition, and cartography. Prerequisites: ESS 103. Choose 1: CS 102, CS 103, or CS 104.

ESS 321 - POLLUTION PROBLEMS

Semester Hours: 3

Quantitative study of environmental conditions, processes, and problem-solving techniques related to specific pollution problems in air, water, and land. Prerequisites: ESS 103, (ESS 104 or ESS 111), (MA 120 or MA 171), (CH 101 or CH 121), and (PH 101 or PH 111).

ESS 341 - THERMODYNAMIC METEOROLOGY

Semester Hours: 3

Introduction to atmospheric thermodynamics with an emphasis on applications in meteorology, including the equation of state, Zeroth, First and Second Laws of Thermodynamics, adiabatic processes, moist processes, static stability, stability of moist air and severe weather applications. Prerequisites: ESS 301 and Choose 1: CS 102, CS 103, or CS 104. Prerequisites with concurrency: MA 201, PH 112.

ESS 351 - DYNAMIC METEOROLOGY

Semester Hours: 3

Dynamics and kinematics of atmospheric flow. Meteorological coordinate systems. Fundamental governing equations of atmospheric motion, circulation, and vorticity. Prerequisites: PH 111, ESS 301, (CS 102 or CS 103 or CS 104), and MA 201 (with concurrency).

ESS 352 - SYNOPTIC METEOROLOGY

Semester Hours: 3

Analysis, interpretation and forecasting synoptic-scale and mesoscale phenomena, including air masses, frontal systems, cyclones, anti-cyclones, tropical cyclones, and associated mesoscale phenomena. Emphasis is placed on the use of remote sensing data from satellites, radars, and profilers using state-of-the-art workstations. Prerequisite: ESS 212, ESS 341, ESS 351.

ESS 370 - INTRODUCTION TO REMOTE SENSING

Semester Hours: 3

This course introduces the fundamental physics of remote sensing systems and incorporates hands-on exercises of image processing, information extraction and interpretation, and basic applications of airborne and satellite data in Earth System Science and Atmospheric Science. Prerequisites: ESS 103, (ESS 104 or ESS 111), (MA 120 or MA 171), (PH 101 or PH 111), and (CS 102 or CS 103 or CS 104).

ESS 402 - SCI & SOC ASPTS NATRL DISASTER

Semester Hours: 3

Students will understand causes of major natural events and evaluate effects of disasters on populations and possible mitigation measures. GIS software will be used to show progression of events and/or their impacts, with course case studies. Prerequisites: ESS 103 and (ESS 104 or ESS 111).

ESS 407 - ENV THRTS, PUB POLY, & DEC MKG

Semester Hours: 3

Researchers, policymakers and environmental campaigners have identified 25 potential future threats to the global environment. This course examines the nature and consequences of these threats and their potential impacts for the survival of the human race. Prerequisite: ESS 103.

ESS 408 - PYTHON FOR GIS

Semester Hours: 3

Introduction to GIS model building, Python programming, and automation of scripts for ArcGIS. Techniques in Model Builder, Python, and the methods for automation will be taught using data from numerous available data sources across the internet with heavy emphasis on the Earth Sciences. Prerequisite: ESS 313.

ESS 409 - SCI PROGRMNG FOR EARTH & ATMOS

Semester Hours: 3

Survey of data types and languages commonly used in the meteorological community along with practical applications to meteorology. Course is designed to prepare students for graduate work and research in atmospheric science. Prerequisite: (CS 102 or CS 103 or CS 104); ESS 301; MA 172; (PH 112 and PH 115).

ESS 410 - OPERATIONAL WEATHER FORECAST'G

Semester Hours: 3

Subjective and objective methods of atmospheric prognosis. Techniques for forecasting critical weather elements. Interpretation, use and systematic errors of computer-generated products, human factors with forecasting, and application of meteorological theory in an operational setting. Prerequisites: ESS 341, ESS 351, ESS 352.

ESS 414 - GEOSPATIAL APPLICATIONS

Semester Hours: 3

An introductory look at the ways in which GIS can be put to use in different fields of study, drawing examples from Demography, Sociology, Archaeology, History, and Ecology. Focus on cartography and map creation principles and public geospatial data acquisition. Prerequisite: ESS 313.

ESS 415 - ADVANCED TOPICS IN GIS

Semester Hours: 3

Advanced continuation of concepts applied in Geospatial Applications. Students will learn through modules of real world scientific research how to use further tools in ArcGIS including: 3D Analyst, Spatial Analyst, Network Analyst. Topics include web data dissemination, spatiotemporal analysis and some basic spatial statistics measures. Prerequisite: ESS 414.

ESS 420 - INTRO ATMOSP CHEM & AIR POLLU

Semester Hours: 3

This self-contained introductory course in atmospheric chemistry and air pollution is designed to provide students the basics of atmospheric chemistry and air pollution concepts. Topics include air pollutants, air-pollution meteorology, atmospheric gases and aerosols, and atmospheric processes. Prerequisites: PH 112, PH 115, CH 121, ESS 301 and ESS 321.

ESS 441 - ATMOSP THERMODY & CLOUD PHYSIC

Semester Hours: 3

General aspects of thermodynamics and cloud physical processes occurring within the atmosphere; atmospheric statics and stability, saturation point analysis, aerosols, nucleation, and the behavior/growth of cloud particles and hydrometeors. Prerequisites: ESS 341, MA 238, PH 112 and PH 115.

ESS 451 - ATMOSPHERIC FLUID DYNAMICS I

Semester Hours: 3

Fluid dynamics in the atmosphere. Coriolis acceleration, scale analysis and appropriate approximations of the complete governing equations. Numerical analysis and interpretation of weather phenomena. Same as ATS 451. Prerequisites: ESS 351, MA 238, PH 112 and PH 115.

ESS 454 - FORECASTING MESOSCALE PROC

Semester Hours: 3

Detection and forecasting of atmospheric mesoscale phenomena including the structure and evolution of clouds, precipitation (including floods) thunderstorms and severe weather. Includes basics of instruments used to detect mesoscale phenomena, most notably satellite and radar. Prerequisite: ESS 352.

ESS 461 - ATMOSPHERIC RADIATION I

Semester Hours: 3

Fundamentals of terrestrial atmospheric radiation. Topics include: basic concepts, radiative transfer equation, gaseous absorption, scattering by molecules and particles, band models, transmittance along an inhomogeneous path. Prerequisite: ESS 301, MA 238, PH 112 and PH 115.

ESS 471 - RADAR METEOROLOGY

Semester Hours: 3

Introduction to principles of radar meteorology, including radar operations, hardware, interpretation and analysis. Doppler, dual-polarization and dual-wavelength radar theory, methods and applications are covered. Prerequisite: ESS 341, ESS 409.

ESS 472 - SATELLITE METEOROLOGY

Semester Hours: 3

The goal for this course is to provide students in undergraduate and graduate-level Earth and Atmospheric Science a background in satellite meteorology. During all components of the course there will be a heavy emphasis on practical meteorological satellite interpretation with respect to land surface and especially atmospheric features. Prerequisites: ESS 212 and ESS 370. Prerequisites with Concurrency: ESS 408 or ESS 409.

ESS 490 - SPEC TOPICS EARTH & ATMOSPH SC

Semester Hours: 1-3

Special offerings to students in areas of interest not covered in the present curriculum. Prerequisite: permission of instructor.

ESS 495 - DIRECTED STUDY

Semester Hours: 2-4

Supervised special study topics for undergraduates; often is offered to undergraduates who have senior standing. Individual students identify and obtain consent from a faculty mentor.

ESS 497 - UNDERGRADUATE INTERNSHIP

Semester Hours: 3

Individual internships in fields directly related to atmospheric or Earth system science. Student must show acceptance into a formal internship program, and the course requires approval by department chair and consent by the internship supervisor.

ESS 498 - RESEARCH & PROF DEV CAPSTONE

Semester Hour: 1

Applied concepts for professional and research development. Includes evaluation and discussion of published literature and department seminars, with focus on research synthesis and critique. Also includes development of professional and career skills focused on the Earth and Atmospheric Sciences. Junior or Senior Standing required.

ESS 499 - UNDERGRADUATE RESEARCH

Semester Hours: 2-4

For advanced Earth System Science students. Individual investigations into Earth systems science problems under direct supervision of a research mentor. Research is conducted and thesis-style paper is written and orally presented. Students identify and obtain consent from a faculty research mentor.

Economics (ECN)

ECN 142 - PRINC OF MACROECONOMICS

Semester Hours: 3

How does our economy function? Why do we have periods of unemployment and inflation and what can we do about it? Economics is a way of thinking about the world, how to identify and focus on fundamental issues so we can understand our economy and how monetary and fiscal policy affects our lives. Prerequisite: any 100 level or 200 level MA course.

ECN 143 - PRINC OF MICROECONOMICS

Semester Hours: 3

How do markets coordinate our unlimited wants with our limited capacity to produce? We study producer and consumer choice in a variety of market structures, the social welfare implications inherent in market systems and policies designed to correct those market failures. Prerequisite: Any 100 level or 200 level MA course.

ECN 340 - MACRO ECONOMIC ANALYSIS

Semester Hours: 3

A comprehensive study of the nation's economic system. How interdependent market systems determine income, consumption, saving, investment, interest, employment, and the aggregate price level. Determinants of economic growth and the effects of monetary and fiscal policy are central issues. Prerequisites: ECN 142 and ECN 143.

ECN 345 - MICRO ECONOMIC ANALYSIS

Semester Hours: 3

This course provides an informed perspective of, and ability to use, microeconomic theory. We develop the analytical tools needed to solve problems and focus on the logical foundations of these tools. Core topics include consumer behavior, production, exchange, markets, and game theory. Prerequisites: ECN 142 and ECN 143.

ECN 352 - MONEY AND BANKING

Semester Hours: 3

Organization, operation, and economic significance of monetary and banking systems. Fractional reserve banking systems, money creation, the Federal Reserve System, U.S. financial intermediaries. Introduction to monetary theory and international finance. Prerequisites: ECN 142 and ECN 143.

ECN 406 - SPORTS ECONOMICS

Semester Hours: 3

The course uses economic tools to study market outcomes in sports: the market for talent, labor relations, and the role of government. Specific topics include the demand for sports, sports franchises, and the theory of the firm, compensation of player talent, economics of stadiums, and sports media. Prerequisite: ECN 143.

ECN 411 - ECONOMICS INFORMATION TECH

Semester Hours: 3

Explores economic theories of consumer and firm behavior and strategy in the information technology industry with emphasis on applying formal tools of analysis in real-world contexts. Core topics include cost structures, non-competitive markets, network effects, and game theory. Prerequisites: ECN 143 and MA 120.

ECN 445 - GAMES AND NETWORKS

Semester Hours: 3

An introduction to game theory and economic and social network analysis. Student will explore the use of simple games to understand serious games strategic interactions -- especially in social network settings. Prerequisite: ECN 143.

ECN 450 - INTERNATIONAL BUSINESS

Semester Hours: 3

Cross-discipline course combining theoretical and practical aspects of doing business in the global market. Three modules consisting of international management, marketing and economic/finance cover topics including the legal, socio-political environment, negotiations/diplomacy, import/export mechanics, international distribution, balance of payments, hedging, trade agreements (GATT), and international business strategy.

ECN 454 - INTERNATIONAL ECONOMICS

Semester Hours: 3

Behavior of foreign exchange rates under different monetary standards, methods of financing international trade, historical development of international financial institutions, current and proposed methods for fostering international trade, and problems of international liquidity. Prerequisite: FIN 301.

ECN 461 - ECONOMIC DEVELOPMENT

Semester Hours: 3

Understand economic development in the developing world. Examine economic transformation & social justice. Highlight domestic & international institutional, structural, & political sources of economic dynamism/lack thereof in the Global South. Prerequisites: Junior standing or higher.

ECN 470 - SEMINAR IN ECONOMICS

Semester Hours: 3

Extensive readings and reports reflecting current developments and trends in economic theory and its application to the decision-making process in business and government.

ECN 475 - LABOR ECONOMICS

Semester Hours: 3

Economic analysis of labor markets; labor demand and labor supply at the market and individual level. Topics include individual decisions to supply labor, compensating wage differentials, human capital investment, discrimination in labor markets, pay and productivity, and the role of labor unions.

Prerequisite: ECN 143.

ECN 480 - INTRO ECONOMETRICS

Semester Hours: 3

An introduction to the quantitative measurement and analysis of actual economic and business phenomena. Prerequisite: MSC 288 or equivalent statistics.

ECN 481 - RESEARCH PRACTICUM

Semester Hours: 3

The economics research practicum is designed to give students research experience. With the approval of one of the economics' professors, a student teams up with a professor who mentors them through a research project. Prerequisites: ECN 340 and ECN 345.

ECN 490 - SPECIAL PROJECTS

Semester Hours: 3

Faculty guided Independent Study in an area of interest to the student and faculty member. Approval of department chair is required.

ECN 499 - AGENT-BASED COMPUTA ECON

Semester Hours: 3

Computational Economics introduces students to complex dynamic economic systems. Agent-based computational economics builds systems piece by piece - individual economic agents are constructed and placed in a virtual environment. This creates a virtual laboratory for economic experimentation.

Prerequisites: ECN 340 and ECN 345.

Education (ED)

ED 060 - ENGLISH FOR ACADMC PURP PRGM

Semester Hours: 3

This course aims to help students achieve a greater level of success academically and professionally. Three types of evaluative and consultation tracks are offered: accent modification, oral communication and literacy. A speech pathology model is used toward the accent modification and oral communication tracks, and a consultation approach utilizing a modified multi-sensory method focusing on comprehensive literacy is used toward the literacy track. By the end of the course, students typically exhibit a strong improvement in self-confidence and ability to proceed with their studies and professional dealings.

ED 115 - EFFECTIVE RDG & STUDY SKILLS

Semester Hours: 3

Developmental course focusing on acquisition of strategies to expand an individual's ability to read and study materials encountered in higher education. Effective reading and study strategies which incorporate reading, writing, and listening skills are taught and applied, using college texts and related readings.

ED 301 - INTRO TO EDUCATION PRACTICUM

Semester Hour: 1

Initial practicum experience designed to provide the opportunity to explore the role of the classroom teacher in today's diverse school settings. This experience is a prerequisite for admission to the Teacher Education Program.

ED 305 - FOUNDATIONS OF EDUCATION

Semester Hours: 3

Survey of social, cultural, historical, and philosophical foundations of education; interrelationships of society and education, effects of social change and influences of social-cultural values upon education; educational ideas and processes as they attempt to shape curricula. The perennial search for the meaning of education, perceived not merely as schooling, but as a process of enculturation and socialization. Prerequisites with concurrency: ED 301 and ED 308.

ED 307 - MULTICULTURAL FND EDUCATION

Semester Hours: 3

This course will provide students with an understanding of selected philosophical, historical, social, cultural, political, and economic questions and influences on the development of educational policies and practices. Through an examination of constructs such as race, ethnicity social class, gender, sexual orientation, and religious affiliation, students will develop an understanding of the connections between identity, difference, power and privilege and the role(s) schools play in perpetuating or ending discriminatory practices.

ED 308 - EDUCATIONAL PSYCHOLOGY

Semester Hours: 3

Psychological principles basic to an understanding of the learner, the learning process, and the learning situation. Intensive field experience required. Prerequisites with concurrency: ED 301 and 305.

ED 309 - CLASSROOM & BEHAVIOR MGMT

Semester Hours: 3

This course focuses on instructional options that learners need in order to be successful. It takes a broad approach to classroom and behavior management that is grounded in both theory and reflective practice. Content will emphasize the study and implementation of a variety of classroom and behavior management strategies that are necessary for working with diverse populations. Intensive field experience in an assigned public school required. Prerequisites: Admission to the Teacher Education Program.

ED 310 - TCHNG THE ARTS IN ELEM SCHOOLS

Semester Hours: 2-3

This course covers multiple aspects of fine arts education in elementary education including the use of content, functions, and achievements of the performing arts (dance, music, theatre) and visual arts as primary media for communication, inquiry, and engagement among elementary students.

ED 315 - EDUC EVALUATION & MEASUREMENT

Semester Hours: 3

This course is designed to help prospective teachers use and construct a range of assessments that will help them plan and teach more effectively, improve learning and meet state and national standards. The class will focus on more traditional assessment issues such as validity and reliability, as well as the alternative assessments that are likely used in today's classrooms. Furthermore contextual issues such as educational accountability testing, the No Child Left Behind Act, and teacher testing and evaluation (PEPE) will be explored. Intensive field experience required. Taken concurrently with ED 373, 374, 405. Admission to the Teacher Education Program or permission of the chair.

ED 350 - TECHNOLOGY IN CLASSROOM

Semester Hours: 3

Introduces prospective teachers to current state of the art in educational technology. Designed as a laboratory course providing extensive hands-on experiences with microcomputers and other emerging technology. Emphasis is on enabling the student to effectively integrate technology into instructional settings. May be taken prior to entering Education Program.

ED 360 - EARLY CHILDHOOD EDUC PRACTICUM

Semester Hours: 3

A three-hour credit course in a state-approved or NAEYC-accredited pre-kindergarten or kindergarten placement. It includes a weekly one-hour seminar with a faculty member. Admission to Teacher Education required.

ED 371 - TCHG ELEM LANGUAGE ARTS

Semester Hours: 3

Introduction to current practices in language arts instruction with emphasis on the development of an integrated curriculum using children's literature as a foundation. Includes appropriate techniques for the teaching of grammar, spelling, and handwriting. Intensive field experience required. Prerequisites: Admission to the Teacher Education Program.

ED 372 - TCHG ELEM SOCIAL STUDIES

Semester Hours: 3

Teaching social studies in grades k-6. Helping beginning teachers acquire background skills in organizing and teaching units of work. Intensive field experience required. Prerequisites: Admission to the Teacher Education Program.

ED 373 - TCHG NATURL/HLTH SCIENCE

Semester Hours: 3

Integrates concepts from reflective practice with elementary science teaching. Opportunity to refine teaching skills in the planning, implementation, and evaluation of science lessons and units of instruction. Intensive field experience required. Prerequisites: Admission to the Teacher Education Program.

ED 374 - TCHG ELEM MATHEMATICS

Semester Hours: 3

Overview of the mathematics concepts and skills taught in grades K-6 with an emphasis on the principles, methods, and materials used in the teaching and evaluation of elementary school mathematics. Focuses on the attitudes and behaviors of students and teachers in the actual planning and implementation of mathematics instruction for an elementary school classroom. Intensive field experience required. Prerequisites: Admission to the Teacher Education Program.

ED 375 - TCHG READING IN PRIMARY GRADES

Semester Hours: 3

An introduction to the basic principles of literacy instruction in culturally and linguistically diverse primary grade classrooms, including theoretical bases for instruction, methods of instruction and organization, developmentally appropriate strategies and materials, and assessment of children's literacy needs. Class activities will include mini-lessons, discussions, group activities, and presentations. An intensive school-based practicum in grades pre K -2 is required.

ED 400 - SPECIAL TOPICS-INTERNSHIP

Semester Hours: 3

Innovative internship focused on working with students with disabilities. Observations, participation, and direct instruction and teaching in a middle or high school setting for a prescribed time.

ED 401 - FNDS OF REFLECTIVE TEACHING

Semester Hours: 3

This diversity elective is designed to develop reflective practitioners, who study teaching and student learning in an effort to improve teaching practices and also meet certification requirements. The course will use various lenses of professional teacher noticing to select and discuss evidence of effective teaching. Course topics include edTPA rubrics, lesson planning, video teaching episode analysis, student assessments and feedback, academic language for describing teaching, and professional writing about teaching.

ED 402 - SPECIAL TOPICS IN EDUCATION

Semester Hours: 3

Introduces students to current issues and trends within educational practice, policy and theory through a specific lens. Provides opportunities for students to investigate issues of teaching and learning within the broader social/cultural vantage basic exploration of current research and debate within education. Topic may vary with each offering.

ED 405 - RDG STRATEGIES INTERMED GRADES

Semester Hours: 3

This course provides an in-depth study in and application of the process of reading and reading instruction, theoretical approaches, instructional strategies, classroom organization, and the formal/informal assessment of reading in intermediate grades. This course is required of all elementary education majors and secondary education candidates who are pursuing a middle school endorsement. Intensive field experience required. Prerequisites: Admission to the Teacher Education Program.

ED 408 - TCHG READING/CONTENT AREA

Semester Hours: 3

Provides knowledge of certain basic developmental and remedial reading skills, practices, and concepts. Extends those learned in previous, more fundamental, reading courses and shows how to apply fundamental skill and knowledge to the classroom. This will include adapting fundamentals of reading instruction to the various subject matter areas (i.e., the sciences, social studies, English, etc.). Survey of special reading programs such as remedial reading and reading instruction as practiced in special education. Intensive field experience required. Prerequisites: Admission to the Teacher Education Program.

ED 410 - FOUNDATIONS EDUC EVALUAT

Semester Hours: 3

Measurement process with emphasis on its relationship to problems of educational evaluation. Evaluation as an integral part of overall educational planning in addition to its use in measurement and evaluation of academic achievement. Prerequisites: Admission to the Teacher Education Program.

ED 413 - CHILDREN'S & ADOLESCENT LIT

Semester Hours: 3

Course content includes the study of various genres of children's and adolescent literature and their relationship to beginning reading, enhancement of reading comprehension, and intervention instruction in the various content areas. Intensive field experience required. Same as EH 413. Prerequisites: Admission to the Teacher Education Program.

ED 421 - SECNDRY ELA INSTR WRIT TO READ

Semester Hours: 2-3

Candidates explore the ways they can use specific writing-to-learn activities to enhance their students' capacity to understand a variety of complex texts. Candidates will learn techniques for engaging students in the questioning, inference-making, syntactical pattern recognition, and meaning-making of both fiction and non-fiction works.

ED 422 - MIDDLE & SECD SCH MATH METHODS

Semester Hours: 2-3

This course is part one in a series of two courses that are designed for teacher candidates who are pursuing teaching certification in middle and/or secondary mathematics. This methods course provides background for middle school and secondary teaching from the perspective of theory, research, and practice.

ED 423 - TCHNG SCIENCE MID & SEC SCH I

Semester Hours: 2-3

This course will focus on how secondary students learn science. Candidates will learn how to develop and design developmentally appropriate lessons in which their students are able to make observations, examine relationships, notice patterns, and make inferences, while confronting naive misconceptions. Candidates will discuss the nature of science (NOS).

ED 424 - TCHNG SOC STUD MID & SEC SCH I

Semester Hours: 2-3

This course teaches research-based techniques and strategies employed by social science teachers at the secondary levels. As well as learning theoretical foundations and the goal of social science instruction (citizenship skills), students will learn pedagogic skills, instructional strategies, and modes of reasoning unique to the social studies classroom.

ED 425 - METHODS OF TEACHG FOREIGN LANG

Semester Hours: 2-3

This course is designed to provide undergraduate level Foreign Language majors with the theory, tools (i.e. authentic media and technology), and techniques for teaching middle and secondary students. The focus of the course is primarily, though not exclusively, on designing lessons that allow for maximum student participation and control.

ED 431 - SEC ELA METHD: READING TO WRIT

Semester Hours: 2-3

In this course, candidates will explore the ways they can use specific reading activities to enhance their students' ability to express themselves in multiple registers and forms of discourse. Candidates will learn techniques for engaging students in the process of developing and expressing their ideas while demonstrating an improved command of the grammatical, syntactical, and discursive elements of language.

ED 432 - TCH REASON/PROOF SEC MATH

Semester Hours: 2-3

This methods course provides background for middle school and secondary teaching from the perspective of theory, research, and practice. It is designed to provide an introduction to and practice in ways in which to engage students in mathematical reasoning and proof.

ED 433 - TEACH SC MID & SEC SCHOOL II

Semester Hours: 2-3

Students will discuss the status of science education in our nation's schools, and the need for implementing research-based strategies in the classroom using the 5E learning cycle as framework.

ED 434 - TCHG SOC ST MID & SEC SCHLS II

Semester Hours: 2-3

This methods course is designed to study effective techniques and strategies employed by social science teachers at the middle and secondary levels. As well as learning theoretical foundations in social studies education, students will learn pedagogic skills, instructional strategies, and modes of reasoning unique to the social studies classroom.

ED 435 - DIFF INSTR IN FOREIGN LANGUAGE

Semester Hours: 2-3

This course is designed to provide undergraduate level Foreign Language majors with the theory, tools (i.e. authentic media and technology), and techniques for teaching middle and secondary students. The focus of the course is primarily, though not exclusively, on designing lessons that allow for maximum student participation through and understanding of student development.

ED 490 - EARLY CHILDHOOD INTERNSHIP

Semester Hours: 12

ED 493 - ELEMENTARY SCHOOL INTERNSHIP

Semester Hours: 12

Observation, participation and teaching in elementary school (full time, 15 week semesters). Students will also attend campus-based seminars designed to meet specific needs of the interns.

ED 497 - HIGH SCHOOL INTERNSHIP

Semester Hours: 12

Observation, participation and teaching in middle/high school (full time, 15 week semester). Students will also attend campus-based seminars designed to meet specific needs of the interns.

ED 499 - P-12 INTERNSHIP

Semester Hours: 12

Observation, participation and teaching in elementary and middle/high school (full time, 15 week semester). Students will also attend campus-based seminars designed to meet specific needs of the interns.

Education Collaborative (EDC)

EDC 301 - TCHG THE EXCEPTIONAL CHILD

Semester Hours: 3

Examines special education laws and methodology used in teaching special education students. Focus is primarily on those students with mild learning disabilities. Also examines requirements needed in the regular classroom for special teachers. Intensive field experience required. To be taken concurrently with ED 301, ED 307, ED 308 and EDC 311. Prerequisites: Completion of all general education classes.

EDC 302 - INTRO LOW INCIDENCE POPULATION

Semester Hours: 3

Students will learn about low incidence disabilities through reading, research, discussion, and the integration of specific learning strategies during class activities. Students are expected to complete a case study/practicum with a disabled student in addition to 15 hours of observation in classrooms for low incidence exceptional students. Intensive field experience required.

EDC 311 - INSTR STRATEGIES INCLUSIVE CLR

Semester Hours: 3

Students learn about low incidence disabilities through reading, research, discussion, and the integration of specific learning strategies during class activities. Students are expected to complete a case study/practicum with a disabled student in addition to 15 hours of observation in classrooms for low incidence exceptional students. Intensive field experience required.

EDC 316 - DIFFER INSTR FOR ECSE

Semester Hours: 3

This course provides practical strategies to maximize learning for all young learners (birth to 8 years old) with a variety of disabilities. Students will learn to utilize the principles of universal design for learning and differentiated instruction to create structured classrooms and lessons that meet the individual needs of young learners with special needs. This will include learning to select, implement, and evaluate lesson accommodations and modifications for students with exceptional needs.

EDC 321 - COLLAB CONSU(PARENT-TCHR-TEAM)

Semester Hours: 3

This class focuses on the description and rationale for collaboration, including communication skills, group work, problem solving, and co-teaching. Each student will participate as a member of a collaborative team during the practicum. This course will also provide an examination of selected school district issues involving collaboration within traditional K-12 educational settings. Intensive field experience required. Prerequisites: Admission to the Teacher Education Program.

EDC 331 - CRITICAL ISSUES IN SPEC EDUC

Semester Hours: 3

Provides an in-depth discussion and evaluation of current issues in special education such as litigation, legislation, personnel preparation, and research. School-based practicum required. Intensive field experience required. Prerequisites: Admission to The Teacher Education Program.

EDC 341 - ASSESS/PLN TRANSITION K-12 STU

Semester Hours: 3

Teacher candidates will develop the skills necessary for transitional planning, including administering cognitive, social, and functional assessments. Results of assessments will be interpreted and utilized to plan transitions from one placement to another, to inform instruction in regular, inclusive and self-contained classrooms, and to develop Individualized Education Plans (IEPs) for eligible students. Field work is required. Prerequisites: Admission to the Teacher Education Program.

EDC 351 - BEHAVIOR ANAL & INTERVENTION

Semester Hours: 3

This course focuses on the concepts of applied behavior analysis and how to implement those concepts in classrooms and other settings. Students learn how to conduct a functional behavior assessment and design, implement, and evaluate a behavioral-change project with an appropriate subject in a public school setting. Intensive field work required. Prerequisites: Admission to the Teacher Education Program.

EDC 361 - ECSE PRACTICUM

Semester Hours: 3

A three-hour credit course in a state-approved or NAEYC-accredited early childhood education setting that includes children with developmental delays or diagnosed disabilities. It includes a weekly one hour seminar with a faculty member. Admission to teacher education program required.

Electrical Engineering (EE)

EE 202 - INTRO DIGITAL LOGIC DSGN

Semester Hours: 3

Engineering approaches to design and analysis of digital logic circuits. Boolean algebra, Karnaugh maps, design using Hardware Description Languages, digital computer building blocks, standard logic (SSI MSI) vs. programmable logic (PLD, PGA0, finite state machine design. Prerequisites: ENG 101.

EE 203 - DIGITAL LOGIC DESIGN LAB

Semester Hour: 1

Experiments in applying Boolean logic concepts to digital design. The course introduces students to small-scale prototyping and simulation techniques that are used to implement and evaluate digital combinational and sequential logic designs. Prerequisite: EE 202.

EE 213 - ELECTRICAL CIRCUIT ANALYSIS I

Semester Hours: 3

Basic concepts of DC and AC circuit theory and analysis. Includes both DC and AC power. Prerequisites: MA 201 and PH 112 both w/concurrency.

EE 223 - DES & MOD ELEC CIR & SYS

Semester Hours: 3

Electrical circuit and systems design and modeling. Includes using modern tools (i.e. Matlab and simulink) to design and model circuits. Introduces and reinforces engineering design principles. Prerequisites: EE 202 & EE 213.

EE 299 - EE MENTORING I

Semester Hours: 0

Yearly mentoring and advising from engineering faculty and staff. Prerequisite w/ concurrency: CPE 211.

EE 307 - ELECTRICITY & MAGNETISM

Semester Hours: 3

Basic concepts of electrostatics, electric potential theory, electric fields and currents, fields of moving charge, magnetic fields, time varying electromagnetic fields, Maxwell's equations. Prerequisites: EE 213, MA 238 and MA 244.

EE 308 - ELECTROMAGNETIC ENGR

Semester Hours: 3

Review of Maxwell's equations, uniform plane waves in different types of media, reflection, and transmission of uniform plane waves, transmission lines, waveguides, and antennas. Prerequisites: EE 307.

EE 310 - SOLID STATE FUNDAMENTALS

Semester Hours: 3

Introduction to semiconductors including crystalline structure, energy bands and charge carriers, excess carriers, and thermal properties. Introduction to semiconductor junctions, the bipolar junction transistor, the MOSFET. Prerequisites: PH 113 and MA 238.

EE 315 - INTRO ELECTRONIC ANAL & DESIGN

Semester Hours: 3

Properties of diode, bipolar transistors, FET and operational amplifiers, analysis of DC and AC small-signal operation and circuit models for the design and analysis of electronic circuits. Prerequisite: EE 213.

EE 316 - ELE CIRCUITS & ELTRNC DSGN LAB

Semester Hour: 1

Electric circuit experiments including first and second order DC circuits, maximum power transfer, impedance measurements, transformers, measurement of electronic device characteristics and design and testing of operational amplifier circuits and single-stage amplifiers using MOSFETs and BJTs. Prerequisite: EE 315.

EE 382 - ANALY METH CONTINUOUS TIME SYS

Semester Hours: 3

Fourier Series, Fourier and Laplace transforms with emphasis on their physical interpretation. System representation by transfer functions and impulse response functions. Convolution integral. Transient response. Modeling and simulation. Prerequisites: EE 213, MA 238 and MA 244.

EE 383 - ANALY METH MULTIVARIABLE

Semester Hours: 3

Discrete time signals and systems, sampling techniques, Z and discrete Fourier transforms, multivariable systems. Introduction to digital signal processing. Prerequisite: EE 382.

EE 384 - DIG SIGNAL PROCESS LAB

Semester Hour: 1

Design and programming of digital processing algorithms such as DFT, FFT, IIR, and FIR filtering. Prerequisites: EE 383 or CPE 381.

EE 385 - RANDOM SIGNALS & NOISE

Semester Hours: 3

Random variables and probabilities description of signals. Introduction to random processes; autocorrelations, cross correlation, power spectral density. Noise analysis, thermal, shot, white, and colored. Response of electrical systems to random inputs. Prerequisites: EE 382 or CPE 381.

EE 386 - INTRO CONTROL/ROBOTIC SYS

Semester Hours: 3

Theory and analytical techniques for modeling, analysis and control of dynamical systems. Transfer functions, block-diagrams, frequency response, stability criteria, series and feedback controller design, and digital control. Introduction to the dynamic analysis and control of robotic systems. Prerequisites: EE 382 or CPE 381.

EE 399 - EE MENTORING II

Semester Hours: 0

Yearly mentoring and advising from engineering faculty and staff. Prerequisites: EE 299 and EE 223.

EE 401 - REAL-TIME DIGITAL SIGNAL PROC

Semester Hours: 3

Introduction to digital signal processor architectures, applications, assembly language programming, and development tools for designing and implementing DSP systems. Prerequisites: EE 383 or CPE 381.

EE 410 - SELECTED TOPICS/ECE

Semester Hours: 1-6

Special topics in Electrical Engineering.

EE 410L - SELECTED TOPIC LABORATORY

Semester Hours: 0

EE 411 - ELECTRIC POWER SYSTEM

Semester Hours: 3

Power generation, transmission and distribution. Three-phase circuits, conventional and renewable power systems, transformers and motors, protection and control. Prerequisite: EE 382.

EE 412 - SR DSGN PROJ ELECT ENGR

Semester Hours: 1-6

Individual design project under the direction of an ECE faculty member. Senior standing and permission of instructor.

EE 414 - ANALOG & DIGITAL FILTER DESIGN

Semester Hours: 3

Analog filter design via Butterworth, Chebyshev, and elliptical approximation. Active filter design using operational amplifiers. Digital filter design methods. Prerequisites: EE 315 and EE 383.

EE 416 - ELECTRONICS II

Semester Hours: 3

Integrated circuits and micro-devices related to multistage amplifiers, oscillators, design specifications, operational amplifiers, and microunits. Computer simulation. Prerequisites: EE 313 and EE 315.

EE 421 - ANTENNA DESIGN & ANALYSIS

Semester Hours: 3

Covers analytical methods and mathematical foundations for solving antenna radiation problems, based on Maxwell's equations. Different types of antennas will be studied, including wire, phased array, aperture, microstrip, and reflector antennas. Prerequisite: EE 308.

EE 423 - COMM SYS & SIMULATION W/ LAB

Semester Hours: 3

Modern test equipment and computer-based simulation methods are used to conduct experiments in the area of communication systems. Includes experiments to investigate signal modulation and demodulation, and filters. (Same as EE 523) Prerequisite: EE 426.

EE 424 - INTRO DATA COMMUN NETWORKS

Semester Hours: 3

Overview of historic development of modern telephone and data communication system, system architecture, standards, broadband switching systems, modems, protocols, personal and mobile communications, digital modulation techniques. (Same as EE 504) Prerequisites: EE 383 and EE 385.

EE 426 - COMMUNICATION THEORY

Semester Hours: 3

Signals and systems including the Hilbert transform, cross and auto correlation, power density spectrum, and the Wiener-Khintchine theorem. Filter design. Linear and nonlinear modulation and demodulation methods and circuits. Phase lock and frequency feedback techniques. (Same as EE 506). Prerequisites: EE 382 or CPE 381.

EE 436 - DIGITAL ELECTRONICS

Semester Hours: 3

Introduction to digital electronics. The Metal-Oxide-Semiconductor (MOS) transistor. MOS inverters and gate circuits. Bipolar junction transistors, ECL inverters, and bipolar digital gates. Semiconductor Memories. (Same as EE 516) Prerequisites: EE 202 and EE 315.

EE 437 - ELECTRONICS MANUF PROCESSES

Semester Hours: 3

Concepts, facilities, and technology utilized in the manufacture of electronic components and products. Includes printed wiring board fabrication and component mounting methods, automation, quality and reliability, product testing, and economic issues. Senior standing. (Same as ISE 437 and EE 537).

EE 451 - OPTOELECTRONICS

Semester Hours: 3

Basic concepts for understanding electro-optic devices and systems. Blackbody radiation; light sources; quantum and thermal detectors, noise in detectors; optical heterodyning; acousto-optic, magneto-optic, and electro-optic modulation. (Same as OPE 451) Prerequisites: EE 307 and EE 315.

EE 453 - LASER SYSTEMS

Semester Hours: 3

Spontaneous and stimulated emission, population inversion, optical resonators, three- and four-level systems, Q-switching and mode-locking, semiconductor lasers, integrated optic waveguides and couplers, scanning systems, high-power industrial application. Prerequisite: EE 307.

EE 454 - OPTICAL FIBER COMMUNICA

Semester Hours: 3

Introduction to optical fibers and their transmission characteristics, optical fiber measurements, sources and detectors, noise considerations for digital and analog communication, optical fiber systems. (Same as OPE 454) Prerequisites: (EE 307 or PH 432) and (EE 382 or CPE 381).

EE 486 - INTRO MODERN CONTROL SYSTEMS

Semester Hours: 3

Modern control theory including techniques for modeling, analysis and control of MIMO dynamic systems, state-variable feedback control design and state observers. Kalman-filtering. Fundamentals of nonlinear systems analysis and discrete-time system modeling, analysis and control. Prerequisites: EE 386.

EE 494 - EE DESIGN PROJECTS

Semester Hours: 3

Senior Capstone Course. Design, simulation, and construction of technical projects. Review of legal, economic, and ethical issues. Students work as individuals or teams to design, implement, test, and evaluate their projects. Oral presentation and written reports are required. Senior Standing. Prerequisites: ISE 321, EE 308, EE 310, EE 313, EE 315, CPE 323, EE 383, EE 386 and EE 399.

EE 497 - ELEC ENGR INTERNSHIP

Semester Hours: 1-3

Active involvement in an engineering project in an engineering enterprise, professional organization, or government agency that has particular interest and relevance in the student. Junior/senior standing and Approval of Engineering Faculty Advisor.

Engineering (ENG)

ENG 100 - EXPLORING ENGINEERING

Semester Hour: 1

Exploring engineering fundamentals and disciplines via the design and development of a payload for a UAH designed spacecraft. Included are lectures and design laboratories that introduce the engineering design process, application of math and science, and presentation skills.

ENG 101 - INTRO COMPUTING ENGINEERS

Semester Hours: 3

Introduces students to the fundamental principles of programming for solving engineering problems. It familiarizes students with the process of computational thinking and the translation of real-life engineering to computational problems. Languages may include Matlab, Python, and others as appropriate. Prerequisites: MA 113 w/concurrency or Math placement level 2000.

ENG 105 - INTRODUCTION TO AERONAUTICS

Semester Hour: 1

Introduction to a variety of aviation subjects, including flight physiology, computer systems, aerodynamics, aeronautics, jet propulsion, thermodynamics, navigation, and survival skills. Lectures and simulated missions. Offered in cooperation with U.S. Space & Rocket Center. Prerequisite: Available only to high-school students with U.S. citizenship enrolled in Aviation Challenge® Mach III.

ENG 109 - ENG ORG

Semester Hour: 1

Immersive experience with an Engineering Student Organization to develop an interest in engineering as a profession. Participate in a semester project, develop leadership and team work skills, give back to the community, network with professionals, learn engineering design skills.

English (EH)

EH 101 - COLLEGE WRITING I

Semester Hours: 3

Introduction to academic writing, critical reading, and rhetorical knowledge.

EH 101L - STUDIO FOR COLLEGE WRITING I

Semester Hours: 0

A writing workshop/lab to be taken concurrently with EH 101S. The course provides supplementary instruction and practice in written English language skills, editing techniques, writing strategies (brainstorming, drafting, revising/editing) as well as critical reading (skimming, scanning, inferring) for students needing additional support. Students must pass EH 101L to pass EH 101S.

EH 101S - COLLEGE WRITING I W/STUDIO

Semester Hours: 3

Introduction to academic writing, critical reading, and rhetorical knowledge. For students whose preparation suggests a need for intensive support as they progress through the composition sequence. Requires concurrent registration in studio section 100L.

EH 102 - COLLEGE WRITING II

Semester Hours: 3

Intermediate academic writing. Focuses on research questions and techniques, as well as critical engagement with published and student texts. Prerequisite: EH 101 or 101S.

EH 103 - ACCELERATED COLLEGE WRITING

Semester Hours: 3

Accelerated introduction to academic writing, critical reading, and research questions. Focuses on research questions and techniques, as well as critical engagement with published and student texts. Prerequisites: minimum highschool GPA 3.5; minimum 26 on ACT or minimum 1170 on SAT.

EH 105 - HONORS ENGLISH SEMINAR

Semester Hours: 3

Interpretive and comparative readings in texts of enduring intellectual, esthetic, and ethical importance; critical and analytic writing and research projects. Grading Scale: A, B, C, D, F. Minimum grade of C- required to advance to 200-level English classes. Prerequisites: Formal admission to the University Honors Program.

EH 207 - READINGS LITERATURE/CULTURE I

Semester Hours: 3

Critical analysis of texts from ancient times through the Age of Discovery. The course introduces students to the methods of literary study through an examination of works in their social, historical, and philosophical contexts. Prerequisite: EH 102 or EH 103 or EH 105.

EH 208 - READINGS LITERATURE/CULTURE 2

Semester Hours: 3

Critical analysis of texts from the Age of Discovery through the present. The course introduces students to the methods of literary study through an examination of works in their social, historical, and philosophical contexts. Prerequisite: EH 102 or EH 103 or EH 105.

EH 209 - HONORS SEM READINGS LIT/CUL I

Semester Hours: 3

Critical analysis of texts from ancient times through the Age of Discovery. The course offers an in-depth examination of important works and their cultural contexts in a seminar format. Prerequisite: EH 102 or EH 103 or EH 105, and Honor's College Student.

EH 210 - HONORS SEM READINGS LIT/CUL 2

Semester Hours: 3

Critical analysis of texts from the Age of Discovery through the present. The course offers an in-depth examination of important works and their cultural contexts in a seminar format. Prerequisite: EH 102 or EH 103 or EH 105, and Honor's College Student.

EH 211 - INTRO CREATIVE WRITING

Semester Hours: 3

Students will discuss contemporary stories/poems and will participate in workshops, where their own poetry and fiction is examined and critiqued by the class and instructor. The class culminates in two revision portfolios (one fiction and one poetry). Prerequisite: EH 102 or EH 103 or EH 105.

EH 242 - MYTHOLOGY

Semester Hours: 3

Archetypal, metaphorical, and historical significance of deities and myths. Prerequisite: EH 102 or EH 103 or EH 105.

EH 260 - INTRO TO WRITING MAJOR

Semester Hours: 2

An introduction to the Writing B.A., this course will overview the field of Writing Studies, its methods of inquiry and the interdisciplinary nature of its rhetoric, composition and language/literacy influences. Prerequisite: EH 102 or EH 103 or EH 105.

EH 300 - STRATEGIES FOR BUSINESS WRIT'G

Semester Hours: 3

Practical business writing with emphasis on rhetoric, organization, and research. Open to all students in the College of Business or by permission of the Department of English. Qualifies as elective in the English major. Does not count toward English minor. Junior standing required. Prerequisite: EH 102 or EH 103 or EH 105.

EH 301 - TECHNICAL WRITING

Semester Hours: 3

Practical writing, especially technical or scientific reports and proposals, with emphasis on organization, research, and presentation. Qualifies as elective in English major. Does not count toward English minor except Cognate Studies in Technical Writing. Junior Standing. Prerequisite: EH 102 or EH 103 or EH 105.

EH 302 - TECHNICAL EDITING

Semester Hours: 4

Clarifying, expanding, reducing, and rewriting technical reports and other documents created by others. Emphasis on elements of style and usage, revision, proofreading, and application of rhetorical techniques to the work of engineers, scientists, and technicians. Includes lab emphasizing software skills useful for technical editing. Qualifies as elective in English major. Does not count toward English minor with special approval. Prerequisite: EH 301.

EH 303 - PRAC & RSRCH IN TECH COMM

Semester Hours: 3

Provides an overview of technical communication as a career field and as a research field. Introduces students to best practices and career options in technical communication and to the research methods used by technical communication practitioners and researchers. Does not count toward English minor without special approval. Prerequisite: EH 301.

EH 305 - INTRO TO LITERARY STUDIES

Semester Hours: 3

Designed as an introduction to the study of literature, this course will address the history of textual interpretation, the practice of literary analysis, the theoretical debates central to literary studies, and the basic research and writing skills required for literary criticism. Prerequisite: Choose 1: EH 207, EH 208, EH 209, EH 210, EH 242.

EH 320 - PRACTICUM IN WRITING

Semester Hours: 3

Writing and editing under the supervision of professionals. Enrollment requires advance planning. Does not count toward English minor without special approval. Prerequisite: EH 301 and EH 302.

EH 335 - SURVEY BRITISH LITERATURE

Semester Hours: 3

Writers, genres, and periods from Beowulf through the present. Prerequisite: EH 207 and 208 OR EH 209 and 210.

EH 336 - SURVEY AMERICAN LITERATURE

Semester Hours: 3

Writers, genres, and periods from the Age of Discovery through the present. Prerequisite: EH 207 and 208 OR EH 209 and 210.

EH 340 - ACADEMIC WRITING

Semester Hours: 3

Advanced academic writing designed to prepare students for the writing, research, and publishing requirements of their field of study. Prerequisite: EH 102 or EH 103 or EH 105.

EH 400 - COMPOSITION STUDIES FOR TCHERS

Semester Hours: 3

Introduction to effective strategies for the teaching of writing. Students will report on their own writing pedagogy as a result of reading and analyzing a range of writing research related to strategies of assigning, responding and assessing writing. Prerequisite: EH 207, EH 208, EH 209, EH 210 or EH 242.

EH 401 - THEORY & PRACTICE IN TECH COMM

Semester Hours: 3

Explores the relationships between common practices in technical communication and the theories that legitimize those practices. Introduces students to research and theories about fundamental issues in technical communication which may then become the basis for further graduate study in technical communication. Prerequisite: EH 301 or CM 301.

EH 403 - LITERARY CRITICISM & THEORY

Semester Hours: 3

Major texts and approaches from Plato to the present. Prerequisite: EH 207, EH 208, EH 209, EH 210 or EH 242.

EH 406 - FEMINISM AND COMPOSITION

Semester Hours: 3

Explores issues of gender in writing: postmodern feminism, feminist theories and research, gender and forms of writing, and finally, gender, teaching and identity. Students will investigate and analyze composition scholarship through reading, writing, and collaborative inquiry. Prerequisite: EH 207, EH 208, EH 209, EH 201 or EH 242.

EH 408 - HISTORY OF ENGLISH LANGUAGE

Semester Hours: 3

History of the emergence and development of English from the pre-Anglo-Saxon period to the present. Emphasis on cultural contexts. Prerequisite: EH 207, EH 208, EH 209, EH 210 or EH 242.

EH 409 - PROPOSAL WRITING

Semester Hours: 3

This course teaches effective strategies for writing successful proposals in business, academic, research, and non-profit contexts. Senior Standing required.

EH 410 - FICTION WRITING

Semester Hours: 3

Practice in writing fiction from conception to revision. Students will read and write contemporary literary fiction. Student work will be commented on and critiqued in regular class workshops. The class culminates in a revision portfolio. Prerequisite: EH 207, EH 208, EH 209, EH 210 or EH 242.

EH 411 - POETRY WRITING

Semester Hours: 3

Practice in writing poetry from conception to revision. Students will read and write contemporary poetry. Student work will be commented on and critiqued in regular class workshops. The class culminates in a revision portfolio. Prerequisite: EH 207, EH 208, EH 209, EH 210 or EH 242.

EH 412 - SPEC STUDIES CREATIVE WRITING

Semester Hours: 3

Topics in creative writing, professional writing, or other advanced writing announced in advance. Prerequisite: EH 207, EH 208, EH 209, EH 210 or EH 242.

EH 413 - CHILDREN'S & ADOLESCENT LIT

Semester Hours: 3

Course content will include the study of various genres of children's and adolescent literature and their relationship to beginning reading, enhancement of reading comprehension, and intervention instruction in the various content areas. Prerequisite: EH 207 and 208 OR EH 209 and 210.

EH 414 - CREATIVE NONFICTION WRITING

Semester Hours: 3

This composition class introduces students to the genre of creative non-fiction via revising, peer responding, prose modeling, and conferencing; and developing expertise in rhetorical writing concepts. Prerequisite: EH 207 and 208 OR EH 209 and 210.

EH 415 - ANGLOPHONE/POSTCOLONIAL LIT

Semester Hours: 3

An introduction to major concepts, figures, and works with emphasis upon historical and cultural context. Specific focus will vary. Prerequisite: EH 207, EH 208, EH 209, EH 210 or EH 242.

EH 418 - REP TEXTS-WOMEN WRITERS

Semester Hours: 3

Focus on women's contribution to the literary tradition. Prerequisite: EH 207, EH 208, EH 209, EH 210 or EH 242.

EH 420 - WRITING FOR TECH PROFESSIONALS

Semester Hours: 3

Teaches students in disciplines such as science, engineering, nursing, and user experience to improve their writing skills and produce important academic and professional documents. Junior Standing required.

EH 422 - STUDIES IN THE NOVEL

Semester Hours: 3

Focuses on varying topics in the novel with special attention to form. Texts may be drawn from diverse national and cultural origins. Prerequisite: EH 207 and 208 OR EH 209 and 210.

EH 423 - CONTEMPORARY BRITISH LITERATURE

Semester Hours: 3

Major works after 1945 with emphasis on historical and cultural contexts. Specific focus will vary. Prerequisite: EH 207, EH 208, EH 209, EH 210 or EH 242.

EH 424 - POETRY AND POETICS

Semester Hours: 3

An attempt to answer (at least provisionally) the questions 'What is a poem?' and 'What is poetry?'. How to read a poem closely and carefully, with attention to theory, history of genres, and especially the technical aspects of poetry. Prerequisite: EH 207 and 208 OR EH 209 and 210.

EH 425 - LITERATURE, SCIENCE & TECH

Semester Hours: 3

Considers the relationships among literature, scientific theories, and technological practices through a study of texts from ancient times to the present. Prerequisite: EH 207, EH 208, EH 209, EH 210 or EH 242.

EH 429 - STUDIES IN AMERICAN CINEMA

Semester Hours: 3

Focuses on select topics in American cinema with an emphasis on film history, technique, aesthetics, and cultural context. Prerequisite: EH 207 and 208 OR EH 209 and 210.

EH 430 - THE AMERICAN NOVEL

Semester Hours: 3

The American novel. In alternate years the course may focus on 19th or 20th century American novels. Prerequisite: EH 207, EH 208, EH 209, EH 210 or EH 242.

EH 432 - AMERICAN LITERARY MODERNISM

Semester Hours: 3

Major writers and cultural/historical events surrounding American Modernism, with a focus on long texts and shorter forays into the major poets. Prerequisite: EH 207, EH 208, EH 209, EH 210 or EH 242.

EH 433 - WILLIAM FAULKNER

Semester Hours: 3

Critical study of the major novels. Prerequisite: EH 207, EH 208, EH 209, EH 210 or EH 242.

EH 434 - SCIENCE FICTION

Semester Hours: 3

Selected short stories and novels, exploring the thematic and narrative concerns of both classic and contemporary science fiction. In alternate years, the course may focus on a specific problem or concern in science fiction. Prerequisite: EH 207 and 208 OR EH 209 and 210.

EH 435 - SPECIAL STUDIES AMERICAN LIT

Semester Hours: 3

Topics announced in advance. Prerequisite: EH 207, EH 208, EH 209, EH 210 or EH 242.

EH 437 - THE AMERICAN NINETEENTH CENTURY

Semester Hours: 3

This class will investigate Anglophone cultural expression and literary critical traditions associated with long nineteenth century (1789-1919). Specific thematic concern or period of focus is left to the discretion of the instructor. Prerequisite: EH 207 and 208 OR EH 209 and 210.

EH 438 - AFRICAN AMERICAN LITERATURE

Semester Hours: 3

Themes, concepts and imagery in the Black American literary tradition. Prerequisite: EH 207, EH 208, EH 209, EH 210 or EH 242.

EH 439 - ETHNIC AMERICAN NOVEL

Semester Hours: 3

Race, ethnicity, and the 20th-century American Novel. Prerequisite: EH 207, EH 208, EH 209, EH 210 or EH 242.

EH 440 - SPECIAL TOPICS ENGLISH STUDIES

Semester Hours: 3

Topics announced in advance. Prerequisite: EH 207, EH 208, EH 209, EH 210 or EH 242.

EH 442 - USABILITY STUDIES

Semester Hours: 3

Introduces students to theory and practice of usability, which involves designing useful, easy-to-use websites, software, and products. The course involves group projects conducting real-world usability testing. Junior Standing required.

EH 448 - THE BIBLE AS LITERATURE

Semester Hours: 3

An introduction to the major literary forms of the Bible. Material will be approached analytically, involving both socio-historical and literary-critical perspectives. Prerequisite: EH 207, EH 208, EH 209, EH 210 or EH 242.

EH 450 - CHAUCER

Semester Hours: 3

A study of Geoffrey Chaucer's Middle English works including the early drama visions, Troilus and Criseyde, and the Canterbury Tales. Prerequisite: EH 207, EH 208, EH 209, EH 210 or EH 242.

EH 451 - ARTHURIAN ROMANCE

Semester Hours: 3

A study of Arthurian Literature focused on medieval Welsh, Scottish, English, and French poetry and prose, as well as early-modern and modern adaptations of Arthurian stories in poetry, prose, drama, and film. Prerequisite: EH 207, EH 208, EH 209, EH 210 or EH 242.

EH 452 - USER CENTERED DESIGN

Semester Hours: 3

Introduces students to user-centered design principles that inform the practice of user experience design. Students will use visual thinking as they complete contextual inquiries and mapping exercises.

EH 454 - NEW MEDIA WRITING & RHETORIC

Semester Hours: 3

This course teaches students to apply rhetorical principles across a variety of media and includes an examination of communication strategies used widely in academic and industry settings. The course focuses on new media through an exploration of digital technologies and the way digital culture and new media have dramatically impacted reading, writing, and research practices. Prerequisites: EH 101 and EH 102.

EH 460 - SIXTEENTH-CENTURY LITERATURE

Semester Hours: 3

Selected works from the reigns of Henry VIII and Elizabeth I Close readings of texts in their historical, intellectual, and social contexts. Prerequisite: EH 207, EH 208, EH 209, EH 210 or EH 242.

EH 461 - SHAKESPEARE I

Semester Hours: 3

Introduction to Shakespeare's canon, selected from tragedies, comedies, histories, romances; the course may include a variety of critical approaches (historical, political, feminist, queer, performative, linguistic, and cultural). Prerequisite: EH 207 and 208 OR EH 209 and 210.

EH 462 - SHAKESPEARE II

Semester Hours: 3

Specialized study of Shakespeare's works, with particular attention to a given genre, time period, theme, cultural context, and/or critical/theoretical approach. Prerequisite: EH 207 and 208 OR EH 209 and 210.

EH 463 - CAPSTONE IN WRITING

Semester Hour: 1

A senior capstone course for the Writing BA for which students will complete a portfolio of their writing. Portfolios will include reflection on and revision to selected samples of course-participants' writing and a scholarly project completed for the capstone course. Prerequisites: EH 260.

EH 465 - DRAMATIC LITERATURE

Semester Hours: 3

Studies in Drama and interpretive strategies for reading plays. May be organized nationally, by genre, or by theme/topic. Prerequisite: EH 207 and 208 OR EH 209 and 210.

EH 470 - MILTON

Semester Hours: 3

A study of the development of Milton's thought and art as it appears in his early poems, selected prose, and later poetry, with particular attention given to Paradise Lost. Prerequisite: EH 207, EH 208, EH 209, EH 210 or EH 242.

EH 473 - EARLY MODERN LITERATURE

Semester Hours: 3

This course will examine a particular theme, issue and/or debate within the early modern period, roughly 1500-1700: constructions of subjectivity and community, the exploration of the New World, the rediscovery of the natural world through scientific investigation. The course will likely introduce modern scholarship. Prerequisite: EH 207, EH 208, EH 209, EH 210 or EH 242.

EH 475 - RHETORIC AND WRITING

Semester Hours: 3

Provides a focused look at specific issues of rhetoric in society, with an emphasis on academic analysis and rhetorical strategy.

EH 480 - THE LONG EIGHTEENTH CENTURY

Semester Hours: 3

Introduction to major works from the Restoration through the American and French Revolutions, 1680-1800, with an emphasis on Britain and the colonies. Topics may include: the rise of the novel, the rise of the lyric, consciousness of modernity, satire, book history, working-class writers, female authorship, empire. Prerequisite: EH 207 and 208 OR EH 209 and 210.

EH 485 - THE ENLIGHTENMENT

Semester Hours: 3

The European Enlightenment emphasized the importance of reasoned, open-eyed investigations into nature and human society. Its legacies include the scientific method, the valuation of universal human rights, and the American and French Revolutions. Authors may include: Bacon, Behn, Hume, Swift, Voltaire, Montagu, Franklin, Jefferson, Equiano, and Wollstonecraft. Prerequisite: EH 207, EH 208, EH 209, EH 210 or EH 242.

EH 498 - INDEPENDENT STUDY

Semester Hours: 3

Individual investigation into significant issues in linguistics, literature, technical communication, or composition studies under direct supervision of instructor. Prerequisites: Written approval by the instructor and the department chair of a project prospectus. Junior or Senior standing.

EH 499 - SENIOR RESEARCH PROJECT

Semester Hours: 3

Required: special approval from chair and instructor.

English Linguistics (EHL)

EHL 301 - TECH WRTG FOR GRAD STUDENTS

Semester Hours: 3

Practical writing, especially technical or scientific reports and proposals, with emphasis on organization, research, and presentation. Designed to address the specific needs of nonnative speakers of English who are developing their skills in written discourse. Prerequisite: ESL 103.

EHL 405 - SUR GEN LINGUISTICS:APP ENG I

Semester Hours: 3

Come to see the strange in familiar as you engage in the study of the system of language through focused analysis of the components of English. Language is usually the lens through which we observe and report on the world. In this course, it becomes the object of observations and discussion.

EHL 406 - CRITICAL ISSUES

Semester Hours: 3

Come to an understanding of the complex of policies, legislation, and practice that impact the progress of English Learners in elementary and secondary schools across the U.S. Understand the impact of federal, state, and local policies on classroom settings and teacher-student interactions.

EHL 407 - ADV EH GRAM:APP LINGUISTICS II

Semester Hours: 3

Through an in-depth analysis of the structure of sentences and discourse in contemporary English, you will understand more clearly the impact of the choices we make in the language we use in day-to-day conversations, instructional settings, political discourse, and beyond.

EHL 409 - SPEC STUDIES: APPL LINGUISTICS

Semester Hours: 3

Special topics in linguistics. Focus and emphasis of topics announced in advance.

Finance (FIN)

FIN 100 - PERSONAL FINANCIAL PLANNING

Semester Hours: 3

An introduction to the study of personal money management. Topics include budgeting, home ownership, insurance, investing, and retirement planning. Cannot be used by finance majors as an elective in the major.

FIN 230 - FINANCE ACADEMY I

Semester Hour: 1

Designed to enhance the learning experience for students majoring in finance, economics, and accounting. Students get a 'jump-start' on learning and applying basic finance knowledge and skills, including Excel spreadsheets. Also includes activities designed to develop 'soft skills' such as professionalism, speaking, and working in teams/groups. Students begin to manage an actual investment portfolio.

FIN 301 - PRINCIPLES OF FINANCE

Semester Hours: 3

A study of the basic principles of modern finance: financial statement analysis, time value of money, security valuation, risk and return, capital investment, cost of capital, and international finance. Prerequisites: ECN 143, and either ACC 210 or ACC 212 and either MSC 287 or SOC 303 or PY 300 or MA 385 or ISE 390.

FIN 330 - FINANCE ACADEMY II

Semester Hour: 1

A continuation of FIN 230. Students learn and apply the tools and knowledge to begin analyzing companies for investment; including TVM, ratio analysis, equity investment fundamentals, and more advanced Excel techniques. Emphasis is placed on individual stock analysis and students propose stocks for the Chan Fund. Prerequisite: FIN 230.

FIN 352 - MONEY & BANKING

Semester Hours: 3

Organization, operation, and economic significance of monetary and banking systems. Fractional reserve banking systems, money creation, the Federal Reserve System, U.S. financial intermediaries, introduction to monetary theory and international finance. Prerequisites: ECN 143.

FIN 370 - COMMERCIAL BANK MANAGEMENT

Semester Hours: 3

A study of the financial management of commercial banks emphasizing both current events and principles of sound management. Topics range from measuring bank performance, asset and liability management, risk management, and international banking.

FIN 375 - FINANCIAL INSTITUTIONS

Semester Hours: 3

Role and activities of financial intermediaries as they affect flow of funds and capital formation money markets, in which these institutions operate.

FIN 378 - INTERMEDIATE CORPORATE FINANCE

Semester Hours: 3

Financial theory as it relates to long-term and short-term financial planning, capital investment decisions, and capital structure policy decisions. Prerequisites: FIN 301.

FIN 400 - INVESTMENT PRACTICUM

Semester Hours: 4

Small number of students work closely with finance faculty in the UAH Capital Management Group (CMG) to manage actual investment portfolios. Emphasis is placed on individual stock selection and management of the portfolio to meet objectives. Prerequisites: FIN 460 or permission of instructor.

FIN 430 - FINANCE ACADEMY III

Semester Hour: 1

A continuation of FIN 330. Emphasis is on the management of the Chan Fund. Students learn different aspects of the portfolio management process, and serve as the portfolio manager for the Chan Fund. Prerequisite: FIN 330.

FIN 431 - ADVANCED CORPORATE FINANCE

Semester Hours: 3

Financial principles applied to financial management problems such as cash management; payables and receivables management; cost of short-term credit; and forecasting and financial planning. Prerequisites: FIN 378.

FIN 454 - INTERNATIONAL FINANCE

Semester Hours: 3

An introduction to international finance for tomorrow's global business leaders, with a focus on the financial management dimensions of leading a multinational enterprise. Prerequisites: FIN 301.

FIN 460 - INVESTMENTS

Semester Hours: 3

A study of standard investment securities, as well as an overall view of the investment process. Securities covered include equities, fixed income, options, futures and mutual funds. Associated topics include financial markets, valuation models, and fundamental portfolio theory. Prerequisites: FIN 301.

FIN 461 - PORTFOLIO MANAGEMENT

Semester Hours: 3

A continuation of FIN 460 with an emphasis on the application of investment portfolio management. An understanding of the functional areas of portfolio management is stressed, including investment policy, investment strategy, portfolio construction, performance evaluation, and portfolio protection. Prerequisites: FIN 460.

FIN 490 - SPECIAL PROJECTS

Semester Hours: 3

Independent study in an area of interest to the student in the field of finance. Approval of department chair is required.

FIN 495 - INTERNSHIP IN FINANCE

Semester Hours: 1-3

Active involvement in a business enterprise, professional organization, or government agency that has particular interest and relevance to the student. Course grade will be given on a satisfactory (S)/unsatisfactory (U) basis. Subject to College's guidelines on internships.

Global Studies (GS)

GS 199 - STUDY ABROAD

Semester Hours: 1-3

Course will involve travel to selected countries for academic study purposes. The course is open to all UAH students with permission of the instructor. May be repeated for credit when the content of the course differs.

GS 200 - GLOBAL SYSTEMS AND CULTURES

Semester Hours: 3

A multidisciplinary introduction to global studies through a focus on cultural, economic, political, and historical dimensions of interactions among world nations and cultures.

GS 299 - ST: GLOBAL STUDIES ABROAD

Semester Hours: 1-3

Course will involve travel to selected countries for academic study purposes. The course is open to all UAH students with permission of the instructor. May be repeated for credit when the content of the course differs.

GS 399 - STUDY ABROAD

Semester Hours: 1-3

Course will involve travel to selected countries for academic study purposes. The course is open to all UAH students with permission of the instructor. May be repeated for credit when the content of the course differs.

GS 400 - GLOBAL STUDIES CAPSTONE

Semester Hours: 3

Capstone independent study for students completing the Global Studies minor. Students complete a portfolio essay assignment and essays connected to the program's core competencies. Prerequisite: GS 200, its equivalent, or approval of instructor. Offered as needed as independent study to students in final semester of study.

GS 450 - GLOBAL PROFESSIONAL PORTFOLIO

Semester Hour: 1

This course serves as the capstone learning experience for students completing the Global Professional Pathways Certificate program. Students will complete the Global Professional Pathways Portfolio in which they reflect on and assess their foreign language study and experience abroad and how these learning experiences have helped them prepare for a global career in their field.

GS 499 - SELECTED TOPICS IN GLOBAL STU

Semester Hours: 1-3

Selected topics in Global Studies. Course may also take place abroad as part of a study abroad program. May be repeated for credit with permission of Global Studies Program director.

Health & Physical Education (HPE)

HPE 100 - AEROBICS

Semester Hours: 2

Improve cardiovascular fitness, flexibility, muscular strength and endurance, balance, and postural alignment. This class will focus on aerobic activity, specifically in the form of low- and high- impact aerobics. A wide variety of exercises will be included to provide a total-body workout.

HPE 105 - CARDIO DANCE

Semester Hours: 1-2

HPE 109 - SPEED & PLYOMETRIC TRAINING

Semester Hours: 2

HPE 110 - WALK/JOG/RUN

Semester Hour: 1

A beginner and intermediate level course with emphasis placed on giving a positive introduction to walking, jogging, and running as a way to enhance fitness and promote weight control, and to provide a viable option for a lifetime fitness activity.

HPE 111 - BUTTS & GUTS WORKOUT

Semester Hours: 2

HPE 117 - WEIGHT TRAINING

Semester Hours: 2

Learn to safely and efficiently use strength training techniques to reach your fitness goals. Develop the skills needed to create a personalized weight training program.

HPE 120 - SWIMMING

Semester Hour: 1

Learn the basic or progress in your swimming by learning the common swim strokes and techniques. Introduction to conditioning and training and work toward improving skills and endurance bringing higher efficiency in the water.

HPE 127 - LADIES SELF-DEFENSE

Semester Hour: 1

Explore the concepts, strategies, and methods of self defense. Topics and skills include wrist escapes, falling skills, various strikes and kicks, groundwork, weaponry, and escape tactics. Further, an emphasis will be placed on developing and improving situational awareness.

HPE 129 - KUNG FU

Semester Hours: 2

Kung Fu has become one of the most popular forms of martial arts. Students will be introduced to Sil Lum Tao, the first in the three forms of Wing Chun Kung Fu. The name means 'little imagination' and refers to the need of the student to use their imagination in the practice and application of techniques.

HPE 130 - KARATE

Semester Hours: 2

Learn karate techniques and acquire skills required to perform these techniques. The objective of Karate is to teach the student defensive skills through various stances and self-defense techniques.

HPE 133 - AIKIDO

Semester Hour: 1

HPE 134 - T'AI CHI

Semester Hours: 2

Learn an ancient Chinese exercise and martial art which is used to develop one's internal energy, health and well-being. The 37 postures of the short form in the Yang style will be executed.

HPE 135 - INTERMEDIATE T'AI CHI

Semester Hours: 2

HPE 136 - YOGA

Semester Hour: 1

HPE 137 - JUDO/JUJITSU

Semester Hours: 2

Judo/Jujitsu provides students with an introduction to the Japanese martial arts of Judo and Jujitsu. Focus will be on both the competition aspect of Judo and the self-defense aspects of each art including throws, take-downs, joint manipulation and chokes.

HPE 140 - BALLROOM DANCE

Semester Hours: 2

An introduction to the most popular smooth and rhythm ballroom patterns danced in America including the Waltz, Fox Trot, Tango, Cha-Cha, Rumba, Samba, Merengue, Bolero, Polka, Swing, and Mambo. Learn the appropriate skills necessary to become a social dancer, including leading, following etiquette and partner dancing.

HPE 142 - SWING DANCE

Semester Hours: 2

HPE 144 - COUNTRY WESTERN DANCE

Semester Hour: 1

HPE 150 - RACQUETBALL

Semester Hours: 2

Learn the basic of racquetball, including rules, equipment and skills. Singles (2 players), Cut throat (3 players) and Doubles (4 players) versions of racquetball will be taught. Double games during class times will be played when both safety and skill level of the players are acceptable to the instructor.

HPE 153 - TENNIS

Semester Hour: 1

Students will learn the fundamentals of tennis including forehand, backhand, serve, volley, footwork, and ground strokes. There will be both singles and doubles play and a class tournament. Highlights include understanding the rules, regulations and strategies of the game.

HPE 156 - GOLF

Semester Hour: 1

Students will understand and learn the basic skills of golf, including rules, proper stance, grip and swing for all clubs. Clubs are available if needed.

HPE 167 - ROCK CLIMBING

Semester Hours: 2

\$100 fee to be paid directly to Rock Climbing facility.

HPE 169 - BASKETBALL

Semester Hour: 1

HPE 170 - VOLLEYBALL

Semester Hour: 1

Learn the fundamentals skills of volleyball including passing, setting, hitting, blocking, and serving with advanced skills in spikes and positioning also being covered. Scrimmage games will be played to practice learned skills. This course will cover the rules of volleyball and its advantage as a lifetime sport, with a focus on skill development.

HPE 174 - BILLIARDS

Semester Hour: 1

HPE 199 - SP TOP:HLTH & PHYS ED

Semester Hours: 1-3

HPE 221 - ADVANCED SCUBA

Semester Hour: 1

Presents skills and knowledge for deep diving (80 + feet). Limited visibility diving, and advanced navigation techniques. Earn YMCA advanced open water certification. Students must provide mask, fins, and snorkel. Cost of open water dives not included in lab fee.

HPE 223 - LIFEGUARD TRAINING

Semester Hours: 2

Certification as a Red Cross approved lifeguard upon successful completion of classroom and in-water instruction and testing.

HPE 224 - WATER SAFETY INSTRUCTOR

Semester Hours: 3

Techniques for teaching infant and pre-school aquatics. The American Red Cross Learn to Swim Program, and Basic Water and Emergency Water Safety courses. Includes pre-test and instructor candidate training course.

HPE 231 - INSTR AIRPLANE(IFR)RATING GR S

Semester Hours: 3

Provides student with knowledge needed for instrument flight instruction air training. Prepares student for FAA Instrument Flying Examination.

HPE 400 - SPECIAL TOPICS - INTERNSHIP

Semester Hours: 3

Innovative internship focused on working with students with disabilities. Observations, participation, and direct instruction and teaching in a middle or high school setting for a prescribed time.

History (HY)

HY 103 - WORLD HISTORY TO 1500

Semester Hours: 3

Explore the historical development of peoples and cultures from their beginnings to 1500. Trace cross-cultural interactions among societies, states, and economies of Asia, Europe, Africa, the Americas and Oceania.

HY 104 - WORLD HISTORY SINCE 1500

Semester Hours: 3

Explore global interdependence from the period of transoceanic exploration to the present. Trace cross-cultural interactions among societies, states, and economies of Asia, Europe, Africa, the Americas, and Oceania.

HY 221 - UNITED STATES TO 1877

Semester Hours: 3

Discovery of America through the Civil War and Reconstruction. Open to all students other than beginning freshmen, with exceptions as indicated.

HY 222 - UNITED STATES SINCE 1877

Semester Hours: 3

United States from the end of the Civil War era to the present. Open to all students other than beginning freshmen, with exceptions as indicated.

HY 300 - CRAFT OF HISTORY

Semester Hours: 3

Introduction to historical methods and thought, designed to prepare history majors for upper-level coursework. Required of all history majors, including transfer students. Open to non-history majors. Prerequisites: HY 103 and HY 104.

HY 306 - COLLAPSE OF CIVILIZATIONS

Semester Hours: 3

This course will investigate why some cultures succeed and others fail.

HY 310 - INTRODUCTION TO PUBLIC HISTORY

Semester Hours: 3

Introduces the interdisciplinary field of public history, including historic preservation, cultural resource management, local and state history, methodology, historical archaeology, museum studies, oral history, and archival management through academic training and practical experience.

HY 311 - HISTORIC ARCHAEOLOGY

Semester Hours: 3

Introduces intellectual and practical concepts using elements of research, fieldwork, analysis, and interpretation to explore and recreate the documented and undocumented past.

HY 312 - CULTURAL RESOURCE MANAGEMENT

Semester Hours: 3

Cultural resource management encompasses recognition description, maintenance, security, and overall management of historical items, places, and ideas through preservation and protection.

HY 318 - CONSTITUTIONAL HY OF THE U.S.

Semester Hours: 3

Growth and development of the American constitutional system with emphasis on those aspects, which relate to the fundamental structure of American government and social order.

HY 325 - HISTORY OF ALABAMA

Semester Hours: 3

The state's past from colonial times to the present with emphasis on its place in United States history.

HY 329 - IMPERIAL ROME

Semester Hours: 3

Roman Empire from the Principate to the barbarian invasions.

HY 331 - WORLD OF MIDDLE AGES

Semester Hours: 3

Survey of the origins and development of medieval society in Europe from the fall of Rome to the Age of Discovery, including the Latin West, Byzantium, and Islamic world.

HY 360 - AMERICAN HISTORY THROUGH FILM

Semester Hours: 3

This course will explore how motion pictures have shaped our views on American history and how the past has shaped movie making.

HY 363 - INDIGENOUS PEOPLES OF AMERICAS

Semester Hours: 3

Surveys the history of Indigenous peoples of the Americas from the fifteenth century to the present.

HY 367 - WOMEN IN U.S. HISTORY

Semester Hours: 3

Women in the United States from the colonial period to the present.

HY 368 - AMERICAN ENVIRONMENTAL HISTORY

Semester Hours: 3

Explores the interrelationship of people and the environment in American history from 1500 to the present.

HY 370 - TECHNOLOGY IN AMERICAN HISTORY

Semester Hours: 3

Explores the history of the interrelationship of people and technology in American history from 1600 to the present.

HY 371 - US MILITARY HY FRM INDP TO PRS

Semester Hours: 3

Explores the evolution of the U.S. military from the War of Independence to the present.

HY 373 - FOREIGN REL US TO 1920

Semester Hours: 3

American foreign relations from the Revolutionary era through World War I. American territorial and commercial expansion, imperialism, and emergence as a world power.

HY 381 - COLONIAL LATIN AMERICA

Semester Hours: 3

This course surveys the history of Colonial Latin America from the Hispanic period to the wars of independence in the nineteenth century.

HY 382 - MODERN LATIN AMERICAN

Semester Hours: 3

This course surveys the history of Latin America from the nineteenth century to the present.

HY 383 - FOOD AND WORLD HISTORY

Semester Hours: 3

Examines the role of food and drink in various historical settings.

HY 384 - ISLAMIC WORLD TO 1800

Semester Hours: 3

This course explores how Islam emerged as a civilization and connected geographic areas across the globe. Topics include: the prophet Muhammad; early Arab conquests; the Sunni-Shiite split; the expansion of the Islamic world into Europe, Africa, and Asia; and the challenge of European imperialism.

HY 385 - MODERN MIDDLE EAST

Semester Hours: 3

This course seeks to establish a historical basis for understanding the current events of the modern Middle East (1800-present). Topics include: the making of the modern Middle East both before and after WWI; the Arab-Israeli conflict; and the relationship between the U.S. and the Middle East.

HY 390 - WOMEN IN MODERN EUROPEAN HIS

Semester Hours: 3

Explores European women's history from the Enlightenment to the present. Focus on gender and women's roles in different historical contexts.

HY 391 - EUROPE, 1500-1815

Semester Hours: 3

Examination of the economic, scientific, social, political, and cultural developments in Europe from the Renaissance to the French Revolution.

HY 392 - EUROPE SINCE 1815

Semester Hours: 3

Europe from the French Revolution to the present.

HY 399 - SPECIAL TOPIC IN HISTORY

Semester Hours: 3

Intensive examination of particular problems, periods, or topics in history.

HY 401 - DAILY LIFE IN ANCIENT ROME

Semester Hours: 3

This course will re-create the daily lives of the ancient Romans using secondary readings, ancient literature, archaeology, and film. It focuses on the lives of ordinary people, with an eye to their struggles, everyday practices, beliefs, values, and mentalities.

HY 410 - SPEC TOPICS IN PUBLIC HISTORY

Semester Hours: 3

Intensive examination of a particular problem, aspect, or methodology in public history.

HY 413 - THE OLD SOUTH

Semester Hours: 3

Southern society, economics, politics and culture concentrating on the nineteenth century South through Reconstruction.

HY 414 - THE NEW SOUTH

Semester Hours: 3

Post-Reconstruction South emphasizing the economic, social, and political readjustments made during the twentieth century. Open to students who have completed 12 semester hours in history or have senior standing or have permission of instructor.

HY 424 - THE ATLANTIC WORLD

Semester Hours: 3

Examines interactions across the Atlantic Ocean among Africans, Americans, and Europeans. This course meets the requirements for either American or non-American credit in the history major.

HY 426 - COLONIAL AMERICA

Semester Hours: 3

Explores the founding of New World colonies, including political, social, economic, and religious developments during the colonial period.

HY 427 - AGE OF AMERICAN REVOLUTI

Semester Hours: 3

Explores the multinational connections and conflicts that lead some English colonists to revolt. Considers the political, social, and economic aspects of the time period.

HY 428 - EARLY AMERICAN REPUBLIC

Semester Hours: 3

Political, social, and economic changes between the American Revolution and the nineteenth century that laid the foundation for the United States.

HY 429 - CIVIL WAR & RECONSTRUCTION

Semester Hours: 3

An examination of the major political, economic, and social developments in the United States during the Civil War and Reconstruction eras.

HY 437 - THE RISE OF MODERN AMER

Semester Hours: 3

Economic and social changes, imperialism, and the growth in government in the United States from 1877 to the 1920s.

HY 438 - MODERN AMERICA

Semester Hours: 3

American society, politics, economics, and foreign affairs from the end of World War I to the origins of the Cold War.

HY 439 - RECENT AMERICAN HISTORY

Semester Hours: 3

Contemporary America from the 1950s to the present, analyzing both domestic and foreign affairs.

HY 440 - FOREIGN REL U.S. SINCE 1920

Semester Hours: 3

United States as a world power. American involvement in World War II, Vietnam, and the Cold War, and the growth of American presence in Asia, Latin America, and the Middle East.

HY 445 - COMPTVE MILITARY PLCY & STRAT

Semester Hours: 3

A comparative analysis of the military policy and strategy of states and empires in World History.

HY 451 - SCIENCE & RELIGION IN HISTORY

Semester Hours: 3

Integrated survey of the history of science and religion in mostly Western contexts from Greek. Antiquity to present debates. Prerequisites: HY 300.

HY 472 - US MILITARY HISTORY SINCE 1920

Semester Hours: 3

The evolution United States armed forces from 1920 to the present. The class will enhance understanding of the development and evolution of American strategy, doctrine, and operational issues.

HY 473 - U.S.-LATIN AMERICAN RELATIONS

Semester Hours: 3

This class focuses on the history of political, economic, and cultural interactions between Latin America and the United States from 1800 to the present. Topics include military intervention, trade, cultural exchanges, the Cold War, the drug war, and immigration.

HY 474 - RENAISSANCE & REFORMATION

Semester Hours: 3

Selected topics in the Italian Renaissance and European Reformation.

HY 475 - SECTARIANISM ISLAMIC WORLD

Semester Hours: 3

This course focuses on sectarianism, the practice and rhetoric surrounding marginalization of certain social-religious groups in the Islamic world. It explores the historical foundations of sectarianism (from early 7th century to today) both within the Islamic world and across the globe.

HY 476 - BEING YOUNG MODERN MIDDLE EAST

Semester Hours: 3

This course focuses on the lives of young men and women of the Modern Middle East. It explores how children and youth experienced historical phenomena in the region, the ways in which these experiences affected the foundations of their adulthood, and how their actions shaped historical events.

HY 480 - ROMANS&BARBARIANS LATE ANTIQTY

Semester Hours: 3

This course explores the dynamic world of Late Antiquity including political developments, social and religious transformation, and exchange patterns in the Mediterranean. It is a history of cultural interaction, continuity, and change during a formative period in western civilization.

HY 481 - EMPIRES AND NATIONS

Semester Hours: 3

Thematic focus on empires and nations as political and cultural constructs in European and world history. Students may take HY 481 more than once for credit ONLY IF 1) a different instructor teaches each offering, and 2) the temporal and/or geographic focus is distinct each time.

HY 482 - COMPTV SLAVERY & ABOLITION

Semester Hours: 3

Explore what slavery has meant in the ancient world, Indian Ocean, Africa, the United States, and/or other locations over time.

HY 483 - WOMEN & GENDER LATIN AMERICA

Semester Hours: 3

This course studies the history of women and gender relations in Latin America from the colonial period to the present.

HY 484 - LATIN AMERICAN HIST THRU FILM

Semester Hours: 3

Latin American history through the perspective of fictional films.

HY 485 - NAZI GERMANY AND THE HOLOCAUST

Semester Hours: 3

Seminar course on the historiography of Nazi Germany and the Holocaust.

HY 486 - COMMUNISM LEGCY RUSSIA EAST EU

Semester Hours: 3

Overview and analysis of communist states and post-communist legacies in Russia and Eastern Europe.

HY 490 - RESEARCH SEMINAR IN HY

Semester Hours: 3

Research and writing with primary sources and historiography. Required of all history majors. Prerequisites: HY 300. Offered once annually.

HY 492 - PUB MEMORY & INTERP

Semester Hours: 3

Examines how public memory is created by looking at the social, political, and economic forces that shape public history and considers how historical knowledge is conveyed to the public. Prerequisites: 6 hours in History or Instructor's Permission.

HY 493 - FUNDAMENTALS OF ARCHIVES

Semester Hours: 3

Survey of basic archival theory and practice, with emphasis on the role of the archivist in contemporary society.

HY 494 - DEVELOPING DIGITAL ARCHIVES

Semester Hours: 3

Survey of the theory and practice of developing digital access tools in archives, libraries, and museums.

HY 495 - PUBLIC HISTORY INTERNSHIP

Semester Hours: 3

A semester-long public history internship for completing a significant project using historical skills as a professional usually in an off-campus setting. Students must complete 125 hours of work during their internship. Permission of instructor or chair is required.

HY 498 - STUDIES IN HISTORY

Semester Hours: 1-3

A readings or research class on a particular problem, period or topic in history. This course may be repeated for credit.

HY 499 - INDEPENDENT STUDY

Semester Hours: 3

In exceptional circumstances, a student and professor may work together on a specialized topic.

Industrial & Systems Engineering (ISE)

ISE 224 - INTRO INDUSTRIAL & SYSTEMS

Semester Hours: 3

Overview of industrial engineering concepts. Includes history and development of classical industrial engineering; documentation and computational methods; basic work methods and measurement; manufacturing systems; and economic decision analysis. Prerequisites: ENG 101.

ISE 299 - ISE MENTORING I

Semester Hours: 0

Yearly mentoring and advising from engineering faculty and staff. Prerequisite w/ concurrency: ISE 224.

ISE 321 - ENGINEERING ECONOMY

Semester Hours: 3

Economic evaluation of engineering alternatives. Interest, time-value of investments, depreciation and income taxes, break-even cost analysis. Sophomore standing.

ISE 324 - WORK DESIGN

Semester Hours: 3

Principles of methods analysis and ergonomics to fit a task and workstation to the human operator including work measurement and tools, work sampling, job analysis, anthropometric data, and workplace design. Laboratory exercises focus on the implementation of lean principles. (Same as PY 324) Prerequisites: ISE 390 or PY 300.

ISE 327 - MANAGEMENT SYSTEMS ANALYSIS

Semester Hours: 3

Formal organization structures and functions. Analysis of organization planning leading toward the accomplishment of goals. Techniques for making decisions within formal organizations, together with ethical constraints. Emphasis on technical writing. Prerequisite: ISE 390.

ISE 328 - INTRO SYSTEMS ENGINEERING

Semester Hours: 3

Development of a systems framework for the design and realization of systems, with emphasis on the conception, design and management of systems in complex environments. Topics include systems concepts, requirements, architecture, evaluation, integration, trades, and object oriented methods and concepts.

ISE 340 - OPERATIONS RESEARCH

Semester Hours: 3

Fundamental methods, models and computational techniques of operations research. Linear programming including transportation, assignment of simplex algorithms. Queuing theory. Prerequisites: ISE 390 and MA 244.

ISE 390 - PROB & ENGR STATISTICS I

Semester Hours: 3

Engineering uses of probability, discrete and continuous probability distributions including the binomial, Poisson, hypergeometric, normal, uniform, lognormal, and exponential distributions. Statistical sampling, distributions of means, variances, and proportions. Hypothesis testing and confidence intervals. Prerequisite: MA 201.

ISE 391 - PROB/ENGR STAT II

Semester Hours: 3

Continuation of ISE 390 with regression analysis, analytics of variance, and nonparametric statistics. Introduction to design of engineering experiments, and computer-based solution of large-scale problems. Prerequisite: ISE 390.

ISE 399 - ISE MENTORING II

Semester Hours: 0

Yearly mentoring and advising from engineering faculty and staff. Prerequisites: ISE 299 and ISE 391.

ISE 402 - INDUSTRIAL & ORGANIZA PSY

Semester Hours: 3

Application of basic principles of learning, motivation, and perception to typical industrial and organizational problems. Senior standing. (Same as PY 402/502).

ISE 403 - HUMAN FACTORS PSYCHOLOGY

Semester Hours: 3

Study of human performance in human-technology-environment systems. Consideration of human capabilities and limitations as related to controls and displays, and the role of human cognition in decision-making and training effectiveness. Senior standing. (Same as PY 403/503).

ISE 423 - INTR STATISTICAL QUALITY CONTR

Semester Hours: 3

Introduces statistical theory and techniques to control quality of manufacturing products. Provides a solid foundation in Statistical Quality Control. The Six Sigma methodology is also introduced in this course. Students can take the certification exam to earn Green Belt in Six Sigma. Prerequisite: ISE 391.

ISE 426 - DSGN & ANALY OF EXPERIM

Semester Hours: 3

Advanced topics in statistical experiments with emphasis on the design aspect. Factorial designs, including fractional replication and confounding. Includes computer laboratory exercises. (Same as ISE 526). Prerequisite: ISE 391.

ISE 428 - SYSTEMS ANALYSIS & DESIGN I

Semester Hours: 3

Philosophy and methods of industrial and non-industrial systems analysis and design. Methods of systems definition, analysis, simplification, evaluation, and optimization. Design project required. Ethics and technical writing are emphasized. Senior Standing. Prerequisites: ISE 124, ISE 321, ISE 340, ISE 391, and ISE 399.

ISE 429 - SYS ANALYSIS/DESIGN II

Semester Hours: 3

Continuation of design project begun in ISE 428. Prerequisite: ISE 428.

ISE 430 - MANUF SYS & FACILITIES DESIGN

Semester Hours: 3

Modern manufacturing systems design with emphasis on facility location and plant layout. Includes classical systems, just-in-time systems, principles of integrated manufacturing systems design, and an analysis of process flow and productivity, and available space to determine facility layout. (Same as ISE 530).

ISE 433 - PROD & INVENTORY CONTROL SYS

Semester Hours: 3

Inventory models including classical optimal economic order quantity models, manufacturing resource planning systems, production scheduling, material requirements, and purchase order control. Emphasis on manufacturing system revisions, continuous process improvement, and implementation of lean principles. Prerequisite: ISE 390.

ISE 436 - INTRO TO ADDITIVE MFG

Semester Hours: 3

Overview course on additive manufacturing technologies, including 3D printing, prototyping, powder deposition, powder spraying, laminate materials manufacturing, ultrasonic consolidation, and other topics. Focus on design for manufacturing. Prerequisite: CE 211 or MAE 211.

ISE 437 - ELECTRONICS MANUF PROCESSES

Semester Hours: 3

Concepts, facilities, and technology utilized in the manufacture of electronic components and products. Includes printed wiring board fabrication and component mounting methods, automation, quality and reliability, product testing, and economic issues. Senior Standing. (Same as ISE 537).

ISE 439 - SELECTED TOPICS/ISE

Semester Hours: 1-3

ISE 447 - INTRO TO SYSTEMS SIMULATION

Semester Hours: 3

Philosophy and elements of digital, discrete-event simulation. Emphasis on modeling and analysis of stochastic systems, including probabilistic models, output analysis, and the use of simulation software. (Same as ISE 547) Prerequisites: CPE 112 and ISE 391.

ISE 480 - SYSTEMS ENGINEERING MODELING

Semester Hours: 3

The main goal of this course is to teach the student Model Based Systems Engineering (MBSE) fundamentals with application to real-world systems engineering problems. Students will learn (1) core systems engineering concepts and processes; (2) System Modeling Language (SysML) fundamentals and its use to develop and execute system models on a SysML based tool and (3) Architecture and physical model execution, simulation and integration.

Information Systems (IS)

IS 146 - COMPUTER APPL IN BUSINESS

Semester Hours: 3

Study of computer solutions to business problems. Overview of hardware/software systems and of data and information processing in organizations. Extensive use of Microsoft Office and other software for word processing, spreadsheet, presentation, and database applications related to business.

IS 210 - INTRO COMP PROG IN BUS

Semester Hours: 3

Fundamentals of business programming using languages such as Python, PHP, JavaScript, JQuery and HTML5. Prerequisite: IS 146.

IS 301 - INFO SYSTEMS IN ORGANIZATIONS

Semester Hours: 3

Understanding the role of information systems in organizations and how they relate to organizational objectives and organizational structure. Introduce information system applications and the SAP software to illustrate the concepts covered in this course. Prerequisite: IS 146.

IS 310 - ADVANCED PROGRAMMING

Semester Hours: 3

This second level programming course introduces advanced programming concepts with more complex I/O, file and data handling, object oriented programming, testing and quality and maintenance. The course focuses on developing solutions for business problems. Prerequisite: IS 210 or equivalent programming course.

IS 340 - DATABASE MANAGEMENT

Semester Hours: 3

Organizing and managing the data resources of an organization using information technology. The course covers modeling and design of databases for organizations. It will also cover query, reporting and visualization of data for supporting decision making by managers. Students will be introduced to the technologies that support business analytics and basics of analytics.. Prerequisite: IS 301.

IS 351 - ENT & SUPPLY CHAIN MGT SYSTS

Semester Hours: 3

This course emphasizes the importance of integration of processes within an enterprises and across enterprises in a supply chain and the systems used to support these processes. Enterprise systems support the internal logistics chain within a firm integrating processes across all functions. Students will learn about the digital transformation taking pace within the firm and across the firm's supply chain. The course will introduce students to processes and systems that firms use to harness the capabilities of their supply chain partners and supply networks. Prerequisites: IS 301.

IS 401 - CYBERSECURITY PRINCIPLES

Semester Hours: 3

Provides a managerial and technical overview of cybersecurity and introduces students to the complexity of the security issues facing organizations. Presents practices and standards for assessing security risks and managerial and technical approaches to minimize such risks. Prerequisite: IS 301.

IS 412 - SYSTEMS ANALYSIS & DESIGN

Semester Hours: 3

Identifying, analyzing, developing and acquiring information systems are central to the information systems discipline. The course covers identifying, conceptualizing and analyzing business opportunities where information systems applications can add value followed by design, development, and implementation of such applications. Planning for and management of this core IS activity is a critical organizational competence. Prerequisites: IS 301, IS 310, and IS 340.

IS 422 - SUPPLY CHAIN MANAGEMENT SYSTEM

Semester Hours: 3

This course presents the main concepts of supply chain management systems and software including ERP, CRM and SCM systems as well as the underlying technologies and managerial implications. It provides hands-on familiarity with SAP supply chain modules. Prerequisite: IS 301.

IS 450 - CYBERSECURITY MANAGEMENT

Semester Hours: 3

Examines management issues associated with cybersecurity system planning, implementation, control and assurance. Specific emphasis is on security system controls and their evaluation, compliance, governance, security policies, ethical and legal issues, and risk management. Recent developments in IT, such as client-server systems, cloud computing and the Internet, and their impact on policies, laws are also considered. Prerequisite: IS 301.

IS 460 - NETWORKING & IT INFRASTRUCTURE

Semester Hours: 3

An overview of the IT infrastructure in modern organizations. The course starts from basic networking concepts to digital platforms and ecosystems in the market. Prerequisite: IS 301.

IS 463 - DIGITAL FORENSICS

Semester Hours: 3

Provides an introduction to the area of digital forensics. Examines the problems and concerns related to Cybersecurity forensic investigations. Blends traditional investigation methods with classic systems-analysis problem-solving techniques and applies them to computing investigations. This course is lab intensive and students are expected to gain hands-on experience through learning to use various forensic software. Several information security topics nonspecific to forensics will also be covered. Prerequisite: IS 401.

IS 471 - BUSINESS ANALYTICS & AI

Semester Hours: 3

The course covers the use of data analytics to support decision making in organizations and gain insights to support tactics and strategy. In addition to analytics, students will also be introduced to Artificial Intelligence (AI) techniques for analytics. Students will use many Business Analytics tools and gain experience in mining data. The course is designed to develop data-analytic thinking in the era of big data. Prerequisite: IS 301, IS 310 and MSC 288.

IS 477 - NETWORK DEFENSE & SECURITY

Semester Hours: 3

Introduction to network security issues and practical applications. Addresses translation, packet filtering, proxy servers, and firewalls, and Virtual Private Networks. This course assumes familiarity with Internet and basic networking concepts such as TCP/IP, gateways, routers, and Ethernet. Prerequisites: IS 401 and IS 460.

IS 480 - CURRENT TOPICS IN MGT INFO SYS

Semester Hours: 3

Prerequisite: IS 301.

IS 490 - SPECIAL PROJECTS

Semester Hours: 3

IS 491 - IS MANAGEMENT & STRATEGY

Semester Hours: 3

This course emphasizes the integration of various principles, theories, and techniques for implementing, deploying and managing enterprise information systems in organizations to gain strategic and operational advantages. Includes lectures, tours, readings, cases, and the completion of a major project. Normally taken during a student's last semester of studies. Prerequisites: IS 340 and either IS 351 or 460. Prerequisite with concurrency: IS 412.

IS 495 - INTERN IN INFO SYSTEMS

Semester Hours: 1-3

Kinesiology (KIN)

KIN 200 - CONTEMPORARY NUTRITION

Semester Hours: 3

Introduction to the principles of nutrition as they relate to the growth, development, and maintenance of the human body throughout the lifespan. Emphasis is placed on the classes of nutrients, weight management, and nutritional planning.

KIN 205 - FIRST AID & CPR

Semester Hour: 1

Students will focus on recognizing emergency situations. First Aid and CPR also provides skills and knowledge necessary in caring for injuries or sudden illness.

KIN 210 - ATHLC INJURY PREVENTION & CARE

Semester Hours: 3

Presents the knowledge and techniques necessary to prevent and/or care for common athletic injuries. For coaches, athletes, and those working in recreation, physical education, or athletics.

KIN 215 - FIRST RESPONDER/PROFESSN'L CPR

Semester Hours: 2

Learn the concepts and skills needed to function as a First Responder and Professional Rescuer. Emphasis is placed on preparing for, recognizing, and providing emergency care in various situations where needed. Additionally, this course fully addresses the objectives in the U.S. Department of Transportation's National Standards Curriculum.

KIN 240 - HEALTH & WELLNESS CONCEPTS

Semester Hours: 3

This course provides students with an overview of individual and societal health and wellness and the impact of lifestyle choices. Laboratory experiences provide opportunity for assessment of individual health and fitness behaviors. Topics covered include: wellness, physical fitness, behavior modification, weight management, stress management, disease prevention, addictive behavior and sexual health.

KIN 250 - ESSENTIALS OF PERSONAL TRAIN'G

Semester Hours: 2

This course is designed to provide theoretical knowledge and practical skills in preparation for a national certification exam in personal training. Topics include guidelines for instructing safe, effective, and purposeful exercise, essentials of the client-trainer relationship, conducting health and fitness assessments, and designing and implementing appropriate exercise programming.

KIN 260 - FOUNDATIONS OF KINESIOLOGY

Semester Hours: 3

An introductory course for students in the Kinesiology major. The course will provide an overview of the Kinesiology field, including all subdisciplines and an in-depth discussion of teacher v non-teacher career choices. The history and development of physical education, exercise science, and sport studies will be covered, as well as issues and trends in physical education, exercise science, and sport studies.

KIN 265 - INTRO TO SPORT MGMT

Semester Hours: 3

This 3 hour course provides the student with the knowledge of sport management and administration in both athletics and leisure-based sports. Topics include management concepts, roles and responsibilities, fiscal management, fundraising, legal issues, event scheduling, and decision making.

KIN 290 - EX TECHNIQUES & LEADERSHIP

Semester Hours: 3

This course provides a practical guide in leadership for group and individual exercise settings. Critical evaluation of a safe fitness environment, adult physical activity programs to promote health, and exercise techniques according to the American College of Sports Medicine and National Strength and Conditioning Association are included.

KIN 300 - NUTRITION FOR FITNESS & SPORT

Semester Hours: 3

Explores the theoretical and applied nutritional sciences as they relate to fitness and sport. Students will develop practical skills applicable to solving nutritional problems in exercising populations. Nutritional requirements and practices related to general fitness, athletic performance, and special needs individuals will also be covered.

KIN 315 - STRENGTH TRNG & CONDITION

Semester Hours: 3

This course provides a comprehensive overview of strength and athletic conditioning. Emphasis is placed on the exercise sciences (including anatomy, exercise physiology, and biomechanics) and exercise technique, program design, organization and administration, and testing and evaluation. Additionally, this course is designed to prepare students for the nationally accredited Certified Strength and Conditioning Specialist (CSCS) certification exam. Prerequisites: KIN 210, KIN 290, KIN 327 (C or better).

KIN 327 - EXERCISE PHYSIOLOGY

Semester Hours: 3

An introduction to the response and adaptations of the body systems to exercise and physical activity. Prerequisites: KIN 260, BYS 215 and BYS 216 with a grade of C- or better Co-requisite: KIN 328.

KIN 328 - EXERCISE PHYSIOLOGY

Semester Hour: 1

Exercise physiology lab experience to accompany the introduction to exercise physiology course lectures. The course meets two hours weekly for one credit hour. Co-requisite: KIN 327.

KIN 340 - SCHOOL AND COMMUNITY HEALTH

Semester Hours: 3

Obtain information and skills related to school and community health programs with an emphasis on health instruction, strategies, and resources. Survey the components of a school health program: school health services, healthful school environment, principles of physical and movement education, nutrition services, counseling and social services, parent/community involvement, health promotion for staff. Examine the core functions of public health, prevention of diseases and injuries, health needs of special populations, and functions of various organizations.

KIN 351 - EXER TEST & PRECR HEALTHY POP

Semester Hours: 3

Provides students with techniques that evaluate aerobic capacity, muscular strength and endurance, flexibility, and body composition. The development of exercise prescriptions based on evaluation results will be emphasized. Prerequisites: KIN 327 (C- or better grade) and KIN 328.

KIN 352 - EXER TEST & PRECR SPECIAL POP

Semester Hours: 3

This advanced-level course integrates both lecture and laboratory to prepare students with the knowledge and skills necessary to conduct fitness evaluations, exercise prescriptions, and risk stratification of at-risk individuals. Specific emphasis will be placed on the administration of safe fitness testing using protocols published by ACSM for the health related components of physical fitness. Prerequisites: KIN 351.

KIN 361 - TEACHING TEAM SPORTS

Semester Hours: 3

Teaching methods and strategies of sports that require more than one participant. While knowledge of how to play the sport will be taught, emphasis will be placed on the organization, management, and assessment of skills in activities such as, but not limited to soccer, handball, and basketball.

KIN 362 - TEACHING INDIVIDUAL ACTIVITIES

Semester Hours: 3

Teaching methods and strategies for games involving individuals rather than a team. Emphasis will be placed on the organization, management, and assessment of skills in activities including, but not limited to, aerobic dance, cross country/trail running, and tumbling/gymnastics.

KIN 363 - TEACHING FITNESS & WELLNESS

Semester Hours: 3

Learn to perform and instruct a variety of fitness activities. Emphasis will be placed on performing fitness skills and on the methods and techniques for instructing and teaching specific fitness activities. Techniques for evaluating the knowledge and skills of the activities will also be stressed.

KIN 370 - ADAPTED PHYSICAL EDUCATION

Semester Hours: 3

Develop knowledge of current concepts and trends in adapted physical education as well as the ability to plan and implement a physical education program designed to meet the unique needs of individuals.

KIN 371 - ADAPTED FITNESS

Semester Hours: 3

Develop knowledge of current concepts and trends in adapted physical fitness as well as the ability to plan and implement fitness and wellness programs designed to meet the unique needs of individuals, particularly those with disabilities and special needs. Prerequisite: KIN 260.

KIN 381 - FACILITIES AND EQUIPMENT MGT

Semester Hours: 3

This course will provide theories for the design, development, operation, maintenance, and management of sport and fitness facilities. Prerequisite: KIN 260.

KIN 382 - SPORT LEADERSHIP

Semester Hours: 3

This course focuses on the role of leadership in general, with a specific application to a sport setting. We will focus on the numerous approaches to leadership that have been used, and emphasize illustrating and applying them to different aspects of sports. Prerequisites: KIN 260.

KIN 383 - SOCIOLOGY IN SPORT

Semester Hours: 3

This course is designed to study the role sport plays as a social institution. Additionally, we will identify what social institutions are most affected by sport and how these institutions are created. Topics will include the definition of sport as well as why and how it is studied, the effect of sport on society, sport as an institution, and sport and culture. Prerequisite: SOC 100.

KIN 384 - EVENT MANAGEMENT

Semester Hours: 3

This course investigates event management (in a planning and administration of sports events context) using a secondary objective model for planning, implementation management of events. This 'management' of an event will include aspects such as event planning, event promotion, event sponsorship, recruiting & managing volunteers, event risk management, and event facilitation. The financial elements of sports event management will be investigated such as: the ability to plan, develop and implement budgets, and to produce a profit/loss statement. The ability to effectively integrate and satisfy the needs of external stakeholders, such as sponsors, media and community will be investigated. This course uses an integrated mix of lecture/seminar and workshop formats for learning. Your learning is complemented with experiential learning opportunities that are supported with accepted theory and practice in planning and administering sports events. Learning outcomes are met with time spent in preparing for, and completing, assessment tasks, time spent in general study/event management delivery, evaluation and reflection. Students will consider how and why events building community (i.e., investigating how the event promotes health and well-being, and how risks can be managed, identifying why sports and recreation events are an important element for building prosperous progressive communities). Students are expected to work inclusively in all learning activities. Classroom as Organisation learning approach will be used to develop competency. Prerequisite: KIN 265.

KIN 400 - NUTRITION IN HEALTH & DISEASE

Semester Hours: 3

This course will provide students an opportunity to examine the role of epigenetics in disease development, the impact of weight stigma on health and the makeup of a healthy relationship with food and exercise. Having knowledge on the complex components that make up a person's body shape and size will allow students to more accurately assess health status. Prerequisite: KIN 200 (C- or better).

KIN 418 - STRUCTURE/FUNCTIONAL KIN

Semester Hours: 3

This course will provide development of knowledge of anatomic systems related to purposeful movement of the human body. Thorough instruction of the structure and function of musculoskeletal system will be provided. Prerequisites: BYS 215 and BYS 216.

KIN 419 - EXERCISE & SPORT BIOMECHANICS

Semester Hours: 3

This course will provide an advanced understanding of biomechanical conditions of human movement as well as knowledge and skills needed to analyze and evaluate human motor performance in order to prescribe appropriate interventions for optimized application to rehabilitation and sports performance. Students will learn to appropriately represent kinematic and kinetic quantities as vectors and use vectors, vector addition, and vector resolution to enhance the understanding of basic mechanical concepts. Prerequisites: BYS 215, BYS 216, and PH 101; and either KIN 418 or BYS 402.

KIN 421 - INST APP TO SPORT PEDAGOGY

Semester Hours: 3

This class is designed to expand and enrich the teaching repertoire. Special emphasis will be given to how selected models of teaching can be used to achieve multiple outcomes of teaching in physical education and other contexts (e.g., physical activity programs & youth sport). Additionally, the course will increase awareness in other instructional areas related to the profession (teaching underserved youth, youth sports programs, etc.). Prerequisites: KIN 361 or KIN 362 or KIN 363.

KIN 427 - ENVIRONMENTAL EXERCISE PHYSIOL

Semester Hours: 3

KIN 427 will examine how the human body responds and adapts to diverse forms of environmental stress during exercise. The course will focus on the responses and adaptations that occur from performing exercise under various environmental conditions. Prerequisite: KIN 327.

KIN 440 - MGT SPORT & PHYSICAL EDUCATION

Semester Hours: 3

This course provides the student with the knowledge of sport management and administration in both athletic and leisure-based sports. Topics include management concepts, roles and responsibilities, fiscal management, fund-raising, legal issues, event scheduling, and decision making.

KIN 442 - INTRO TO SPORT LAW

Semester Hours: 3

This course is designed to introduce students to the legal doctrines, major statutes, standards, and case law that establish legal responsibilities, rights, privileges and controls related to the field of exercise and sport sciences. Prerequisite: KIN 260.

KIN 443 - SP TOPICS IN SPORT ADMIN

Semester Hours: 3

This course will address a variety of topics based on emerging trends in Sport Administration. Potential course offerings will include coach education, advanced legal issues, sport sociology, sport finance and accounting and globalization of sport. Course content will be offered in rotation as needed. Prerequisite: KIN 260.

KIN 445 - PRINCIPLES OF COACHING

Semester Hours: 3

Gain knowledge and skills specific to coaching: developing a coaching philosophy and objectives, motivating athletes, managing a team. Emphasis is placed on sport at the high school and club level with consideration given to coaching youth, recreational, and intercollegiate. Coursework provides preparation for the American Sport Education Program (ASEP) Coaching Principles exam which is required by the Alabama High School Athletic Association (AHSAA).

KIN 450 - EXERCISE PHYSIOLOGY INTERNSHIP

Semester Hour: 1

Designed to provide on-site practical experience in a wellness/fitness program, physical therapy clinic, and/or a cardiac rehabilitation facility for Kinesiology-Exercise Science majors. Prerequisites: KIN 351.

KIN 451 - RESEARCH EXERCISE SCIENCE I

Semester Hours: 3

Initial capstone course (part of a two-course sequence) providing a broad and balanced background in various types of research methods and the development of a research proposal. Development of a research question, hypothesis, and research methodology. Application of computers will be used to search databases for relevant literature. Completion of an Institutional Review Board application is required. Prerequisites: KIN 351.

KIN 452 - RESEARCH EXERCISE SCIENCE II

Semester Hours: 3

Final capstone course (part of a two-course sequence) in which students must integrate and apply skills acquired throughout the program to complete a comprehensive research project. The student will complete the research project proposed in KIN 451 by recruiting research participants to collect data, writing the results and conclusions for a manuscript. Results will be prepared for publication and presented in a professional setting. Prerequisites: KIN 451 and PY 300 (with concurrency).

KIN 455 - MOTOR LEARNING

Semester Hours: 3

Study the principles and practices that affect the learning and development of motor skills; theories of motor learning, motor control, and development; lifespan motor development perspective related to performing motor and sport skills; and professional applications of motor learning and development in exercise science, athletic training, and physical education.

KIN 457 - MEASUREMENT & EVAL IN PHYS ACTV

Semester Hours: 3

Measure and evaluate learning or skill improvement based on accepted standards. Gain an understanding of the logic behind measurement instruments in order to better interpret and implement results and to achieve improved learning or physical fitness improvement. These methods of measurement and evaluation are important skills in health, physical education, and exercise science fields. Prerequisite: KIN 351 or permission of instructor.

KIN 460 - SPECIAL TOPICS KINESIOLOGY I

Semester Hours: 3

This course is intended to cover a variety of topics based on emerging topics in Kinesiology. Potential course offerings will include environmental exercise physiology, cardiovascular exercise physiology, childhood and adolescent exercise physiology, emerging topics in sport & fitness management, and expanded nutrition content. Prerequisites: KIN 327 or instructor permission.

KIN 461 - SPECIAL TOPICS KINESIOLOGY II

Semester Hours: 3

This course is developed to cover a variety of topics based on emerging topics in Kinesiology. Potential course offerings will include environmental exercise physiology, cardiovascular exercise physiology, childhood and adolescent exercise physiology, emerging topics in sport & fitness management, and expanded nutrition content. Course content will be offered in rotation. Prerequisites: KIN 327 or instructor permission.

KIN 462 - TEACHING PHYS ED IN ELEM SCH

Semester Hours: 3

Physical education teacher candidates will acquire the ability to understand, recognize, analyze, and demonstrate the range of teaching skills employed by successful physical educators in the preschool and elementary setting. Emphasis is placed on understanding the theoretical implications of different teaching skills and the contexts in which they are effective. Teacher candidates will design lessons that allow for maximum student participation while remaining aligned with Alabama Consent Standards. Field experience is required. Candidates will observe, participate in, and teach lessons in physical education classrooms. Prerequisite: Admission to the Teacher Education Program. Prerequisite: KIN 370.

KIN 463 - PSYCHOLOGICAL ASPECTS SPORT

Semester Hours: 3

Provides students with an introductory experience in sport, exercise, and fitness psychology based on the latest research and practice. Practical examples and case studies for individual and group sports are provided. The aim is to bridge science and practice to teach students the role of a sport and fitness psychologist. Prerequisites: KIN 327.

KIN 464 - HEALTH/PE FOR ELEM TEACHERS

Semester Hours: 2

The purpose of this course is to help the future elementary classroom teacher learn to appreciate, plan, organize, and conduct (if called upon to do so) a quality physical education program for children in grades pre-K-5. The pre-service teacher (PT) will be provided background knowledge about physical education content, skill themes and movement concepts, how to teach skill themes and movement concepts, and fitness concepts.

KIN 465 - TEACHING SECONDARY PE

Semester Hours: 3

Physical education teacher candidates will acquire the ability to understand, recognize, analyze, and demonstrate the range of teaching skills employed by successful educators in the secondary setting.

KIN 470 - SPORT MARKETING

Semester Hours: 3

Sport Marketing presents an overview of the various techniques and strategies used in meeting the wants and needs of consumers in the sport industry as well as the understanding how sport can be used to assist in the marketing of other companies and products. Areas to be addressed are the uniqueness of sport marketing in comparison with traditional marketing, an overview of the segments of the sport industry, the importance of market research and segmentation in identifying the right sport consumer, the issue of data-based marketing in researching the sport consumer, an overview of the marketing mix as individual units and the relationship between those units, and the development of sponsorship and endorsement packages. Prerequisite: MKT 301.

KIN 471 - SPORT FINANCE

Semester Hours: 3

This course examines the financial tools that sports managers use to run their sport businesses. As such, it explores traditional and innovative methods of revenue acquisition and financial management in sports organizations, the financial business structure of sports organizations, and the financial planning and forecasting processes that make organizations effective. Various other aspects of finance are discussed as they relate to sports organizations, including the time value of money, capital structuring, stocks and bonds, inventory management, and taxation. Prerequisite: FIN 301.

KIN 472 - ETHICS IN SPORT

Semester Hours: 3

This course prepares students to take a more critical view of sport, as well as reflect on their own personal ethical and competitive orientations. A central focus of the course is to view sport and competition from social justice and diversity perspectives. More specifically, sport is discussed from a socio-cultural context regarding how dominant and non-dominant groups (racial, ethnic, or socio-economic) have used sport to preserve or change their societal status. This includes such areas as racial identity and equity, gender identity and equity, cultural and ethnic stereotyping, sexual orientation, hazing and bullying, religion and sport, and individuals with disabilities. This course will also look at how to become an agent for change by using social capital to promote ethical equity and diversity. Prerequisite: KIN 265.

KIN 473 - SPORT & FITNESS MANAGEMENT

Semester Hours: 3

The course is an in-depth analysis of the relationship of sport and management. The study of sport includes sporting goods manufacturers; fitness centers; recreation departments; broadcasting; Little League teams; and high school, NCAA, and professional leagues. The study of management follows the four functions of management: planning, organizing, leading, and controlling. Prerequisite: KIN 265.

KIN 490 - EXERCISE SCIENCE INTERNSHIP

Semester Hours: 6

Designed to provide on-site practical experience in a wellness/fitness program, physical therapy clinic, and/or a cardiac rehabilitation facility for Kinesiology-Exercise Science majors. Prerequisites: KIN 351, senior standing.

KIN 491 - SPORT & FITNESS MGT INTERNSHIP

Semester Hours: 6

Sport Administration Internship will introduce and promote professionalism through a hands-on experience with a local company. The student will be guided by a faculty member and company representative to achieve a strong overall work experience pertaining to the student's interests. Prerequisites: KIN 265.

Management (MGT)

MGT 100 - INTRO TO BUSINESS

Semester Hours: 1-3

Career options for students interested in business are stressed. Fundamentals of business organizations, effective management and the functions of business are explored.

MGT 101 - INTRO ENTREPRENEURSHIP

Semester Hours: 3

Introduction to the startup of a new business and the entrepreneurial career. Focuses on elementary concepts of planning, financing, developing, and managing a new business.

MGT 301 - MANAGING ORGANIZATIONS

Semester Hours: 3

Introduces management theories, roles, functions, and processes that facilitate the successful operation of organizations. Provides overviews of the following topics: managerial roles and functions, the strategic management process, organizational structure, organizational theory and behavior, and the human resource management function.

MGT 320 - CAREER DEVELOPMENT

Semester Hours: 3

Concepts drawn from theories on career development, human capital, social networks, labor markets, and strategic management will provide a theoretical foundation for students to formulate short and long-term career goals and a strategic plan for achieving those goals.

MGT 361 - ORGANIZATIONAL BEHAVIOR

Semester Hours: 3

Behavioral science approach to the study of individual performance. Performance evaluation, job design, employee turnover, organizational culture, communication process, work motivation, leadership, group dynamics, and organizational development. Prerequisite: MGT 301.

MGT 363 - HUMAN RESOURCE & LABOR REL MGT

Semester Hours: 3

Theories and practices related to human resource management functions, including strategic planning, internal and external staffing, training and development, compensation management, employee and labor relations, and international human resource management. Prerequisite with concurrency: MGT 301.

MGT 401 - INTRO TO CONTRACT MANAGEMENT

Semester Hours: 3

General survey in contracting basics, covering procedures as described by Federal Acquisition Regulations, statutes, ethics, policies, and other pertinent authorities.

MGT 402 - CONTRACT EVALUATION & AWARD

Semester Hours: 3

Study of the evaluation, award, and post-award aspects of the contracting process, focusing on federal government contracting. Covers acquisition and past performance evaluation; the proposal receipt process; and post-award contract administration, closeout, modifications, and dispute resolution. Prerequisite: MGT 401.

MGT 403 - CONTRACT PRICING & COST ANALYS

Semester Hours: 3

Study of methods of price analysis and cost estimation and analysis. Covers data sources, legal requirements, rates, definitions, projection methods, factors affecting profits/fees, the weighted guidelines technique, statistical analysis methods, and learning curve theory.

MGT 405 - NEW VENTURE STRATEGIES

Semester Hours: 3

Theory and application of strategies for start-up, operation, and control of new ventures. Roles of entrepreneurship in the economy. Case studies of corporate and independent new ventures. Prerequisite: MGT 301 and MKT 301.

MGT 408 - TEAMWORK & TEAM PROCESSES

Semester Hours: 3

This course provides an introduction to teams and teamwork processes. The foundation of the course is research-based; topics will be approached from the context of empirical research. The types of research designs that are typically used in team research are addressed. Junior standing required.

MGT 410 - LEADERSHIP, PERSONAL DEV & ORG

Semester Hours: 3

The focus of this course is on the in-depth self-examination of skills, ability, personality, attitudes, values and behavior to increase self-awareness of leadership competencies. Students will also examine theories of leadership to develop insights for their personalized leadership development. Prerequisite: MGT 301.

MGT 411 - SUPPLY CHAIN MANAGEMENT

Semester Hours: 3

A study of problems and practices of operations and materials management. Topics include: materials acquisitions, inventory systems, demand management, aggregate planning, materials, logistics systems and current topics. Prerequisite: MSC 287.

MGT 450 - INTERNATIONAL BUSINESS

Semester Hours: 3

Explores the economic, social, political, cultural, and legal environment of global business operations and considers how environmental effects on business programs and strategies. Relies on a variety of conceptual, methodological and application perspectives. Prerequisite: MGT 301, MKT 301, and FIN 301.

MGT 460 - EMPLOYEE STAFFING & DEVELOP

Semester Hours: 3

The study of employee staffing and development concepts, issues and tools. Topics include forecasting staffing needs, recruitment strategies, development and validation of selection procedures, placement, socialization and development of employees, and the utilization of contingent workers. Prerequisite: MGT 363.

MGT 461 - STRATEGIC COMPENSATION MGMT

Semester Hours: 3

Introduction to management of employees' compensation. Overview of compensation practices, behavioral and economic theories of compensation, and research on compensation programs. Prerequisites: MSC 287 and MGT 363.

MGT 462 - EMPLOYMENT LAW FOR MANAGERS

Semester Hours: 3

The study of government regulation of the management of human resources. Examines employer responsibilities and employee rights under federal state law pertaining to separations, discrimination, compensation and other terms of employment, worker safety and health, privacy, and unions.

MGT 470 - SPEC TOPICS SEMINAR IN MGMT

Semester Hours: 3

In-depth study of a selected topic relevant to contemporary management. Different sections of this course may address different topics.

MGT 490 - SPECIAL PROJECTS

Semester Hours: 1-3

Active involvement in an on-going project in a business enterprise that has particular interest and relevance to the student, or an in-depth investigation of contemporary management problems. Approval of department chair is required.

MGT 494 - PRACTICUM IN MANAGEMENT

Semester Hours: 3

Student teams will apply management concepts and skills in a semester-long business simulation or management project conducted for a client firm or non-profit. The teams will be closely supervised by a faculty member with expertise related to the simulation or project. Prerequisite: MGT 301, MSC 287, and MSC 288.

MGT 495 - INTERNSHIP IN MANAGEMENT

Semester Hours: 1-3

Under the direction of a faculty advisor, experience is gained with an entrepreneur in a small business firm or a manager in a large firm. Subject to College's guidelines on internships.

MGT 499 - COMPETITIVE STRATEGY

Semester Hours: 3

Addresses formulation & implementation of business/corporate level strategies: defining the mission, setting goals and objectives, analyzing current operating conditions and the organization's environment, and setting a unified strategic direction. Recommended taking during final semester of degree. Upper division standing required. Student must obtain a grade of C or higher. Prerequisite: MGT 301, MKT 301, FIN 301, EH 300, IS 301, and MSC 385.

Management Science (MSC)

MSC 287 - BUSINESS STATISTICS I

Semester Hours: 3

Introduction to probability & business statistics. Covers: tabular, graphical, and numerical methods for descriptive statistics; measures of central tendency, dispersion, and association; probability distributions; sampling and sampling distributions; and confidence intervals. Uses spreadsheets to solve problems. Prerequisite: Any 100 level MA course.

MSC 288 - BUSINESS STATISTICS II

Semester Hours: 3

Inferential statistics for business decisions. Topics include: review of sampling distributions and estimation; inferences about means, proportions, and variances with one and two populations; good of fit tests; analysis of variance and experimental design; simple linear regression; multiple linear regression; non parametric methods. Prerequisite: MSC 287.

MSC 385 - OPERATIONS ANALYSIS

Semester Hours: 3

Survey of the firm's production function and quantitative tools for solving production problems, quality management, learning curves, assembly and waiting lines, linear programming, inventory, and other selected topics (e.g., scheduling, location, supply chain management). Uses the SAP software. Prerequisite: MSC 288.

MSC 410 - TRANSPORTATION & LOGISTICS

Semester Hours: 3

An analysis of transportation and logistical services to include customer service, distribution operations, purchasing, order processing, facility design and operations, carrier selection, transportation costing, and negotiation. Prerequisite: MKT 301.

MSC 412 - ARMY SENIOR LOGISTICIAN-ADV

Semester Hours: 3

The Senior Logistician Advanced Course (SLAC) is part of the U.S. Army's Master Logistician Certificate Program for logistics management specialists within the 0346 occupational series. SLAC is an 80-hour academic learning experience designed to improve senior logistician competencies at the strategic level. The program is organized around the logistics management specialist's 12 competencies, and the coursework is specially designed to better develop and further enrich the thinking and skills of the Army's Senior Logisticians. Special approval and enrollment in CPCS U.S. Army Senior Logistician Advanced Course required.

MSC 470 - SPECIAL TOPICS IN MGMT SCI

Semester Hours: 3

In depth study of a selected topic relevant to contemporary management science. Different sections of this course may address different topics.

MSC 490 - SPECIAL PROJECTS

Semester Hours: 3

Independent study in an area of interest to the student in the field of management science. Approval of department chair is required.

MSC 494 - PRACTICUM IN MANAGEMENT SCIENC

Semester Hours: 3

Student teams will apply management science concepts and skills in a semester-long simulation or management science project conducted for a client firm or non-profit. The teams will be closely supervised by a faculty member with expertise related to the simulation or project. Prerequisite: MSC 287, MSC 288 and MSC 385.

MSC 495 - INTERN IN MGMT SCIENCE

Semester Hours: 3

Active involvement in a project in a business enterprise, professional organization or in a government agency that has particular interest and relevance to the student. Subject to College's guidelines on internships.

Marine Science (MS)

MS 202 - MARINE BIOLOGY

Semester Hours: 4

Survey of invertebrates, vertebrates, and marine plants as communities with local examples. Examination of marshland, estuarine, beach, dune, inlet and neritic habitats, and niches. Lecture/Lab/field work. Offered only at the Marine Environmental Sciences Consortium Sea Lab at Dauphin Island, AL. Prerequisites: BYS 119 and BYS 120.

MS 204 - COM MARINE FISHERIES/ALA

Semester Hours: 2

Biology, harvesting technology, and processing of commercially valuable fish and shellfish species of Alabama. Offered only at the Marine Environmental Sciences Consortium Sea Lab at Dauphin Island, Alabama. No credit for biological sciences major or minor; can be used for marine science minor.

MS 301 - MARINE TECH METHODS I

Semester Hours: 2

Marine science research equipment, methods, and techniques. Operation and field maintenance of major sampling gear. Only at the Marine Environmental Sciences Consortium Sea Lab at Dauphin Island, Alabama. No credit for biological sciences major or minor; can be used for a marine science minor. Prerequisites: BYS 119 and BYS 120.

MS 303 - COASTAL CLIMATOLOGY

Semester Hours: 2

Physical factors resulting in climatic conditions in and near coastal region. Emphasis on northern Gulf of Mexico. Only at the Marine Environmental Sciences Consortium Sea Lab at Dauphin Island, Alabama. No credit toward a biological sciences major or minor; can be used for a marine science minor.

MS 304 - COASTAL ZONE MANAGEMENT

Semester Hours: 2

Examination of ecological features and physical management policies design for coastal communities and a review of the federal and state programs that impinge upon coastal ecological communities. Only at the Marine Environmental Sciences Consortium Sea Lab at Dauphin Island, Alabama.

MS 491 - SPECIAL TOPICS IN MARINE SCIEN

Semester Hours: 1-4

Marketing (MKT)

MKT 301 - PRINCIPLES OF MARKETING

Semester Hours: 3

Integration of professional selling techniques and concepts with sales management problems. Addresses objectives and policies for managing a sales force; market analysis methods used for sales forecasts and budgeting; and problems faced by sales management in competition, pricing, and promotions.

MKT 315 - SALES MGT/PROF SELLING

Semester Hours: 3

Integration of techniques and concepts of professional selling with problems of sales management. Objectives and policies for sales managers concerning managing sales force and methods of marketing analysis in terms of sales forecasts and budgeting. Problems faced by sales management in competition, pricing, and promotion. Prerequisite: MKT 301.

MKT 316 - RETAILING POLICY/MGT

Semester Hours: 3

Policies, practices, and problem solutions in efficient operation of chain and independent retail stores. Store location, organizational layout, merchandise planning and control, buying, pricing, and promotion.

MKT 332 - BUYER BEHAVIOR

Semester Hours: 3

Interdisciplinary and organizational approach to analyze and interpret consumer buying habits and motives and the resultant purchases of goods and services. Purchaser's psychological, economic, and sociocultural actions and reactions as they relate to better understanding of consumption.

Prerequisite: MKT 301.

MKT 342 - PROMOTIONAL STRATEGY

Semester Hours: 3

Promotional techniques available to marketing management. Consumer behavior and communication process by which products can be effectively promoted. Specific tools of personal selling, advertising, sales promotion, and publicity as components of overall promotional strategy. Prerequisite: MKT 301.

MKT 343 - MARKET RESEARCH DESIGN

Semester Hours: 3

Introduction to the principles and purposes of marketing research; relationship to other marketing functions and data sources. Application of the principles and purposes of marketing research; qualitative research methods, experimental design, survey and questionnaire design, sampling procedures, and data analysis. Prerequisites: MKT 301 and ((MSC 287 and MSC 288) or CM 370 or PY 300 or SOC 303).

MKT 344 - DIGITAL MARKETING ANALYTICS

Semester Hours: 3

Application of the principles and purposes of marketing research; laboratory, field and historical research methodologies, experimental design, sampling procedures, questionnaire design, and data analysis.

MKT 345 - MKT CHANNEL STRUCT & STRATEGY

Semester Hours: 3

Marketing channels as a functional area and the alternative choices available to marketing management in developing overall marketing strategy. Institutional structures and dynamic interrelationships in distribution logistics.

MKT 350 - MARKETING EMERGING TECHNOLOGY

Semester Hours: 3

Comprehensive review of the new product development and marketing process. Emphasizes actual case examples showing how companies develop and market radically new products. Prerequisite: MKT 301.

MKT 405 - NEW VENTURE STRATEGIES

Semester Hours: 3

Theory and application of both marketing and management strategies for start up, operation and control of new ventures. The course also discusses the role of entrepreneurship in the economy. Prerequisite: MKT 301 and MGT 301.

MKT 415 - INTERNATIONAL MARKETING

Semester Hours: 3

Procedures and problems associated with establishing and carrying out marketing operations in or with foreign companies. Institutions, principles, and methods involved in solving these business problems. Effect of national differences in business practices and regulation. Prerequisite: MKT 301.

MKT 420 - SERVICES MARKETING

Semester Hours: 3

Addresses the challenge of delivering quality service to customers. Focuses on organizations whose core products are services (e.g., banks, hospitals, non-profit organizations) or which depend on service excellence for competitive advantage. Prerequisite: MKT 301.

MKT 465 - MARKETING FOR NEW VENTURES

Semester Hours: 3

The goal is to provide a solid background with practical application of theories, concepts, and techniques at the interface of entrepreneurship and marketing. Student will learn the cutting-edge development in entrepreneurial practices with hands-on experience. The course will rely on class discussion, case analysis, and group project on marketing for entrepreneurs. Prerequisite: MKT 301 and FIN 301.

MKT 470 - SOCIAL MEDIA MARKETING

Semester Hours: 3

The course focuses on how to meet the challenge of brand building in a digital age. It aims to foster the students' acquisition of social media marketing skills, equipping them with relevant knowledge of how to incorporate social media into marketing strategy this way enhancing value to both companies and customers. As future marketers, students will learn how to adopt a customer centric approach to their future marketing tasks, and be guided through a number of hands-on assignments that are immediately applicable to marketing practices. Prerequisite: MKT 301.

MKT 475 - ADVANCED MARKETING SEMINAR

Semester Hours: 3

Investigation of advanced marketing topics that are relevant to contemporary marketing practices. The course will focus on current issues related to marketing in a high technology environment, relationship marketing, channel design and strategy, transportation, and logistics. Prerequisite: MKT 301.

MKT 480 - MARKETING MANAGEMENT

Semester Hours: 3

Study of management of marketing function. Addresses setting objectives, organization and control of marketing resources in coordination with other functional areas, identification and selection of market opportunities, competitive strategies, and development of marketing policies and programs.

Prerequisite: MKT 301, MKT 332 (with concurrency).

MKT 490 - SPECIAL PROJECTS

Semester Hours: 1-3

Independent study in an area of interest to the student in the field of marketing. Approval of Dept. Chair required.

MKT 494 - PRACTICUM IN MARKETING

Semester Hours: 3

MKT 495 - INTERN IN MARKETING

Semester Hours: 1-3

Active involvement in an project in a business enterprise, professional organization or in a government agency that has particular interest and relevance to the student. Course grade will be given on a satisfactory (S)/unsatisfactory (U) basis. Subject to College's guidelines on internships.

Mathematics (MA)

MA 105 - NATURE OF MATHEMATICS

Semester Hours: 3

The course explores mathematical ideas that historically led to the development of major branches of mathematics. Conceptual understanding and real-world problem solving will be emphasized. Topics may include world of numbers, infinity, chance, foundations of statistics, and mathematical aesthetics. MA 105 cannot be used to fulfill prerequisite requirements for any mathematics course.

MA 107 - ALGEBRA WITH APPLICATIONS

Semester Hours: 3

Algebra review, functions and graphs, linear models, exponential logarithmic functions, mathematics of finance, sets and probability. Prerequisites: Level 1 placement for MA 107 and Level 0 placement for MA 107L. No credit given to students who have received credit for another MA course.

MA 107S - ALGEBRA W/APPLICATIONS S-SECT

Semester Hours: 3

This course offers all of the Algebra with Applications curriculum with the addition of remedial material. This course is 3 credit hours, but meets 5 days per week. The S-section is intended for students with math placement 0. Prerequisite: math placement level 0.

MA 110 - FINITE MATHEMATICS

Semester Hours: 3

Algebra review, elementary functions, matrices, logic, sets, counting, and an introduction to probability and statistics. MA 110 is an AGSC core course. Prerequisites: Level 1 placement for MA 110 and Level 0 placement for MA 110L.

MA 110S - FINITE MATHEMATICS S-SECTION

Semester Hours: 3

This course offers all of the Finite Mathematics curriculum with the addition of remedial material. This course is 3 credit hours, but meets 5 days per week. The S-section is intended for students with math placement 0. Prerequisite: Math placement level 0.

MA 112 - PRECALCULUS ALGEBRA

Semester Hours: 3

Real number systems, exponents, radicals, factoring, absolute value, inequalities, function notation, functions, inverse functions, graphing techniques, polynomial and rational functions, operations with complex numbers, conic sections, and theory of equations. Prerequisites: Level 1 placement for MA 112 and Level 0 placement for MA 112L.

MA 112S - PRECALCULUS ALGEBRA S-SECTION

Semester Hours: 3

This course offers all of the Pre-Calculus Algebra curriculum with the addition of remedial material. This course is 3 credit hours, but meets 5 days per week. The S-section is intended for students with math placement 0. Prerequisite: math placement level 0.

MA 113 - PRECALCULUS TRIGONOMETRY

Semester Hours: 3

Exponential and logarithmic functions, trigonometric functions of angles and real numbers, graphing trigonometric functions, inverse trigonometric functions, solving trigonometric equations, verifying identities, laws of sines and cosines, vectors, trigonometric form of complex numbers, DeMoivre's theorem, summation notation, arithmetic and geometric sequences and series. Prerequisites: Level 2 placement or MA 112 with a grade of C or better. No credit given to students who have completed a MA course numbered above MA 113. MA 113 is an AGSC core course.

MA 115 - PRECALCULUS ALGEBRA & TRIG

Semester Hours: 4

The algebra of functions, including polynomial, rational, exponential, and logarithmic functions; systems of equations and inequalities; trigonometric and inverse trigonometric functions; trigonometric identities and equations; a brief introduction to DeMoivre's Theorem, vectors, polar coordinates, and the binomial theorem. This course is intended for students who plan to take at least MA 171 (Calculus A) but who do not need the full two-semester sequence in precalculus (MA 112, 113). MA 115 is an AGSC core course.

MA 120 - MATH PROFESSIONAL APPLICATIONS

Semester Hours: 3

Limits, continuity, differentiation, applications of the derivative, integration, the fundamental theorem of calculus, applications of the integral. Prerequisites: MA 107, MA 110, or MA 112 with a grade of C or better, or Level 2 placement. No credit given to students who have already received credit for a calculus course. MA 120 is an AGSC core course.

MA 171 - CALCULUS A

Semester Hours: 4

Limits, derivatives, applications of the derivative, definite and indefinite integrals, exponential and logarithmic functions, and inverse functions.

Prerequisites: MA 113 or MA 115 with a grade of C or better, or Level 3 placement.

MA 171R - CALCULUS A RECITATION

Semester Hours: 0

Extension of MA 171. Review of previous math skills needed for success. Homework discussed; examination preparation, review of homework and examination tutoring and individual consultation.

MA 171S - CALCULUS A S-SECTION

Semester Hours: 4

This course offers all of the Calculus A curriculum with the addition of trigonometry review. The course is 4 credit hours but meets five days per week. The S-section of Calculus A is intended for students with math placement level 2 but who are willing to put in extra time and effort to study trigonometry along with all of the requirements for MA 171. Prerequisite: MA 113 or math placement level 2.

MA 172 - CALCULUS B

Semester Hours: 4

Techniques of integration, applications of the integral, polar coordinates, sequences, series, and conic sections. Prerequisites: MA 171 with a grade of C or better.

MA 201 - CALCULUS C

Semester Hours: 4

Vectors, vector-valued functions, partial derivatives, multiple integrals, vector fields, line and surface integrals. Prerequisites: MA 172 with a grade of C or better.

MA 230 - MATH FOR ELEMENTARY TEACHERS

Semester Hours: 3

The course emphasizes the use of logical thinking in mathematics and the development of students' understandings of algorithm design. Directed at providing the elementary education student the mathematical background necessary for an understanding of the mathematical principles that are introduced to children in the elementary grades. Emphasis on sets, logic, an understanding of the number systems (integers, fractions, decimals, percents) and number theory. Prerequisites: Two MA courses at the 100 level or above, each with a grade of C or better. Open only to students majoring in elementary education.

MA 231 - MATH FOR ELEM SCH TCHERS II

Semester Hours: 3

Rational numbers, real numbers, algebra, statistics, probability, geometric shapes, measurement, and geometry (using triangle congruence and similarity, coordinates, and transformations). Prerequisites: MA 230 with a grade of C or better.

MA 238 - APPL DIFFERENTIAL EQUATIONS

Semester Hours: 3

This course provides an elementary introduction to the techniques and necessary theory for solving the basic differential equations usually encountered by beginning science and engineering students. General topics include analytical and graphical methods for solving and analyzing first order differential equations; Euler's numerical method; the basic theory of higher-order, linear differential equations, with major emphasis on equations with constant coefficients; variation of parameters; the Laplace transform as a tool for solving differential equations. MA 238 is an AGSC core course. Prerequisites: MA 172 & MA 201 with concurrency.

MA 244 - INTRO TO LINEAR ALGEBRA

Semester Hours: 3

Systems of linear equations, matrices, matrix operations, determinants, vector spaces, bases, dimension of a vector space, inner product, Gram-Schmidt process, linear transformations, change of basis, similar matrices, eigenvalues and eigenvectors, diagonalization, symmetric matrices, and applications. Prerequisites: MA 120 or MA 172.

MA 281 - ELEMENTS OF STATISTICAL ANALYSIS

Semester Hours: 3

Descriptive statistics, fundamentals of probability theory, fundamentals of statistical inference, including estimation and hypothesis testing, and use of a typical statistical package such as MINITAB. Prerequisites: MA 113, or MA 115, or Level 2 Placement.

MA 299 - MATHEMATICS PROJECT

Semester Hour: 1

Individualized special projects in mathematics and its applications for inquisitive and well prepared sophomore-level undergraduate students. No credit allowed toward major or minor in mathematics. S/U grading. Approval of department chair and instructor required.

MA 301 - INTRO ELEMENTARY NUMBER THEORY

Semester Hours: 3

Fundamental properties of integers, divisibility, linear Diophantine equations, congruency, Euler function, Chinese Remainder Theorem, Fermat Theorems, Wilson Theorem, and applications to Cryptography. Prerequisite: MA 244.

MA 330 - FOUNDATIONS OF MATH

Semester Hours: 3

Symbolic logic and methods of proof, set theory, combinations and permutations, equivalence relations and functions, mathematical induction and recurrence relations, cardinality (finite, countably infinite, and uncountable sets), and decimal representation of the rational and real numbers. Prerequisites: MA 172 and (MA 201 or MA 244).

MA 385 - INTRO TO PROBABILITY & STATISTICS

Semester Hours: 3

This course is a calculus-based introduction to probability with special emphasis on the interplay between probability and statistics. Topics include descriptive statistics; probability spaces; discrete distributions (including the binomial, geometric, hypergeometric, and Poisson); continuous distributions (including the uniform, exponential, and normal); joint distributions; mean, variance, and general expected value; independence and correlation; the law of large numbers; and the central limit theorem. Prerequisites: MA 201 with grade of C- or better.

MA 399 - MATHEMATICS PROJECT

Semester Hour: 1

Individualized special projects in mathematics and its applications for inquisitive and well prepared junior-level undergraduate students. No credit allowed toward a major or minor in mathematics. S/U grading. Approval of department chair and instructor required.

MA 415 - INTRO NUMERICAL METHODS

Semester Hours: 3

Derivation and analysis of approximate methods for the solution of nonlinear equations, interpolation and integration of functions, and techniques for the solution of systems of linear equations and for approximating solutions of elementary differential equations. Emphasis is placed on obtaining an intuitive understanding of both the problem at hand and the numerical method used to solve it. Prerequisites: MA 201, MA 244, and CS 121.

MA 420 - INTERM DIFFERENTIAL EQUATIONS

Semester Hours: 3

This is a second course in differential equations. Course topics include series solutions for second order differential equations and the method of Frobenius; eigenvalue and eigenvector methods for solving systems of linear first order equations; the qualitative theory of nonlinear equations; boundary value problems and the Sturm-Liouville theory. Prerequisites: MA 201, MA 244 and MA 238.

MA 433 - INTRODUCTION TO GEOMETRY

Semester Hours: 3

Axiomatic development of geometry, introduction to non-Euclidean geometries with emphasis in elliptic and hyperbolic geometries, selected topics in Euclidean geometry. Prerequisites: MA 172 and Either MA 201 or MA 244.

MA 442 - ALGEBRAIC STRUCTURES W/APPLIC

Semester Hours: 3

Mappings, binary operations, equivalence relations, groups and subgroups, Lagrange's theorem, homomorphisms and isomorphisms, normal subgroups and quotient groups, rings, fields, ordered integral domains, fields of quotients, error correcting codes, linear codes, and decoding. Prerequisites: MA 244 and either MA 330 or 385.

MA 450 - COMBINATORIAL ENUMERATION

Semester Hours: 3

Counting, pigeonhole principle, permutations and combinations, generating functions, principle of inclusion and exclusion, Polya's theory of counting. Prerequisite: MA 385 or MA 442 (with concurrency).

MA 452 - INTRO TO REAL ANALYSIS

Semester Hours: 3

Sequences, limits, continuity, differentiation of functions of one real variable, Riemann integration, uniform convergence, sequences and series of functions, power series, and Taylor series. Prerequisites: MA 330.

MA 453 - INTRO TO COMPLEX ANALYSIS

Semester Hours: 3

Complex algebra, analytic functions, Cauchy-Riemann equations, exponential, trigonometric, and logarithmic functions, integration, Cauchy integral theorem, Morera's theorem, Liouville's theorem, maximum modulus theorem, residue theory, Taylor and Laurent series, and applications. Prerequisites: MA 201 and one MA course at 300 level or above.

MA 456 - METHODS OF PARTIAL DIFF EQUA

Semester Hours: 3

Survey of theory and methods for solving elementary partial differential equations. Topics include first-order equations and the method of characteristics, second-order equations, reduction to canonical form, the wave equation, the heat equation, Laplace's equation, separation of variables, and Fourier series. Prerequisites: MA 238 and MA 244.

MA 458 - APPLIED LINEAR ALGEBRA

Semester Hours: 3

Fundamental concepts of linear algebra are developed with emphasis on real and complex vector spaces, linear transformations, and matrices. Systems of equations, inverses of matrices, determinants, vector spaces, linear transformations, eigenvalues and eigenvectors, normal matrices, canonical forms of matrices, applications of systems of linear differential equations, and use of computer software such as MATLAB. Prerequisites: MA 238 and MA 244.

MA 460 - INTRO FOURIER ANALYSIS

Semester Hours: 3

Brief development of trigonometric and exponential Fourier series, derivation of the classical Fourier transform from series, classical properties of Fourier transforms, transforms of functions, convolution, elementary development of the delta function, transforms of periodic functions, use of transforms to solve systems, introduction to the discrete transform and/or multidimensional transforms, as time permits. Prerequisites: MA 238 and MA 244.

MA 465 - INTRO TO MATH MODELING

Semester Hours: 3

Applying mathematics by formulating, analyzing, and criticizing mathematical models of various phenomena. Examples will be chosen from the physical, biological, and social sciences. Emphasizes development and use of simple mathematical models by having student study general modeling principles and case studies (some open-ended) drawn from various sources. Prerequisites: MA 201, MA 238, and MA 244.

MA 487 - INTRO TO MATH STATISTICS

Semester Hours: 3

This is an introductory, calculus-based course in mathematical statistics. Topics include a review of basic probability, including probability spaces, independence, distributions and expected value; the fundamental theorems of probability, including the law of large numbers and the central limit theorem; estimation, including point estimation and interval estimates for means, variances, and proportions; hypothesis testing, including tests for means, variance, and goodness of fit; an introduction to correlation and regression; theory of inference, including sufficiency and power. Prerequisites: MA 201 and either MA 385 or ISE 390.

MA 490 - SEL TOP UNDERGRAD MATH

Semester Hours: 1-3

Requested undergraduate topics. Approval of instructor required.

MA 499 - MATHEMATICS PROJECT

Semester Hour: 1

Individualized special projects in mathematics and its applications for superior undergraduate students. No credit is allowed toward a major or minor in mathematics. S/U grading. Approval of department chair and instructor required.

Mechanical & Aerospace Engineering (MAE)

MAE 115 - INTRODUCTION TO MACHINING

Semester Hour: 1

Safety and familiarity with the machine shop environment, equipment, tools, and practices. Correlate student design with consequences of design choice. Basic turning, milling, welding, and sheet metal operations. Programming and operation of numerically controlled machines.

MAE 200 - PRINC AERONAUTICS & ASTRONAUTI

Semester Hours: 3

Fundamental concepts of aerospace engineering including the history of flight, standard atmosphere, fluid and flow properties, lift and drag, propulsion, and structures; elementary aircraft performance, stability and control; basic astronautics and space environment; and aerospace vehicle design. Prerequisites: PH 111, ENG 101, MA 172. Prerequisite with concurrency: MAE 211.

MAE 211 - INTRO COMPUTATIONAL TOOLS

Semester Hours: 2

Computer-aided design and solid modeling concepts including: model definition through constraints and dimensioning, and development of subassemblies and assemblies. Prerequisites: ENG 101 and MA 171.

MAE 271 - STATICS

Semester Hours: 3

Topics include: forces, resultant forces, moments, couples equivalent force systems, equilibrium, distributed loads, two force members, trusses, centroids, moments of inertia, shear and bending moment diagrams, static and kinematic friction. (Same as CE 271) Prerequisites: PH 111, MA 201 and ENG 101.

MAE 272 - DYNAMICS

Semester Hours: 3

Kinematics and kinetics of a particle and of systems of particles with applications to central force motion, impact, relative motion, vibrations, and variable mass systems. Dynamics of rigid body in plan motion, relative motion in rotating coordinates, and gyroscopic motion. (Same as CS 362) Prerequisites: (CE 271 or MAE 271) and MA 201.

MAE 284 - NUMERICAL METHODS

Semester Hours: 3

Use computational tools to solve mathematical problems of engineering interest. Discussion and application of root finding and optimization techniques. Other topics include curve fitting, Gauss Elimination, LA decomposition, and Cholesky decomposition, numerical integration and numerical differentiation. Solving initial and boundary value problems. Course includes a lab experience using modern computational tools. Prerequisites: MA 244, ENG 101, MAE 211 and MA 238.

MAE 284L - NUMERICAL METHODS LAB

Semester Hours: 0

MAE 299 - MAE MENTORING I

Semester Hours: 0

Yearly mentoring and advising from engineering faculty and staff. Prerequisite w/ concurrency: MAE 271.

MAE 310 - FLUID MECHANICS I

Semester Hours: 3

Fluid properties and fundamental principles governing fluid behavior. Fluid statics, basic equations in integral form and differential form, potential flow, dimensional analysis, and internal incompressible viscous flows. Prerequisites: (CE 271 or MAE 271) and MA 238.

MAE 311 - PRIN MEASUREMENT & INSTRUMEN

Semester Hours: 3

Instrumentation and techniques for measurement of mechanical phenomena. Calibration, standards, computerized data acquisition, error analysis, signal conditioning, dynamic response, and experimental design. Laboratory included. Prerequisites: EE 213 and MAE 284.

MAE 311L - PRINC MEASUREMENT & INSTR LAB

Semester Hours: 0

MAE 330 - FUNDAMENTALS AERODYNAMICS

Semester Hours: 3

Fundamentals of incompressible flow, conservation laws, potential flow, similarity, airfoil and finite wing lift and drag, thin airfoil and panel methods, introduction to viscous flows and boundary layers, and modern airfoil and wing design. Prerequisites: MAE 200, MAE 272 and MA 238 (all with minimum grade of C-). Corequisite: MAE 331.

MAE 330L - LABORATORY

Semester Hours: 0

This lab is a 0 credit lab component of the 4 credit MAE 330 course.

MAE 331 - AERODYNAMICS LAB

Semester Hour: 1

Demonstration of fundamental aerodynamic principles through wind tunnel testing including comparison of theory to experimental results. Corequisite: MAE 330.

MAE 341 - THERMODYNAMICS I

Semester Hours: 3

Basic laws of energy that apply in all branches of engineering and science. Properties of matter, state variables, reversible processes, first and second laws of thermodynamics with applications to closed and open systems. Availability of energy and irreversibility. Prerequisites: CH 121, PH 112, and MA 201.

MAE 342 - THERMODYNAMICS II

Semester Hours: 3

Continuation of MAE 341. Thermodynamic cycles, thermodynamic relations among properties, chemical reactions, and phase and chemical equilibrium. Prerequisites: MAE 341 and MA 238.

MAE 343 - COMPRESSIBLE AERODYNAMICS

Semester Hours: 3

Compressible flow including area change, friction, and heat transfer. Fundamentals of acoustic waves, 1- and 2-D shock and expansion waves, shock-expansion theory, and linearized flow with applications to inlets, nozzles, wind tunnels, and supersonic flow over aerodynamic bodies and wings. Prerequisites: MAE 200, MAE 341 and MA 238 (all with minimum grade of C-).

MAE 345 - HONORS THERMODYNAMICS COLQ

Semester Hour: 1

Students in this course will be expected to participate in assigned readings and discussions to develop an understanding of the context behind the fundamental concepts and principles of thermodynamics. Through reflections students will be encouraged to apply this knowledge to develop their own creative ideas. Prerequisites with concurrency: MAE 341 or CHE 344.

MAE 364 - KINEMATICS/DYNAM MACHINE

Semester Hours: 3

Kinematics and dynamics of planar machinery including principles of mechanisms, cam design, gears and epicycle gear trains, determination of velocity and acceleration in mechanisms. Inertia forces in machines, balancing of rotating masses and reciprocating masses, and vibration analysis. Prerequisites: MAE 211 and (MAE 272 or CE 272).

MAE 364L - KINEMATICS/DYN MACHINE LAB

Semester Hours: 0

MAE 370 - MECHANICS OF MATERIALS

Semester Hours: 3

Design and analysis of simple structures for predetermined strength and deformation requirements. Topics include: theory of stress-strain, Hooke's Law, analysis of stresses and deformations in bodies loaded by axial, torsional, bending, and combined loads, and analysis of statically indeterminate systems. Same as MAE 370. Prerequisites: (CPE 211 or MAE 211) and (MAE 271 or CE 271) and MA 244, corequisite MAE 375.

MAE 370L - LABORATORY

Semester Hours: 0

MAE 371 - AEROSPACE STRUCTURES

Semester Hours: 3

Analysis and design of lightweight aerospace structures including sandwich structures, stiffened panels, and tubing stress and deflection analysis. Design of members in tension, torsion, and bending. Space structures. Prerequisites: MAE 200 and (MAE 370 or CE 370).

MAE 375 - MECHANICS OF MATERIALS LAB

Semester Hour: 1

Experimental verification of material properties and structural deformation under axial, torsional, and bending loads. Test procedures, use of instrumentation, interpretation of experimental results and comparison to theory. (Same as CE 375). Corequisites: MAE 370.

MAE 378 - MATERIALS & MFG PROCESS

Semester Hours: 3

Engineering properties of materials, sources of information for properties of materials, cost considerations for material selection, manufacturing processes, casting, forming, machining, cost considerations for machining operations. One or more field trips included. (Same as ISE 378).

Prerequisites: MAE 370 or CE 370.

MAE 395 - SEL TOPICS:MECH & AEROSPACE EG

Semester Hours: 1-3

Special topics in Mechanical or Aerospace Engineering.

MAE 399 - MAE MENTORING II

Semester Hours: 0

Yearly mentoring and advising from engineering faculty and staff. Prerequisites: MAE 299 and MAE 272.

MAE 425 - DESIGN OF MACHINE ELEMENTS/A&M

Semester Hours: 3

MAE 440 - ROCKET PROPULSION I

Semester Hours: 3

Introduction to the operation, analysis, and design of liquid and solid rockets. Incorporates design and realization of a thermal system, in which students work in teams to design a rocket motor or component. Prerequisite: MAE 343.

MAE 441 - AIRBREATHING PROPULSION

Semester Hours: 3

Air breathing propulsion systems with emphasis on gas turbine engines for air-and rotor-craft. Includes thermodynamic power cycles, components design, and engine performance analysis. Incorporates a turbine engine design and realization team project. Prerequisite: MAE 343.

MAE 444 - INTRO TO ELECTRIC PROPULSION

Semester Hours: 3

Elements of electrically-driven rocket propulsion for applications from low earth orbit to the outer planets will be discussed. The physics of ionizing and heating gases and plasmas for electrothermal, electrostatic and electromagnetic acceleration will be studied. Characteristics of Resistojet, Arcjet, Magnetoplasmadynamic thrusters, Electrothermal, Pulsed plasma, Electrostatic, and Hall thrusters will be covered. Review thruster system performance, power requirements and selection for space missions. Overview of current research efforts, including thruster systems, physics, and performance. Prerequisite: MAE 420.

MAE 449 - AEROSPACE LABORATORY

Semester Hours: 2

Experimental investigation of aerospace structures, airfoils and bodies in subsonic flow, and performance of various aerospace propulsion systems. An experiment design project is included. Concurrent registration in MAE 449L is required.

MAE 450 - INTRO TO HEAT & MASS TRANSFER

Semester Hours: 3

Principles of heat and mass transfer; application of principles to problems in conductive, convective, and radioactive heat transfer and mass transfer; laminar and turbulent flow processes; boiling and condensation; heat exchangers. Prerequisites: MAE 283, MAE 311, MAE 341 and (MAE 310 or MAE 330). Corequisite: MAE 451.

MAE 450L - INTRO HEAT & MASS TRANSFER LAB

Semester Hours: 0

MAE 451 - HEAT & MASS TRANSFER LAB

Semester Hour: 1

Experimental measurements and analysis of heat and mass transfer mechanisms, processes and systems. Test procedures, use of instrumentation, interpretation of experimental results and comparison to theory. Corequisite: MAE 450.

MAE 455 - DESIGN OF THERMAL SYSTEMS

Semester Hours: 3

Heat transfer, thermodynamics, and fluid mechanics applied to analysis and design of systems for storage and transport, and exchange of thermal energy. Modeling of thermal equipment, simulation of system performance, optimization of system design, and comprehensive design of thermal systems. Prerequisites: MAE 342 and MAE 450.

MAE 461 - VIBRATIONS ELASTIC SYS

Semester Hours: 3

Formulation of the equations of motion of discrete and continuous systems, analytical and numerical methods of solution, eigenvalue problems and dynamic response. Prerequisite: MAE 488.

MAE 463 - INTERMEDIATE DYNAMICS

Semester Hours: 3

Kinematics and dynamics of particles, system of particles, and rigid-bodies. Variational principles and Lagrangian mechanics. Prerequisites: MAE 272 and MAE 488.

MAE 466 - MECH & DSGN MACH ELEMENT

Semester Hours: 3

Detailed design and selection of machine elements such as gears, shafts, and bearings. Analysis of stresses and deformations under combined static and dynamic loads, stress concentrations, and fatigue. Prerequisites: MAE 364 and (MAE 370 or CE 370).

MAE 468 - ELEMENTS OF SPACECRAFT DESIGN

Semester Hours: 3

Fundamentals of spacecraft engineering and design. Topics include: orbital mechanics, space environment, attitude determination and control, communications, space structures, thermal control, propulsion and power, and systems and mission design. Prerequisites: MAE 371 and (MAE 272 or CE 272).

MAE 471 - ADV AEROSPACE STR & MTRLs

Semester Hours: 3

Composite materials and applications in aerospace structures including: material types and properties and fabrication techniques, micromechanics, constitutive behavior, and classical laminated plate theory. Introduction to failure concepts, sandwich panels and finite element modeling of 1-and 2-D aerospace structures. Prerequisites: MAE 311 and MAE 371.

MAE 474 - APP MECHANICS OF SOLIDS

Semester Hours: 3

Stresses and strains at a point, theories of failures, stress concentration factors, thick-walled cylinders, torsion of noncircular members, curved beams, unsymmetrical bending, and shear center. Prerequisites: MAE 370 or CE 370.

MAE 477 - EXP TECH SOLID MECHANICS

Semester Hours: 3

Experimental methods to determine stress, strain, displacement, velocity, and acceleration in various media. Theory and laboratory applications of electrical resistance strain gages, brittle coatings, and photo elasticity. Application of transducers and experimental analysis of engineering systems. Prerequisites: MAE 370 or CE 370.

MAE 480 - AIRCRAFT STABILITY & CONTROL

Semester Hours: 3

The stability and control of aerodynamic vehicles. The design of aircraft to obtain good flying characteristics. The complete governing equations and analog solutions of linearized equations. Prerequisites: MAE 430 and MAE 488.

MAE 488 - ANALY ENGINEERING SYSTEM

Semester Hours: 3

Development of mathematical engineering models of physical systems including: mechanical, electrical, and fluid systems and combined systems. Determination of the dynamic response of physical systems. Prerequisites: EE 213, MAE 284 and (MAE 272 or CE 272).

MAE 489 - COMPUTER AIDED ENGR

Semester Hours: 3

Analysis of design of structural, thermal, and dynamical systems using finite element and finite difference computer programs. Practical guidelines for discrete modeling; analysis of modeling errors. Comparison of exact and approximate solutions to boundary value problems. Prerequisites: MAE 370 or CE 370 and MAE 284 w/concurrency.

MAE 490 - SENIOR DESIGN I

Semester Hours: 3

Application of basic design principles including: design methodology, decision making, creativity, product liability, human factors, patents, ethics, and technical writing. Students will be assigned to a multi-disciplinary teams to develop design project requirements and initial concepts. Prerequisites: ISE 321, MAE 311, MAE 341 and [(MAE 310, MAE 364, MAE 375 & MAE 371) or (MAE 330, MAE 331, MAE 343, MAE 371, MAE 375)] and MAE 399.

MAE 491 - SENIOR DESIGN II

Semester Hours: 3

Continuation of MAE 490. Students work on multi-disciplinary teams to design, fabricate, test and demonstrate the performance of various mechanisms, products and vehicles according to customer requirements. Oral presentations and written detailed documentation of the project must also be completed. Prerequisite: MAE 490.

MAE 492 - MISSION DESIGN & DEVELOPMNT

Semester Hours: 3

Senior Capstone Course Option. Students work design teams to develop missions of interest to NASA, DoD and industry. Includes defining the mission architecture and associated vehicles and components required to meet the customer requirements. Prerequisites: MAE 490.

MAE 493 - ROCKET DESIGN

Semester Hours: 3

Senior Capstone Course Option. Design, build, test and fly a high-powered rocket with a payload to a specified altitude. Students work on multi-disciplinary teams to design payloads, avionics, recovery systems, structures and other sub-systems and then integrate them into the final vehicle. Prerequisites: MAE 490.

MAE 494 - AIRCRAFT DESIGN

Semester Hours: 3

Senior Capstone Course Option. Design, build, and test an unmanned aircraft to meet specified requirements. Students work on multi-disciplinary teams. Systems engineering aspects including simulation, fabrication, integration, scheduling and cost estimation are also emphasized. Prerequisite: MAE 490.

MAE 495 - SEL TOPICS:MECH & AEROSPACE EG

Semester Hours: 1-4

MAE 496 - IND STUDY:MECH & AEROSPACE EG

Semester Hours: 1-4

Special independent project in a topic of Mechanical or Aerospace Engineering. Must work with a MAE faculty member with project approved by MAE department chair.

MAE 499 - UNDERGRADUATE THESIS

Semester Hours: 3

Required for students completing an Honors Program Bachelors Thesis. Senior standing and permission of thesis advisor required.

Military Science (MIL)

MIL 101 - MILITARY SCIENCE I

Semester Hours: 2

MIL 101L - LABORATORY

Semester Hours: 0

MIL 102 - MILITARY SCIENCE I

Semester Hours: 2

MIL 102L - LABORATORY

Semester Hours: 0

MIL 201 - MILITARY SCIENCE II

Semester Hours: 2

MIL 201L - LABORATORY

Semester Hours: 0

MIL 202 - MILITARY SCIENCE II

Semester Hours: 2

MIL 202L - LABORATORY

Semester Hours: 0

MIL 206 - LEADER'S TRAINING COURSE

Semester Hours: 6

MIL 301 - MILITARY SCIENCE III

Semester Hours: 3

MIL 301L - LABORATORY

Semester Hours: 0

MIL 302 - MILITARY SCIENCE III

Semester Hours: 3

MIL 302L - LABORATORY

Semester Hours: 0

MIL 401 - MILITARY SCIENCE IV

Semester Hours: 3

MIL 401L - LABORATORY

Semester Hours: 0

MIL 402 - MILITARY SCIENCE IV

Semester Hours: 3

MIL 402L - LABORATORY

Semester Hours: 0

MIL 498 - MILITARY SCIENCE-VA/A&M

Semester Hours: 2

MIL 499 - MILITARY SCI-SPEC TOPICS/A&M

Semester Hours: 2

Music (MU)

MU 100 - INTRO TO MUSIC LITERATURE

Semester Hours: 3

Basic music appreciation. Exploration of ideas and issues in various types of western music through reading, listening, and discussion. Offered every semester.

MU 102 - INTRODUCTION TO WORLD MUSIC

Semester Hours: 3

Exploration of ideas and issues in various types of non-Western music through reading, listening, and discussion. Includes optional travel abroad. Offered summer semesters only.

MU 106 - INTRO TO MUSIC TECHNOLOGY

Semester Hour: 1

Introduction to Music Technology provides students with an overview of the technical and scientific aspects of music such as: acoustics, music psychology/sociology, and modern electronics. There will be particular emphasis on the use of electronic devices, MIDI and computer software to facilitate recording, playback, composition, storage, performance and analysis. Offered Fall and Spring semesters only.

MU 108 - INTRODUCTION TO MUSIC THEORY

Semester Hours: 3

Music fundamentals presented in a practical way for students who have no musical training as well as for majors/minors with limited theory knowledge. Mechanical aspects of clefs, notation, scales, intervals, chords, and rhythm with some aural skills, and practice in writing and harmonizing melodies. For students who expect to major or minor in music, this course may not be taken for degree credit. Offered Summer and Fall semesters only.

MU 110 - INTRO ARTS MANAGEMENT

Semester Hours: 3

Designed to explore arts management and administration, focusing primarily on non-profit considerations, but also addressing commercial activities in the arts.

MU 120 - BEGINNING CLASS VOICE

Semester Hour: 1

This course is designed to aid beginning singers in learning the fundamentals of solo singing.

MU 130 - PIANO CLASS

Semester Hour: 1

Techniques of performance, note reading, and basic musicianship.

MU 131 - PIANO CLASS II

Semester Hour: 1

MU 140 - BEGINNING GUITAR CLASS

Semester Hour: 1

The course objective is to provide basic guitar instruction for students who have had little or no experience playing the guitar. The course will cover note reading, posture, chords, strumming patterns, simple arpeggios, scales, and simple to intermediate solo playing.

MU 199 - MUSIC FORUM

Semester Hours: 0

Concert attendance is an indispensable aspect of a student's music education. Attendance requirements for this course include Thursday morning Music Forums as well as the number of formal concerts specified in the syllabus.

MU 201 - MUSIC THEORY I

Semester Hours: 3

Fundamentals of basic musicianship through practical as well as theoretical studies. Development of skills in written harmony and analysis. Appropriate Musicianship skills (e.g. MU 203) to be taken concurrently throughout theory program. Prerequisites: The approval of instructor or department chair. Offered Spring semesters only.

MU 202 - MUSIC THEORY II

Semester Hours: 3

Continuation of MU 201. Offered Fall semesters only. Prerequisites: MU 201 and MU 203.

MU 203 - MUSICIANSHIP SKILLS I

Semester Hour: 1

To be taken concurrently with MU 201 and designed to complement written studies. Exercises in sight singing using solfege, numbers or other systems. Basic conducting patterns, rhythmic execution and melodic, harmonic, and rhythmic dictation. Prerequisites: Approval of instructor or department chair. Offered Spring semesters only.

MU 204 - MUSICIANSHIP SKILLS II

Semester Hour: 1

Continuation of MU 203. Offered Fall semesters only. Prerequisites: MU 201 and MU 203.

MU 205 - JAZZ THEORY

Semester Hours: 2

This course serves as an introduction to the theoretical analysis of jazz harmony, with an emphasis on styles from the bebop era and later. Offered every other Fall semester. Prerequisites: MU 201.

MU 207 - MUSIC TECHNOLOGY I

Semester Hours: 3

Students will learn the basics of using a computer interface to create and edit music, using a software MIDI sequencer and Digital Audio Workstation. Students will learn the basics of MIDI sequencing and music production. Prerequisites: MU 106.

MU 208 - MUSIC TECHNOLOGY II

Semester Hours: 3

Students will learn advanced techniques in digital audio production, including (but not limited to): Advanced MIDI sequencing, audio sampling, and production/mastering. Prerequisites: MU 106, MU 207.

MU 301 - THEORY OF MUSIC III

Semester Hours: 3

A study on chromatic harmony and a continuation of the studies of MU 201 and MU 202. Prerequisites: MU 202 and MU 204.

MU 302 - MUSICAL MATLS OF MODERN ERA

Semester Hours: 3

Systems of tonal organization, compositional procedures, terminology, and analytical methods that related to music since 1900. Offered every other Fall semester only. Prerequisites: MU 301 and MU 303 and MU 304.

MU 303 - MUSICIANSHIP SKILLS III

Semester Hour: 1

Continuation of MU 204. Offered Spring semesters only. Prerequisites: MU 202 and MU 204.

MU 305 - MUSIC TECHNOLOGY III

Semester Hours: 3

This course will focus primarily on analogue and digital audio systems setup and implementation. Mixing consoles, amplifiers, loudspeakers, microphones, keyboards, playback equipment, processing, cabling, configuration, computer hardware and software will be discussed and demonstrated in depth. Prerequisite: MU 106.

MU 306 - MUSIC TECHNOLOGY IV

Semester Hours: 3

An exploration of music technology hardware and software, including an overview of acoustics, MIDI and digital audio data structures, and an introduction to multimedia authoring. Offered every other Spring semester only. Prerequisites: MU 106.

MU 311 - HISTORY OF MUSIC I

Semester Hours: 3

Focus on music as an art in western civilization to 1750. Representative musical works and style. Understanding of musical concepts in view of historical background and cultural context. Offered Fall semesters only. Prerequisites: MU 100 and MU 301.

MU 312 - HISTORY OF MUSIC II

Semester Hours: 3

Focus on music as an art in western civilization from 1750 to the present. Representative musical works and style. Understanding of musical concepts in view of historical background and cultural context. Offered Spring semesters only. Prerequisites: MU 100 and MU 301.

MU 313 - SURVEY OF CHURCH MUSIC

Semester Hours: 3

Explores Christian music from historical and musical perspectives. Prerequisites: MU 100 and MU 301.

MU 314 - THE BEATLES

Semester Hours: 3

The purpose of this course is to familiarize the student with the music, lyrics, recordings, personal and public lives, production techniques, career strategy, social ramifications, and technological impact of the musical group known as The Beatles. The course will provide the student with an appreciation for the music itself, and a broader comprehension of the social, economic, political, and cultural upheavals that gave rise to the musical trends of the Sixties.

MU 316 - HIST & APPRECIATION OF JAZZ

Semester Hours: 3

This course is designed to explore the history and development of jazz as an art form, from its origins as popular music to its evolution into an Art Music. Improvisation will be explained and explored in the context of the different styles of jazz. The course will focus on understanding through listening to jazz. Every other spring semester only. Prerequisite: MU 100.

MU 317 - JAZZ ARRANGING

Semester Hours: 2

This course provides the student with instruction in arranging for small and large jazz ensembles, both instrumental and vocal. Offered every other Spring semester only. Prerequisite: MU 205.

MU 320 - PIANO PEDAGOGY

Semester Hours: 2

Materials, techniques, and practices in teaching beginners and students through lower advanced grades of piano. Practical experience. Offered upon demand. Prerequisite: approval of instructor.

MU 321 - PIANO PEDAGOGY II

Semester Hours: 2

An examination of relevant methods in piano pedagogy and technique for all levels of instruction. The course will also assess the historical achievements made by previous pedagogues in the field of piano pedagogy. Prerequisite: MU 320.

MU 322 - DICTION FOR SINGERS

Semester Hours: 2

Intended as an overview for vocal and choral students who wish to learn the diction requirements for singing in Latin, Italian, German, French, and English. Offered every Fall semester only. Prerequisite: MUA 111.

MU 325 - CONDUCTING

Semester Hours: 2

Basic techniques of choral and instrumental conducting. Offered Fall semesters only. Prerequisite: MU 301.

MU 399 - SPECIAL TOPICS IN MUSIC

Semester Hours: 3

Special topics in music. Focus and emphasis of topics announced in advance. Offered upon demand.

MU 401 - FORM AND ANALYSIS

Semester Hours: 2

Musical forms and analysis. Offered every other Fall semester only. Prerequisites: MU 303 and 312.

MU 402 - CHURCH MUSIC METDS, MATRL & AD

Semester Hours: 3

Church Music Methods, Materials, and Administration. Prerequisite: MU 301.

MU 404 - MUSIC TECHNOLOGY INDIV PROJECT

Semester Hour: 1

Three-semester sequence for students enrolled in music technology majors and minors. Students will create individual projects in MIDI, sound creation and editing, and multimedia. Prerequisite: MU 306.

MU 406 - INTERNSHIP IN MUSIC TECHNOLOGY

Semester Hours: 3

An internship of eight hours per week working in the music technology industry. Offered upon demand. Prerequisite: MU 306.

MU 407 - INTERNSHIP MUSIC BUSINESS

Semester Hours: 3

Internship in Music Business. Prerequisites: MU 100 and MU 110 and MU 301 and MKT 301 and MGT 301 and FIN 410.

MU 408 - INTERNSHIP CHURCH MUSIC

Semester Hours: 3

An internship of nine hours per week working in church music. Prerequisites: MU 100 and MU 301 and MU 313 and MU 402 and MUE 328.

MU 409 - INTERNSHIP GRP PIANO PEDAGOGY

Semester Hour: 1

An internship of three hours per week working with an approved group piano program. Prerequisites: MU 100 and MU 321 and MU 420 and MUE 328.

MU 410 - INTERNSHIP INDIVID PIANO PEDAG

Semester Hours: 3

An internship of nine hours per week working with a local piano teacher. Prerequisites: MU 100 and MU 321 and MU 420 and MUE 328.

MU 411 - INTNSHIP INDVL PIANO PEDAGOGY

Semester Hours: 3

Courses of study and activity developed by the student and submitted to music faculty for approval. Projects to reinforce learning and performance experiences. May be repeated, but no more than two hours count toward degree requirements. Offered upon demand. Prerequisites: MU 100 and MU 321 and MU 420 and MUE 328.

MU 416 - ORCHESTRATION

Semester Hours: 2

Instruments of the band and orchestra, their ranges, transpositions, and capabilities. Practical experience in arranging for instruments. Offered every other Fall semester only. Prerequisite: MU 302.

MU 420 - PIANO LITERATURE

Semester Hours: 2

Music for string keyboard instruments from the pre-pianoforte period to the present. Representative works from all periods. Offered upon demand. Prerequisites: MU 302 and MU 304 and MU 312.

MU 425 - ADVANCED CONDUCTING

Semester Hours: 2

Review of basic conducting patterns. Emphasis on communication as the role of the conductor. Detailed score preparation. Offered every other Spring semester only. Prerequisite: MU 325.

MU 440 - STUDIO INSTR-VOICE

Semester Hours: 0.5

Music Applied (MUA)

MUA 111 - STUDIO INSTR-VOICE

Semester Hour: 1

For non-music majors, music minors, and music majors' secondary instrument.

MUA 115 - STUDIO INSTR-VOICE

Semester Hour: 1.5

For aspiring music majors who have not yet been accepted as music majors. Prerequisite: permission of instructor.

MUA 121 - STUDIO INSTR-ORGAN

Semester Hour: 1

For non-music majors, music minors, and music majors' secondary instrument.

MUA 125 - STUDIO INSTR IN ORGAN

Semester Hour: 1.5

For aspiring music majors who have not yet been accepted as music majors. Prerequisite: permission of instructor.

MUA 131 - STUDIO INSTR-PIANO

Semester Hour: 1

For non-music majors, music minors, and music majors' secondary instrument.

MUA 135 - STUDIO INSTR-PIANO

Semester Hour: 1.5

For aspiring music majors who have not yet been accepted as music majors. Prerequisite: permission of instructor.

MUA 141 - STUDIO INSTR-GUITAR

Semester Hour: 1

For non-music majors, music minors, and music majors' secondary instrument.

MUA 145 - STUDIO INSTR-GUITAR

Semester Hour: 1.5

For aspiring music majors who have not yet been accepted as music majors. Prerequisite: permission of instructor.

MUA 151 - STUDIO INSTR-STRINGS

Semester Hour: 1

For non-music majors, music minors, and music majors' secondary instrument.

MUA 155 - STUDIO INSTR-STRINGS

Semester Hour: 1.5

For aspiring music majors who have not yet been accepted as music majors. Prerequisite: permission of instructor.

MUA 158 - STUDIO INSTR-STRINGS

Semester Hour: 1

For secondary instrument, instrumental music education students.

MUA 159 - STUDIO INSTR-STRINGS

Semester Hour: 1

For secondary instrument, instrumental music education students.

MUA 161 - STUDIO INSTR-WOODWINDS

Semester Hour: 1

For non-music majors, music minors, and music majors' secondary instrument.

MUA 165 - STUDIO INSTR-WOODWINDS

Semester Hour: 1.5

For aspiring music majors who have not yet been accepted as music majors. Prerequisite: permission of instructor.

MUA 171 - STUDIO INSTR-BRASS

Semester Hour: 1

For non-music majors, music minors, and music majors' secondary instrument.

MUA 175 - STUDIO INSTR-BRASS

Semester Hour: 1.5

For aspiring music majors who have not yet been accepted as music majors. Prerequisite: permission of instructor.

MUA 181 - STUDIO INSTR-PERCUSSION

Semester Hour: 1

For non-music majors, music minors, and music majors' secondary instrument.

MUA 185 - STUDIO INSTR-PERCUSSION

Semester Hour: 1.5

For aspiring music majors who have not yet been accepted as music majors. Prerequisite: permission of instructor.

MUA 191 - STUDIO INSTR-COMPOSITION

Semester Hour: 1

For aspiring music majors who have not yet been accepted as music majors. Prerequisite: permission of instructor.

MUA 195 - STUDIO INSTR-COMPOSITION

Semester Hour: 1.5

For aspiring music majors who have not yet been accepted as music majors. Prerequisite: permission of instructor.

MUA 211 - STUDIO INSTR-VOICE

Semester Hour: 1.5

For music majors' principal instrument. Prerequisite: MUA 111.

MUA 215 - STUDIO INSTR-VOICE

Semester Hours: 2

For music majors' principal instrument.

MUA 217 - STUDIO INSTRUCTION IN VOICE

Semester Hours: 2

For music majors' principal instrument.

MUA 218 - STUDIO INSTRUCTION IN VOICE

Semester Hours: 2

For music majors' principal instrument.

MUA 219 - STUDIO INSTRUCTION IN VOICE

Semester Hours: 2

For music majors' principal instrument.

MUA 221 - STUDIO INSTR-ORGAN

Semester Hour: 1.5

For music majors' principal instrument. Prerequisite: MUA 121.

MUA 223 - STUDIO INSTR-ORGAN

Semester Hour: 1.5

For music majors' principal instrument.

MUA 226 - STUDIO INSTRUCTION-ORGAN

Semester Hours: 2

For music majors' principal instrument.

MUA 227 - STUDIO INSTRUCTION-ORGAN

Semester Hours: 2

For music majors' principal instrument.

MUA 228 - STUDIO INSTRUCTION-ORGAN

Semester Hours: 2

For music majors' principal instrument.

MUA 229 - STUDIO INSTRUCTION-ORGAN

Semester Hours: 2

For music majors' principal instrument.

MUA 231 - STUDIO INSTR-PIANO

Semester Hour: 1.5

For music majors' principal instrument. Prerequisite: MUA 131.

MUA 236 - STUDIO INSTRUCTION-PIANO

Semester Hours: 2

For music majors' principal instrument.

MUA 237 - STUDIO INSTRUCTION-PIANO

Semester Hours: 2

For music majors' principal instrument.

MUA 238 - STUDIO INSTRUCTION-PIANO

Semester Hours: 2

For music majors' principal instrument.

MUA 239 - STUDIO INSTRUCTION-PIANO

Semester Hours: 2

For music majors' principal instrument.

MUA 241 - STUDIO INSTR-GUITAR

Semester Hour: 1.5

For music majors' principal instrument. Prerequisite: MUA 141.

MUA 246 - STUDIO INSTR-GUITAR

Semester Hours: 2

For music majors' principal instrument.

MUA 247 - STUDIO INSTR-GUITAR

Semester Hours: 2

For music majors' principal instrument.

MUA 248 - STUDIO INSTR-GUITAR

Semester Hours: 2

For music majors' principal instrument.

MUA 249 - STUDIO INSTR-GUITAR

Semester Hours: 2

For music majors' principal instrument.

MUA 251 - STUDIO INSTR-STRINGS

Semester Hour: 1.5

For music majors' principal instrument. Prerequisite: MUA 151.

MUA 256 - STUDIO INSTR-STRINGS

Semester Hours: 2

For music majors' principal instrument.

MUA 257 - STUDIO INSTR-STRINGS

Semester Hours: 2

For music majors' principal instrument.

MUA 258 - STUDIO INSTR-STRINGS

Semester Hours: 2

For music majors' principal instrument.

MUA 259 - STUDIO INSTR-STRINGS

Semester Hours: 2

For music majors' principal instrument.

MUA 261 - STUDIO INSTR-WOODWINDS

Semester Hour: 1.5

For music majors' principal instrument. Prerequisite: MUA 161.

MUA 268 - STUDIO INSTR-WOODWINDS

Semester Hours: 2

For music majors' principal instrument.

MUA 269 - STUDIO INSTR-WOODWINDS

Semester Hours: 2

For music majors' principal instrument.

MUA 271 - STUDIO INSTR-BRASS

Semester Hour: 1.5

For music majors' principal instrument. Prerequisite: MUA 171.

MUA 276 - STUDIO INSTR-BRASS

Semester Hours: 2

For music majors' principal instrument.

MUA 277 - STUDIO INSTR-BRASS

Semester Hours: 2

For music majors' principal instrument.

MUA 278 - STUDIO INSTR-BRASS

Semester Hours: 2

For music majors' principal instrument.

MUA 279 - STUDIO INSTR-BRASS

Semester Hours: 2

For music majors' principal instrument.

MUA 281 - STUDIO INSTR-PERCUSSION

Semester Hour: 1.5

For music majors' principal instrument. Prerequisite: MUA 181.

MUA 286 - STUDIO INSTR-PERCUSSION

Semester Hours: 2

For music majors' principal instrument.

MUA 287 - STUDIO INSTR-PERCUSSION

Semester Hours: 2

For music majors' principal instrument.

MUA 288 - STUDIO INSTR-PERCUSSION

Semester Hours: 2

For music majors' principal instrument.

MUA 289 - STUDIO INSTR-PERCUSSION

Semester Hours: 2

For music majors' principal instrument.

MUA 291 - STUDIO INSTR-COMPOSITION

Semester Hour: 1.5

MUA 311 - STUDIO INSTR-VOICE

Semester Hour: 1.5

For music majors principal instrument. Prerequisite: MUA 211.

MUA 321 - STUDIO INSTR-ORGAN

Semester Hour: 1.5

For music majors principal instrument. Prerequisite: MUA 221.

MUA 331 - STUDIO INSTR-PIANO

Semester Hour: 1.5

For music majors principal instrument. Prerequisite: MUA 231.

MUA 341 - STUDIO INSTR-GUITAR

Semester Hour: 1.5

For music majors principal instrument. Prerequisite: MUA 241.

MUA 351 - STUDIO INSTR-STRINGS

Semester Hour: 1.5

For music majors principal instrument. Prerequisite: MUA 251.

MUA 361 - STUDIO INSTR-WOODWINDS

Semester Hour: 1.5

For music majors principal instrument. Prerequisite: MUA 261.

MUA 371 - STUDIO INSTR-BRASS

Semester Hour: 1.5

For music majors principal instrument. Prerequisite: MUA 271.

MUA 381 - STUDIO INSTR-PERCUSSION

Semester Hour: 1.5

For music majors principal instrument. Prerequisite: MUA 281.

MUA 411 - STUDIO INSTRUCTION-VOICE

Semester Hour: 1.5

For music majors' principle instrument. Prerequisite: MUA 211.

MUA 416 - STUDIO INSTR-VOICE

Semester Hours: 2

For music majors' principal instrument.

MUA 417 - STUDIO INSTR-VOICE

Semester Hours: 2

For music majors' principal instrument.

MUA 418 - STUDIO INSTR-VOICE

Semester Hours: 2

For music majors' principal instrument.

MUA 419 - STUDIO INSTR-VOICE

Semester Hours: 2

For music majors' principal instrument.

MUA 421 - STUDIO INSTR-ORGAN

Semester Hour: 1.5

For music majors' principle instrument. Prerequisite: MUA 221.

MUA 422 - STUDIO INSTR-ORGAN

Semester Hours: 2

For music majors' principal instrument.

MUA 426 - STUDIO INSTR-ORGAN

Semester Hours: 2

For music majors' principal instrument.

MUA 427 - STUDIO INSTR-ORGAN

Semester Hours: 2

For music majors' principal instrument.

MUA 428 - STUDIO INSTR-ORGAN

Semester Hours: 2

For music majors' principal instrument.

MUA 429 - STUDIO INSTR-ORGAN

Semester Hours: 2

For music majors' principal instrument.

MUA 431 - STUDIO INSTR-PIANO

Semester Hour: 1.5

For music majors' principle instrument. Prerequisite: MUA 231.

MUA 432 - STUDIO INSTR-PIANO

Semester Hours: 2

For music majors' principal instrument.

MUA 433 - STUDIO INSTR-PIANO

Semester Hours: 2

For music majors' principal instrument.

MUA 434 - STUDIO INSTR-PIANO

Semester Hours: 2

For music majors' principal instrument.

MUA 435 - STUDIO INSTR-PIANO

Semester Hours: 2

For music majors' principal instrument.

MUA 436 - STUDIO INSTR-PIANO

Semester Hours: 2

For music majors' principal instrument.

MUA 437 - STUDIO INSTR-PIANO

Semester Hours: 2

For music majors' principal instrument.

MUA 438 - STUDIO INSTR-PIANO

Semester Hours: 2

For music majors' principal instrument.

MUA 439 - STUDIO INSTR-PIANO

Semester Hours: 2

For music majors' principal instrument.

MUA 441 - STUDIO INSTR-GUITAR

Semester Hour: 1.5

For music majors' principle instrument. Prerequisite: MUA 241.

MUA 445 - STUDIO INSTR-GUITAR

Semester Hours: 2

For music majors' principal instrument.

MUA 446 - STUDIO INSTR-GUITAR

Semester Hours: 2

For music majors' principal instrument.

MUA 447 - STUDIO INSTR-GUITAR

Semester Hours: 2

For music majors' principal instrument.

MUA 448 - STUDIO INSTR-GUITAR

Semester Hours: 2

For music majors' principal instrument.

MUA 449 - STUDIO INSTR-GUITAR

Semester Hours: 2

For music majors' principal instrument.

MUA 451 - STUDIO INSTR-STRINGS

Semester Hour: 1.5

For music majors' principle instrument. Prerequisite: MUA 251.

MUA 452 - STUDIO INSTR-STRINGS

Semester Hours: 2

For music majors' principal instrument.

MUA 453 - STUDIO INSTR-STRINGS

Semester Hours: 2

For music majors' principal instrument.

MUA 454 - STUDIO INSTR-STRINGS

Semester Hours: 2

For music majors' principal instrument.

MUA 455 - STUDIO INSTR-STRINGS

Semester Hours: 2

For music majors' principal instrument.

MUA 456 - STUDIO INSTR-STRINGS

Semester Hours: 2

For music majors' principal instrument.

MUA 457 - STUDIO INSTR-STRINGS

Semester Hours: 2

For music majors' principal instrument.

MUA 458 - STUDIO INSTR-STRINGS

Semester Hours: 2

For music majors' principal instrument.

MUA 459 - STUDIO INSTR-STRINGS

Semester Hours: 2

For music majors' principal instrument.

MUA 461 - STUDIO INSTR-WOODWINDS

Semester Hour: 1.5

For music majors' principle instrument. Prerequisite: MUA 271.

MUA 462 - STUDIO INSTR-WOODWINDS

Semester Hours: 2

For music majors' principal instrument.

MUA 467 - STUDIO INSTR-WOODWINDS

Semester Hours: 2

For music majors' principal instrument.

MUA 468 - STUDIO INSTR-WOODWINDS

Semester Hours: 2

For music majors' principal instrument.

MUA 469 - STUDIO INSTR-WOODWINDS

Semester Hours: 2

For music majors' principal instrument.

MUA 471 - STUDIO INSTR-BRASS

Semester Hour: 1.5

For music majors' principle instrument. Prerequisite: MUA 271.

MUA 473 - STUDIO INSTR-BRASS

Semester Hours: 2

For music majors' principal instrument.

MUA 474 - STUDIO INSTR-BRASS

Semester Hours: 2

For music majors' principal instrument.

MUA 475 - STUDIO INSTR-BRASS

Semester Hours: 2

For music majors' principal instrument.

MUA 476 - STUDIO INSTR-BRASS

Semester Hours: 2

For music majors' principal instrument.

MUA 477 - STUDIO INSTR-BRASS

Semester Hours: 2

For music majors' principal instrument.

MUA 478 - STUDIO INSTR-BRASS

Semester Hours: 2

For music majors' principal instrument.

MUA 479 - STUDIO INSTR-BRASS

Semester Hours: 2

For music majors' principal instrument.

MUA 481 - STUDIO INSTR-PERCUSSION

Semester Hour: 1.5

For music majors' principle instrument. Prerequisite: MUA 281.

MUA 482 - STUDIO INSTR-PERCUSSION

Semester Hours: 2

For music majors' principal instrument.

MUA 483 - STUDIO INSTR-PERCUSSION

Semester Hours: 2

For music majors' principal instrument.

MUA 484 - STUDIO INSTR-PERCUSSION

Semester Hours: 2

For music majors' principal instrument.

MUA 485 - STUDIO INSTR-PERCUSSION

Semester Hours: 2

For music majors' principal instrument.

MUA 486 - STUDIO INSTR-PERCUSSION

Semester Hours: 2

For music majors' principal instrument.

MUA 487 - STUDIO INSTR-PERCUSSION

Semester Hours: 2

For music majors' principal instrument.

MUA 488 - STUDIO INSTR-PERCUSSION

Semester Hours: 2

For music majors' principal instrument.

MUA 489 - STUDIO INSTR-PERCUSSION

Semester Hours: 2

For music majors' principal instrument.

MUA 491 - STUDIO INSTR-COMPOSITION

Semester Hour: 1.5

For music majors' principal instrument.

MUA 498 - SENIOR RECITAL

Semester Hour: 1.5

Represents the final semester of studio instruction on the primary instrument for all music majors except those pursuing the performance emphasis, who typically perform this recital as juniors. The recital must include a minimum of 30 minutes of music. The student must pass a recital jury at least two weeks before the scheduled recital performance.

MUA 499 - PERFORMANCE EMPHASIS RECITAL

Semester Hour: 1.5

For music majors pursuing the performance emphasis only. The Performance Emphasis Recital represents the final semester of studio instruction on the primary instrument for music majors pursuing the performance emphasis. The recital must include a minimum of 60 minutes of music. The student must pass a recital jury at least two weeks before the scheduled recital performance.

Music Education (MUE)

MUE 215 - MUSIC FOR YOUNG CHILD

Semester Hours: 3

For elementary and special education teachers, recreational therapists, church school, or prospective teachers not trained in music. Preparation to teach children ages 3-12 through experience in singing, reading, planning, and presentation. Elementary education majors using music as their second area of study must select MUE 326 rather than MUE 215 for their GER.

MUE 321 - CHORAL/INSTRUMENTAL DIR OBSERV

Semester Hour: 1

In this course, music education students will observe band or choral programs outside their primary area: choral students in an instrumental program and instrumental students in a choral program. The student will observe and assist the band or choir director, gaining an experience in working with ensembles outside the student's primary area. Prerequisite: MU 325.

MUE 328 - TEACHING GENERAL MUSIC

Semester Hours: 3

Materials and methods. Emphasis on developing teaching competencies in general music, with an emphasis on the elementary school level. Prerequisite: MU 301.

MUE 427 - ORG & DIR VOCALS ENS SEC

Semester Hours: 3

MUE 428 - VOCAL/CHORAL METH SEC SCH

Semester Hours: 3

Includes basic principles of breathing, posture, and resonance. Diction guidelines for Latin, Italian, German, and French; repertoire for both vocal and choral students; organizational methods for leading choral programs; rehearsal techniques; classroom management skills. Prerequisites: MUE 326 and MUE 327 and MU 425.

MUE 429 - ORG & DIR INSTRU GRP SEC SCH

Semester Hours: 3

Reperatoire, procedures for administering and teaching school bands, orchestras and instrumental ensembles. Prerequisite: MU 425.

Music Jazz (MUJ)

MUJ 131 - JAZZ STUDIO INSTR-PIANO

Semester Hour: 1

For non-music majors, music minors, and music majors' secondary instrument.

MUJ 141 - JAZZ STUDIO INSTR-GUITAR

Semester Hour: 1

For non-music majors, music minors, and music majors' secondary instrument.

MUJ 151 - JAZZ STUDIO INSTRUCTION-BASS

Semester Hour: 1

For non-music majors, music minors, and music majors' secondary instrument.

MUJ 152 - JAZZ STUDIO INSTR-BASS

Semester Hour: 1.5

MUJ 161 - JAZZ STUDIO INSTR-WOODWINDS

Semester Hour: 1

For non-music majors, music minors, and music majors' secondary instrument.

MUJ 171 - JAZZ STUDIO INSTR-BRASS

Semester Hour: 1

For non-music majors, music minors, and music majors' secondary instrument.

MUJ 181 - JAZZ STUDIO INST-PERCUSSION

Semester Hour: 1

For non-music majors, music minors, and music majors' secondary instrument.

MUJ 205 - JAZZ THEORY

Semester Hours: 2

This course serves as an introduction to the theoretical analysis of jazz harmony, with an emphasis on styles from the bebop era and later. Offered every other Fall semester. Prerequisites: MU 201.

MUJ 231 - JAZZ STUDIO INSTR-PIANO

Semester Hour: 1.5

For music majors' principal instrument.

MUJ 237 - STUDIO INSTR: JAZZ PIANO

Semester Hours: 2

MUJ 241 - JAZZ STUDIO INST-GUITAR

Semester Hour: 1.5

For music majors' principal instrument.

MUJ 251 - JAZZ STUDIO INSTRUCTION-BASS

Semester Hour: 1.5

For music majors' principal instrument.

MUJ 261 - JAZZ STUDIO INSTR-WOODWINDS

Semester Hour: 1.5

For music majors' principal instrument.

MUJ 265 - JAZZ STUDIO INSTR-WOODWINDS

Semester Hours: 2

For music majors' principal instrument.

MUJ 271 - JAZZ STUDIO INSTR-BRASS

Semester Hour: 1.5

For music majors' principal instrument.

MUJ 281 - JAZZ STUDIO INSTR-PERCUSSION

Semester Hour: 1.5

For music majors' principal instrument.

MUJ 308 - JAZZ IMPROVISATION I

Semester Hours: 2

MUJ 309 - JAZZ IMPROVISATION II

Semester Hours: 2

MUJ 331 - STUDIO INSTR-PIANO

Semester Hour: 1.5

For music majors principal instrument. Prerequisite: MUJ 231.

MUJ 341 - STUDIO INSTR-GUITAR

Semester Hour: 1.5

For music majors principal instrument. Prerequisite: MUJ 241.

MUJ 351 - STUDIO INSTR-BASS

Semester Hour: 1.5

For music majors principal instrument. Prerequisite: MUJ 251.

MUJ 361 - STUDIO INSTR-WOODWINDS

Semester Hour: 1.5

For music majors principal instrument. Prerequisite: MUJ 261.

MUJ 371 - STUDIO INSTR-BRASS

Semester Hour: 1.5

For music majors principal instrument. Prerequisite: MUJ 271.

MUJ 381 - STUDIO INSTR-PERCUSSION

Semester Hour: 1.5

For music majors principal instrument. Prerequisite: MUJ 281.

MUJ 431 - JAZZ STUDIO INSTR-PIANO

Semester Hours: 2

For music majors' principal instrument.

MUJ 441 - JAZZ STUDIO INSTR-GUITAR

Semester Hours: 2

For music majors' principal instrument.

MUJ 461 - JAZZ STUDIO INSTR-WOODWINDS

Semester Hours: 2

For music majors' principal instrument.

MUJ 471 - JAZZ STUDIO INST-BRASS

Semester Hours: 2

For music majors' principal instrument.

MUJ 481 - JAZZ STUDIO INSTR-PERCUSSION

Semester Hours: 2

For music majors' principal instrument.

MUJ 498 - SENIOR JAZZ RECITAL

Semester Hour: 1.5

For music majors pursuing the jazz emphasis only. The Senior Jazz Recital represents the final semester of studio instruction on the primary jazz instrument for music majors pursuing the jazz emphasis. The recital must include a minimum of 30 minutes of music. The student must pass a recital jury at least two weeks before the scheduled performance.

Nursing (NUR)

NUR 000 - NURSING-CREDIT BY VALIDATION

Semester Hours: 3-42

NUR 001 - NURSING TESTING BLOCK

Semester Hours: 0

Nursing Testing Block is a common block of time for students in different cohorts to take their examinations.

NUR 102 - MULTIDIMENSIONS OF NURSING

Semester Hours: 3

This course is designed for the student who has declared nursing as a major. Emphasis will be placed on the role of professional nurses working with clients and other health care professionals. The evolution of nursing as a profession will be examined and the student introduced to the health care delivery system.

NUR 201 - MULTIDIM ASPECTS HL CAREER OPT

Semester Hours: 3

This course is designed for the student who wishes to explore a career in the health care professions as a potential career path. Particular emphasis will be placed on the role of health care providers working in partnership with clients to promote health states and prevent disease.

NUR 202 - HEALTHY LIVING LIFESPAN

Semester Hours: 3

This class will focus on health and wellness across the lifespan, with an emphasis on promoting healthy living and preventing illness. It is designed to develop health literacy and to identify ways to put healthy ideas into practice. Diverse perceptions and beliefs related to health are explored and strategies to optimize health are presented.

NUR 220 - HEALTH PROMOTION NUR MAJORS

Semester Hours: 3

The focus of this class is on health and high-level wellness across the lifespan, with an emphasis on promoting healthy living and preventing illness. Diverse perceptions and beliefs related to health and wellness are explored, and ways to put healthy ideas into practice are applied. Medical terminology to improve healthcare communication is incorporated into the course.

NUR 301 - Professional Concepts in Nursing

Semester Hours: 2

This course will focus on development using concepts and theories basic to the art and science of nursing. Students are introduced to the concepts of communication, teaching/learning, clinical decision making, ethical, legal, nursing history, and philosophy for knowledge development of the discipline. Prerequisites with concurrency: NUR 303, 304, 309, and 311.

NUR 302 - NURSING & HEALTH PROMOTION

Semester Hours: 3

Focus on nursing, health, and wellness across the life span. Emphasis on health promotion and prevention of illness. Strategies to optimize health are presented. Perceptions and beliefs related to health, illness, disease, and cultural diversity are explored as are mechanisms for promoting health through politics and the health care delivery system.

NUR 303 - HEALTH ASSESSMENT

Semester Hours: 4

Focus on holistic assessment of culturally diverse clients across the life span. Communication & psychomotor skills are developed in clinical laboratory settings with an emphasis on normal findings and health promotion.

NUR 303L - CLINICAL

Semester Hours: 0

NUR 304 - APP PATHOPHYSIOLOGY LIFESPAN

Semester Hours: 3

The course is designed to help the student build on previous knowledge of anatomy and physiology and microbiology. Adaptations and alterations in health status throughout the lifespan are emphasized. Students explore the implications of lifestyle to pathology within a nursing framework, and learn to relate normal body functioning to the pathophysiological changes that occur in, and as a result of disease.

NUR 305 - NUR PROC MENTAL HLTH/ILLNESS

Semester Hours: 4

Nursing process in the promotion of psychosocial integrity. Emphasis is on the therapeutic use of self through providing interventions for individuals and groups in a variety of settings. Prerequisites: NUR 310 and NUR 312 and NUR 321.

NUR 305L - CLINICAL

Semester Hours: 0

NUR 307 - INQRY TO EVIDNC BASED NURS PRC

Semester Hours: 3

This course identifies various modes of inquiry and critical analysis used in the development of nursing science. Explore evidence based models to examine the evidence from a variety of research designs used to formulate nursing decisions. Emphasis is on identifying and synthesizing the best evidence to solve complex health problems in order to deliver safe, competent nursing care to diverse populations. Prerequisites: NUR 310 and NUR 312 and NUR 321.

NUR 308 - NURS CARE ADULTS ALTER HLTH

Semester Hours: 8

This course focuses on the application of the nursing process in the collaborative nursing management of adult clients experiencing simple to complex physiological health alterations. Clinical experiences provide opportunities for beginning to intermediate clinical reasoning in the acute care environment. The embodiment of professionalism and professional values are emphasized. Prerequisites: NUR 310 and NUR 312 and NUR 321.

NUR 308L - CLINICAL

Semester Hours: 0

NUR 309 - CLINICAL INFORMATICS

Semester Hours: 2

This course is designed to introduce clinical informatics as a tool to improve healthcare systems through safe, ethical, and evidence-based practice. Advances in technology, data management, and decision support software are explored. Competencies in basic computer skills are also included in the course to improve information literacy. Prerequisites with concurrency: NUR 301, 303, 304, and 311.

NUR 310 - PROFESSIONAL PRACTICE NURS I

Semester Hours: 6

This course will begin the process of learning foundational nursing skills to be used in nursing practice. Psychomotor nursing skills needed to assist individuals meet basic human needs will be taught with expectation the student will demonstrate competency in performing skills. Laboratory and clinical experiences are included. Prerequisites: NUR 301, NUR 303, NUR 304, NUR 309, NUR 311.

NUR 310L - CLINICAL

Semester Hours: 0

NUR 311 - CLINICAL CALCULATIONS

Semester Hour: 1

In this course, students will learn to accurately calculate medication dosages. Testing in this course will establish minimal medication calculation proficiency required to progress to the second semester of the nursing program. Prerequisites with concurrency: NUR 301, 304, 303, and 309.

NUR 312 - GERO NURSING CARE

Semester Hours: 3

This course is designed to focus on current health care issues affecting the older adult. Physical, psychological, sociocultural, and spiritual aspects of aging are examined within the context of the family and society. The course applies the nursing process with emphasis on optimal health for the older adult. Prerequisites: NUR 301, 303, 304, 309, and 311. Prerequisite with concurrency: NUR 310 and 321.

NUR 312L - CLINICAL

Semester Hours: 0

This is the clinical component of the Gerontological Nursing Care course. The course will focus on current health care issues affecting the older adult. Physical, psychological, sociocultural, and spiritual aspects of aging are examined within the context of the family and society. The course applies the nursing process with emphasis on optimal health for the older adult.

NUR 321 - PHARMACOLOGY IN NURS

Semester Hours: 3

This course comprises pharmacological concepts incorporating an overview of historical and current issues in drug therapy. Pharmacotherapeutics, pharmacodynamics, pharmacokinetics, contraindications and precautions for prototype drugs for multiple body systems are presented. Major emphasis is placed on nursing management practices using nursing process as well as the nurses' role in optimizing reliable medication administration.

Prerequisites: NUR 301, 303, 304, 309, 311.

NUR 336 - SPIRITUALITY IN NURSING

Semester Hours: 3

Spirituality aspects of client, family and community care are the focus of this course. The course reviews the history of spirituality in nursing care. The nurses' role in meeting the spiritual needs of clients throughout the lifespan is explored.

NUR 339 - INFO MGMT IN HEALTHCARE

Semester Hours: 3

This course is designed to introduce information management, including decision support systems. The use of information management nomenclature is integrated into the learning activities. The role of the nurse as an advocate in improving patient outcomes using data management is explored. Safety, ethical, and legal concerns are addressed. Prerequisite: NUR 410.

NUR 390 - INDEPENDENT STUDY

Semester Hours: 1-4

Individualized independent study of specific nursing problem under sponsorship of a nursing faculty member with special preparation in the field. Elective.

NUR 391 - GLOBAL HEALTH

Semester Hour: 1

NUR 400 - SPECIAL TOPICS

Semester Hours: 3

NUR 401 - NURS CARE CRITICALLY ILL ADULT

Semester Hours: 5

This course explores the evidence-based collaborative nursing management of clients experiencing complex physiological health alterations. Clinical experiences will provide opportunities for advanced clinical reasoning in the acute and critical care environments. Prerequisites: NUR 305 and NUR 307 and NUR 308.

NUR 401L - CLINICAL

Semester Hours: 0

NUR 402 - POPULATION BASED HLTH CARE

Semester Hours: 3

Promotion of health, prevention of disease in at-risk aggregate populations. Examines complex problems and health care policy. Open to all university students.

NUR 402L - CLINICAL EXPERIENCE

Semester Hours: 0

NUR 403 - MATERNAL INFANT NURSING

Semester Hours: 4

This course explores internal and external factors, which impact the health of the family during the antepartal, intrapartal, postpartal and neonatal periods of childbearing. Emphasis is placed on nursing care of these clients, normal physiology, pathophysiology, psychological and sociocultural needs, and risk identification and reduction. Prerequisites: NUR 305 and NUR 307 and NUR 308 and NUR 321.

NUR 403L - CLINICAL

Semester Hours: 0

NUR 404 - FAMILY-CENTER NUR CARE CHILDRE

Semester Hours: 4

This course is designed to introduce the concept of family centered pediatric care that is developmentally appropriate for a culturally diverse population. Clinical experiences in selected agencies. Prerequisites: NUR 301 and NUR 307 and NUR 308 and NUR 321.

NUR 404L - CLINICAL

Semester Hours: 0

NUR 405 - COMMUNITY HEALTH NURS

Semester Hours: 4

The course explores the community as client and teaches concepts and knowledge necessary to promote the health of the public and communities. Emphasis is on community health theory, individual, family, and community assessment, aspects of epidemiology, program planning and evaluation, trends and issues, legislation, ethics, research, health care economics and disaster management. Prerequisites: NUR 401 and NUR 403 and NUR 404.

NUR 405L - CLINICAL EXPERIENCE

Semester Hours: 0

NUR 406 - LEADERSHIP & MGMT IN NURSING

Semester Hours: 3

Describes and analyzes selected theories of management and leadership in health care systems with focus on broadening students' knowledge base and skills as they relate to entry-level nursing management. Organization structures and dynamics as well as pertinent issues and trends are addressed.

NUR 407 - PROF PRACTICE IN NURSING II

Semester Hours: 8

The focus of this course is the leadership and management functions of professional nursing. Essential skills are communication, interprofessional collaboration, delegation, coordination, and the application of evidence-based practice models. Clinical experiences will focus on performance of the professional nurse role in a concentrated practicum. Prerequisites: NUR 401 and NUR 403 and NUR 404.

NUR 407L - CLINICAL EXPERIENCE

Semester Hours: 0

NUR 408 - PROF PRAC IN NURS III SEMINAR

Semester Hours: 2

The purpose of this class is to facilitate the synthesis of knowledge, the application of critical thinking to decisions about patient care, and to ensure safe and competent nursing practice. Test-taking skills and time management concepts will be applied in preparation of the NCLEX-RN licensure exam. Prerequisites: NUR 407.

NUR 410 - TRANSITION INTO PROFESSIONAL ROLES

Semester Hours: 3

The course examines the multi-dimensional role of the professional nurse in health systems. Through the analysis of a paradigm case and development of a personal philosophy of nursing, the student evaluates professional practice and develops goals designed to guide learning and professional development. Philosophical, social, political, legal, and ethical issues inherent in the practice of professional nursing in health systems are discussed.

NUR 411 - THEORETICAL APPL IN PROF NURS

Semester Hours: 3

Designed for registered nurse students to synthesize knowledge gained from previous nursing experience when analyzing theories, issues and concepts that influence professional nursing practice. Theoretical concepts, which influence critical thinking, are applied to the nursing process. Analysis of normal processes and professional nursing responses to alterations in life processes across the lifespan are examined. Caring for diverse clients is emphasized. Ethical and legal issues which impact the care for client systems are examined when synthesizing theoretical and nursing practice issues.

NUR 412 - CARE FOR AGGREGATES, FAM & POP

Semester Hours: 7

Designed for registered nurse students to apply theoretical concepts related to primary, secondary, and tertiary care of aggregates. Emphasis is on application of the nursing process in promoting community health for at-risk aggregate populations and is delivered in an on-line format. Course objectives are designed to meet the individual learning needs of the student in delivering and managing care of selected families with emphasis on the aggregate. Prerequisites: NUR 339 and NUR 410.

NUR 412L - CLINICAL EXPERIENCE

Semester Hours: 0

NUR 413 - LEADERSHIP PROF NURS PRACT

Semester Hours: 5

4 course / 1 clinical Designed to improve leadership in professional nursing practice, this course provides the basis for advancing health through leading and managing the care giver and care coordinator roles in a variety of culturally diverse healthcare systems. The exploration of the health care environment takes place within the context of organizational climate and culture, leading change and innovation and promoting excellence in professionalism. Students apply leadership principles through case study and the development of a clinical change project within indirect practice experiences. Prerequisite with concurrency: NUR 410.

NUR 415 - HONORS DIRECTED RESEARCH

Semester Hours: 2

This course allows for implementation of the student's research proposal as developed in the Honors section of NUR 307. The focus is on data collection and preliminary data analysis. The seminar format will provide students access to expert researchers.

NUR 416 - HONORS RESEARCH SEMINAR

Semester Hour: 1

The focus of this seminar is completion of final research report, as begun in NUR 307 and NUR 415.

NUR 417 - NURS CARE VUL POP

Semester Hours: 4

This course examines health determinants and health disparities within the US as well as in the global community. The student will examine health disparities and the burden of disease within social, cultural, political, economic, and environmental contexts. Students will examine strategies aimed at risk reduction and improvement through outcomes. Prerequisite with concurrency: NUR 410.

NUR 419 - SCHOLRY INQUIRY IN NURSING PRA

Semester Hours: 3

Focuses on the various modes of inquiry used in the development of nursing science. Emphasis on the critical examination of nursing research including methodologies, utilization, and theoretical bases.

NUR 420 - EVIDENCE BASED NURS PRACTICE

Semester Hours: 3

This course focuses on developing the nurse to be an 'evidence user' for the purpose of improving healthcare outcomes. Emphasis is on the critical analysis of evidence to be used in formulating nursing decisions and the design of client care guidelines. Structured for the registered nurse student.

NUR 421 - AC CARE FOR PROFESSIONAL NURSE

Semester Hours: 3

2 Course / 1 Clinical The nursing process is applied to clients experiencing physiological health alterations requiring complex and collaborative nursing strategies and appropriate resource management. Direct practice experiences are focused on conducting comprehensive assessments and care planning with the interprofessional team. Prerequisite with concurrency: NUR 410.

NUR 422 - COMMUNITY HEALTH FOR PROF NURS

Semester Hours: 5

4 course/1 clinical. This course is designed to provide the application of theoretical concepts related to primary, secondary, and tertiary care of families and aggregates in professional nursing practice. Emphasis is on application of the nursing process in assessing social determinants of health and promoting community health for diverse communities. Application of direct practice experience activities are designed to meet individual learning needs of the student in delivering and managing care of selected aggregate populations. Prerequisite with concurrency: NUR 410.

NUR 423 - EVID BASED PRACTICE PROFESS NU

Semester Hours: 3

This course fosters the application of the best clinical evidence into practice in order to promote improvement in healthcare experiences and patient outcomes. Various modes of scientific inquiry used in the development of nursing science are incorporated into a survey of research techniques, methodologies, and ethical concerns. This will enable students to select and evaluate appropriate information relevant to evidence based practice. Students will develop skills in the use of electronic databases to facilitate acquisition of current information. Emphasis is placed on the critical analysis of evidence to be used in formulating nursing decisions and the design of client care guidelines. Prerequisite: NUR 410.

NUR 426 - SPACE LIFE SCIENCES

Semester Hours: 3

Theories and concepts of contemporary issues in health and nursing related to space life sciences.

NUR 427 - INTRODUCTION TO FORENSICS

Semester Hours: 3

This course provides an overview of the field of forensic nursing. Concepts of care for victims and family members of violence, abuse, traumatic accidents, and criminal activity are discussed. Current healthcare practices and medical/legal/ethical issues are reviewed. Elective, open to all university students.

NUR 428 - GERONTOLOGICAL NURSING

Semester Hours: 3

Nursing care of older adults in multiple settings. Issues and trends are incorporated.

NUR 430 - HLTH CARE WKFR:ISS/LDRSH STRAT

Semester Hours: 3

Description and analysis of contemporary issues regarding the health care workforce. Particular focus will be placed on the multifaceted nature of health care workforce shortages. Various models for analysis of workforce issues will be used and strategies being used will be examined. An evaluation of the nurse leader role in creating positive work environments and implementing solutions concludes the student experience.

NUR 434 - PALLIATIVE CARE

Semester Hours: 3

Palliative care is when there is no longer a medical treatment or cure for a physical problem. This palliative care course includes meeting the physical, emotional, social cultural and spiritual needs of individuals and their families. A course focus will be coping, grief, bereavement pain relief and managing living implications for individuals with life-threatening illnesses. There will be recognition of the importance of individuality, vulnerability, and resilience in the quality of living during the dying process.

NUR 437 - NURSING AS A POLITICAL FORCE

Semester Hours: 3

Overview of the legislative process and legislation relative to health care issues. The role of the professional nurse in the political climate is explored. Elective, open to all university students.

NUR 439 - NURSING MEDICAL MISSIONS

Semester Hours: 2

This course will examine concepts and issues associated with humanitarian and medical missions. Commonly occurring healthcare needs relevant to specific vulnerable populations will be analyzed in preparation for delivery of healthcare. The culmination of this course is a trip abroad to deliver healthcare to a population in need within the structure of a medical mission. This course is an accepted elective in the Nursing program. Prerequisite: NUR 303.

Optical Engineering (OPE)

OPE 451 - OPTOELECTRONICS

Semester Hours: 3

Basic concepts for understanding electro-optic devices and systems. Blackbody radiation; light sources; quantum and thermal detector, noise in detectors; optical heterodyning; acoustooptic, magneto-optic, and electro-optic modulation. (Same as EE 451) Prerequisites: EE 307 and EE 315.

OPE 453 - LASER SYSTEMS

Semester Hours: 3

Spontaneous and stimulated emission, population inversion, optical resonators, three- and four-level systems, Q-switching and mode-locking, semiconductor lasers, integrated optic waveguides and couplers, scanning systems, high-power industrial application. Prerequisites: EE 307.

OPE 454 - OPTICAL FIBER COMMUNICATIONS

Semester Hours: 3

Introduction to optical fibers and their transmission characteristics, optical fiber measurements, sources and detectors, noise considerations for digital and analog communications, optical fiber systems. (Same as EE 454) Prerequisites: (EE 307 or PH 432) and (EE 382 or CPE 381).

OPE 456 - PHOTONICS LABORATORY

Semester Hours: 3

Photonic devices, wave nature of light, diffraction, spectral measurements, refractive index, single mode and multimode optical fibers, simple optical communication systems, fiber optic sensors, cast study. Prerequisites: OPE 451.

OPE 459 - OPTICAL ENGINEERING DESIGN I

Semester Hours: 3

Identification, documentation, and presentation of proposed senior design project, followed by initial project design, analysis, and development, including the consideration of legal economic, and ethical issues. Prerequisites: ISE 321 and OPE 456.

OPE 460 - OPTICAL ENGINEERING DESIGN II

Semester Hours: 3

Continuation of design project begun in OPE 459 to include prototype testing of the design optical or opto-electronic system. Prerequisites: OPE 459.

Optics (OPT)

OPT 341 - GEOMETRICAL OPTICS

Semester Hours: 3

Introduces geometrical optics. The nature of light, basic radiometry, rays and waves, Fermat's principle, Snell's law, thin and thick lenses, paraxial rays, ray transfer matrix and ray tracing, optical imaging and imaging system design, aberrations, optical instrumentation, prisms, and dispersion. Prerequisite: PH 113. Prerequisite with concurrency: PH 305 and MA 244.

OPT 342 - PHYSICAL OPTICS

Semester Hours: 3

Electromagnetic waves, superposition of waves, interference of light, Young's double slit experiment, Michelson interferometer, Fabry-Perot interferometer, coherence, diffraction gratings, polarization and its matrix treatment, and polarization generation. Offered Spring. Prerequisite with concurrency: OPT 341.

OPT 411 - OPTICS LAB

Semester Hours: 3

Lab course supporting the introductory optics sequence OPT 341 and OPT 342. Basic laboratory techniques in optics, such as optical alignment, imaging, interferometry, refractometry, and polarimetry, as well as fundamental optics concepts, such as the cardinal points, aberrations, dispersion, interference, diffraction, and polarization. Offered Spring Prerequisite with concurrency: OPT 341. Corequisite OPT 342.

OPT 441 - OPTICAL SYSTEMS

Semester Hours: 3

Intermediate geometrical optics, first-order optics, linear transformations, paraxial optics, reflection and transmission at an interface, polarized light, Jones and Mueller calculi, matrix methods, ray tracing, apertures and stops, third order optics and aberrations. Offered Fall, even years. Prerequisite: OPT 342.

OPT 442 - INTERFERENCE & DIFFRACTION

Semester Hours: 3

Two beam interference, multiple beam interference, optical testing. Fraunhofer diffraction, Fresnel diffraction, the Fourier transform, Fourier methods in optics, Coherence, Holography.

OPT 444 - OPTOELECTRONICS

Semester Hours: 3

Reviews polarized light, propagation and modulation of light using effects of electro and acousto optics, Kerr, and Faraday. Photo-detection, signal processing, and signal-to-noise ratios. Design/analysis of beam scanners, various optical spectrum analyzers, sensors, and communication systems. Prerequisite: OPT 342.

OPT 445 - INTRODUCTION TO LASERS

Semester Hours: 3

Introduces concepts and principles of lasers. Stimulated emission, light amplification, optical pumping, optical resonator theory, cavity modes, gas lasers, solid state lasers, laser applications, Gaussian beams, coherence, and holography. Offered Fall, odd years. Prerequisite: PH 432. Prerequisite with concurrency: PH 351.

OPT 446 - RADIOMETRY, DETECTORS, SOURCES

Semester Hours: 3

Theory and practice of radiometry and photometry. Blackbody radiation and Lambertian sources. Propagation of radiant energy in free space and through optical systems. Detector classes, responsivity, bandwidth and noise. Power spectral density, properties of sources, photon noise. Prerequisites: OPT 342, MA 238, and PH 112.

OPT 447 - POLARIZED LIGHT & POLARIMETRY

Semester Hours: 3

Linear, circular, and elliptical polarization of light. Mueller and Jones calculi, Stokes vectors, measuring polarized light, polarization properties of crystals and thin films, polarization ray tracing. Offered Fall, odd years. Prerequisite: OPT 342.

Philosophy (PHL)

PHL 101 - INTRODUCTION TO PHILOSOPHY

Semester Hours: 3

Introduction to philosophical reflection focusing upon central problems in the major branches of the western tradition: metaphysics, epistemology and value theory.

PHL 102 - INTRO TO ETHICS

Semester Hours: 3

Major ethical positions in both classical and modern thought. The course may include a consideration of case studies drawn from practical contexts in engineering, medicine and other areas.

PHL 103 - INTRODUCTION TO LOGIC

Semester Hours: 3

Methodology of formal and informal reasoning.

PHL 150 - TECH, SCIENCE & HUMAN VALUES

Semester Hours: 3

A philosophical examination of the intersection of human values with science and technology. Questions include: what exists, the nature and extent of knowledge, and moral problems posed by technical and scientific change.

PHL 220 - CRIT THINKING FOR INTEL ANALYS

Semester Hours: 3

Examines critical reasoning strategies designed to correct cognitive biases and improve tradecraft skills in the context of intelligence analysis.

PHL 301 - ANCIENT PHILOSOPHY

Semester Hours: 3

Survey of classical philosophy from the Pre-Socratics through Aristotle. Prerequisite: 3 hrs of PHL, except PHL 103.

PHL 302 - MODERN PHILOSOPHY

Semester Hours: 3

Survey of the British and Continental traditions from Descartes through Kant. Prerequisite: 3 hrs of PHL, except PHL 103.

PHL 303 - CONTINENTIAL PHILOSOPHY

Semester Hours: 3

Examination of important trends in the Continental tradition from nineteenth through twenty-first century thought.

PHL 310 - PHILOSOPHY OF ART

Semester Hours: 3

Major aesthetic theories of the western tradition, may include visual or non-visual arts. Prerequisite: 3 hrs of PHL, except PHL 103.

PHL 311 - PHILOSOPHY OF SCIENCE

Semester Hours: 3

Critical assessment of the historical and logical foundations of the natural and theoretical sciences. Prerequisite: 3 hrs of PHL, except PHL 103.

PHL 312 - AMERICAN PHILOSOPHY

Semester Hours: 3

Survey of American thought with emphasis upon the development of pragmatism in the work of Peirce, James, and Dewey. Prerequisite: 3 hrs of PHL, except PHL 103.

PHL 314 - ASIAN PHILOSOPHY

Semester Hours: 3

Survey of philosophical traditions from Asia, such as various schools of Buddhism and Hinduism, Confucianism, Daoism. Topics may include: conceptions of human nature and the good life, the nature of the self and its relation to society, comparisons to philosophies from Europe and North America. Prerequisite: 3 hrs of PHL, except PHL 103.

PHL 317 - PHILOSOPHY OF MIND

Semester Hours: 3

A philosophical examination of a range of models, theories, and arguments concerning the nature of mind and its relationship to the physical world. Prerequisite: 3 hrs of PHL, except PHL 103.

PHL 320 - SYMBOLIC LOGIC

Semester Hours: 3

Symbolic deductive logic, including propositional calculus (truth-functional logic), predicate calculus (propositional functions and quantification), and the logic of relations. Prerequisite: PHL 103.

PHL 330 - CLASSI POLITI PHILOSOPHY

Semester Hours: 3

Careful analysis of the roots of political inquiry in selected works of ancient and medieval political philosophers. Major themes include the search for a just social order, the proper relationship between the citizen and the state, and other fundamental concepts of western political institutions. Prerequisite: PHL 101 or PHL 102 or PSC 101.

PHL 332 - MODERN POLITICAL PHILOSOPHY

Semester Hours: 3

Critical examination of the philosophical foundations for modern politics that emerged from the 15th through the 19th century in western Europe. Major themes include the concepts of individual rights, property, representation, majority rule, limited government, and revolution. Prerequisite: PHL 101 or PHL 102 or PSC 101.

PHL 335 - FEMINIST PHILOSOPHY

Semester Hours: 3

Philosophical examination of issues related to feminism and feminist theory. Topics may include: women in the history of philosophy, contemporary feminist political theory, feminist ethics, feminist epistemology, or gender theory (including racial and sexual identity). Prerequisite: 3 hrs of PHL, except PHL 103.

PHL 337 - PHILOSOPHY OF RACE

Semester Hours: 3

Philosophical examination of the nature and importance of race. Topics may include: the debate between essentialist and constructionist views of race, the political importance of race, and the intersection of race and other forms of identity. Prerequisite: 3 hrs of PHL, except PHL 103.

PHL 385 - SELECTED TOPICS

Semester Hours: 3

Intensive examination of particular problems, periods, or movements in the history of philosophy. Prerequisite: 3 hrs of PHL, except PHL 103.

PHL 395 - RESEARCH SEMINAR

Semester Hours: 3

Intensive examination of particular problems, periods, or movements in the history of philosophy. Intensive examination of selected topics leading to the preparation of a substantial philosophical paper. Required of all majors. May be taken twice for credit. Prerequisite: 3 hrs of PHL, except PHL 103.

PHL 397 - PHILOSOPHY INTERNSHIP

Semester Hours: 1-3

A supervised experience in a professional environment enhanced by a student's background in philosophy. Paid or unpaid. Prerequisites: 18 hrs of PHL, JR/SR standing, minimum 3.0 GPA in PHL Major, approval of department chair.

PHL 399 - DIR STUDY IN PHILOSOPHY

Semester Hours: 1-3

Independent study in an area of philosophy selected in consultation with faculty advisor. Requires approval of department chair. Prerequisite: 3 hrs of PHL, except PHL 103.

PHL 401 - METAPHYSICS

Semester Hours: 3

Critical examination of traditional and contemporary responses to questions about the nature of reality. Prerequisite: 6 hrs of PHL, except PHL 103.

PHL 402 - EPISTEMOLOGY

Semester Hours: 3

Investigation of fundamental problems of knowledge such as the relation of knowledge and belief, truth, certainty and skepticism, perception, logic, explanation, and justification. Prerequisite: 6 hrs of PHL, except PHL 103.

PHL 403 - ADV MORAL PHILOSOPHY

Semester Hours: 3

Critical examination of significant works in moral and political philosophy such as the relationship between morality and human nature, the individual and the state, and the consequences of actions. Prerequisite: 6 hrs of PHL, except PHL 103.

PHL 438 - CONTEMPORARY POLITICAL THOUGHT

Semester Hours: 3

Systematic study of recent and current thinking on issues and problems of politics, social theory, and ethics with special attention to the philosophical dimension of these issues and problems. Prerequisite: 6 hrs of PHL or PSC, except PHL 103.

Physics (PH)

PH 100 - CONCEPTUAL PHYSICS

Semester Hours: 4

Classical and modern physics survey course. Approach physical laws conceptually and intuitively, with minimal mathematics. Motion, gravitation, energy, electricity and magnetism, quantum mechanics, physics of everyday phenomena, philosophical and historical implications. Offered Spring.

PH 100L - CONCEPTUAL PHYSICS LAB

Semester Hours: 0

PH 101 - GENERAL PHYSICS I

Semester Hours: 4

Introductory non-calculus based course using algebra and trigonometry. The basic laws of physics and their application to specific problems. Newtonian mechanics, energy, conservation laws and thermodynamics. Laboratory included. PH 101 and 102 satisfy the laboratory science requirement. Offered Fall
Corequisite: PH 101L.

PH 101L - GENERAL PHYSICS I LAB

Semester Hours: 0

Laboratory for PH 101 Corequisite: PH 101.

PH 102 - GENERAL PHYSICS II

Semester Hours: 4

Continuation of PH 101. Electrostatics, currents, magnetic phenomena, relativity, waves, quantum nature of matter. Laboratory included. Offered Spring.
Prerequisite: PH 101. Corequisite: PH 102L.

PH 102L - GENERAL PHYSICS LAB II

Semester Hours: 0

Laboratory for PH 102 Corequisite: PH 102.

PH 110 - FRONTIERS IN SCIENCE

Semester Hours: 3

Introduces frontiers and problems of modern physical science. Physicist present the role of physics in diverse careers and physics fields. Introduction to physics applications and future employment opportunities motivates students to master skills required in undergraduate studies. Offered Fall. Freshmen physics majors (<30 credit hours), physics minors, and physics major transfers. All others by permission of chair.

PH 111 - GEN PHYSICS W/CALCULUS I

Semester Hours: 3

For science and engineering students. Basic laws of physics and their application to specific problems: vectors, Newtonian mechanics, energy, conservation laws, simple harmonic motion, statics, fluids. Offered all terms. Prerequisite: MA 171 Corequisite: PH 114.

PH 111R - RECITATION

Semester Hours: 0

PH 112 - GEN PHYSICS W/CALC II

Semester Hours: 3

Continuation of PH 111. Heat and thermodynamics, basic electricity, electric and magnetic fields. Offered all terms. Prerequisite: MA 172, PH 111, PH 114. Corequisite: PH 115.

PH 112R - RECITATION

Semester Hours: 0

PH 113 - GEN PHYSICS W/CALC III

Semester Hours: 3

Continuation of PH 111 and 112. Wave motion, optics, relativity, quantum effects, atomic and nuclear structure, and elementary particles. Offered all terms. Prerequisite: MA 201 (or higher), PH 112, and PH 115. Corequisite: PH 116.

PH 113R - RECITATION

Semester Hours: 0

PH 114 - GENERAL PHYSICS LAB I

Semester Hour: 1

Laboratory instruction in support of material covered in PH 111. Offered all terms. Corequisite: PH 111.

PH 115 - GENERAL PHYSICS LAB II

Semester Hour: 1

Laboratory instruction in support of material covered in PH 112. Offered all terms. Corequisite: PH 112.

PH 116 - GENERAL PHYSICS LAB III

Semester Hour: 1

Laboratory instruction in support of material covered in PH 113. Offered all terms. Corequisite: PH 113.

PH 251 - SPECIAL RELATIVITY

Semester Hour: 1

Einstein's theory of special relativity. Invariance, geometry of Minkowski spacetime, non-Euclidean geometry; Principle of Relativity; clock synchronization; Lorentz transformations; counter-intuitive effects measured in relative motion; casualty and the speed of light; relativistic dynamics.

Prerequisite: PH 112 and MA 172. Prerequisite with concurrency: PH 113.

PH 301 - INTERMEDIATE MECHANICS

Semester Hours: 3

Reviews Newtonian mechanics, natural and driven oscillations, variational calculus and Lagrange's equations, application to central force motion, rigid body rotation and coupled oscillators. Offered Spring. Prerequisite: PH 111 and either PH 305 or MA 238.

PH 305 - MATH METHODS IN PHYSICS

Semester Hours: 3

Applied analytical techniques to solve problems in physics. Complex analysis, Fourier series, linear algebra, differential equations and vector calculus. Applications to mechanics, electricity and magnetism, optics, and thermodynamics. Offered Spring. Prerequisite: PH 112.

PH 306 - APPLIED PHYSICS

Semester Hours: 3

Computational and numerical techniques for problem solving. Applications to classical mechanics, electrodynamics, quantum mechanics, optics, astrophysics. Offered Fall. Prerequisite: PH 305, (CS 102 or CPE 112 or CS 121) and (MA 238 or MA 244 or MA 324).

PH 310 - INTERMEDIATE LAB I

Semester Hours: 2

Experiments in classical physics. Introduction to statistical methods. Offered Fall. Prerequisites: PH 113 or 116.

PH 311 - INTERMEDIATE LAB II

Semester Hours: 2

Experiments in modern physics. Offered Spring. Prerequisite: PH 251 and PH 310.

PH 337 - ELECTRONICS

Semester Hours: 4

Introductory course for all science students. Basic AC and DC circuits, operational amplifier circuits, transistor circuits, power supplies, digital logic and their use in laboratory instruments. Laboratory included. Offered Fall, odd years. Prerequisite: PH 112.

PH 351 - INTRODUCTION TO MODERN PHYSICS

Semester Hours: 3

Kinetic theory, Blackbody radiation, Quantum physics: wave packets, the uncertainty principle, Schrodinger's equation and solutions for simple systems, application to atomic, nuclear, and solid-state physics. Offered Fall. Prerequisite: PH 113, and either MA 238 or 244. Prerequisite with concurrency: PH 251.

PH 416 - SENIOR LABORATORY

Semester Hours: 2

Advanced experimental techniques in various sub-fields of physics. Offered Fall, Spring. Prerequisite: PH 311.

PH 420 - SENIOR THESIS

Semester Hours: 3

Research performed under direction of a faculty member. Final research report required. Offered all terms.

PH 421 - THERMAL & STATISTICAL PHYSICS

Semester Hours: 3

States of model system, entropy and temperature, Boltzmann distribution, thermal radiation and Planck distribution, chemical potential and Gibbs distribution, ideal gas, Fermi and Bose gases, heat and work, semiconductor statistics, kinetic theory. Offered Spring, even years. Prerequisite: PH 351. Prerequisite with concurrency: PH 301 and PH 306.

PH 431 - INTERM ELECTRICI & MAGNETISM I

Semester Hours: 3

Electrostatics: electric fields, electric potential, Poisson's equation. Electric fields in matter. Magnetostatics: currents, magnetic fields. Magnetic fields in matter. Prerequisite: PH 305 and MA 201. Prerequisite with concurrency: MA 238.

PH 432 - INTERM ELECTRIC & MAGNETISM II

Semester Hours: 3

Continuation of PH 431. Maxwell's equations for time-varying fields. Electromagnetic waves. AC circuits. Radiation. Relativistic electrodynamics. Offered Spring, odd years. Prerequisite: PH 431.

PH 451 - INTRO QUANTUM MECHANICS I

Semester Hours: 3

Waves and particles: deBroglie waves, wave-packets, and the uncertainty principle. Postulates of quantum mechanics. Schrodinger's equation: simple systems in one, two and three dimensions, the hydrogen atom. Angular momentum and spin. Offered Fall. Prerequisite: PH 305, PH 351, and (MA 244 or MA 238) and PH 306 with concurrency.

PH 452 - INTRO QUANTUM MECHANICS II

Semester Hours: 3

Multiparticle systems. Atomic structure. Approximation methods. Scattering. Applications to nuclear, atomic, and molecular systems. Offered Spring. Prerequisite: PH 451.

PH 453 - INTRO TO PARTICLE PHYSICS

Semester Hours: 3

Surveys elementary particle physics, Standard Model of quarks, leptons, and gauge bosons. Lorentz transformations, four-vectors and relativistic kinematics, angular momentum and spin. Lifetimes, cross-sections, and Feynman rules. Quantum electro and chromo-dynamics, Dirac equation, renormalization. Prerequisite with concurrency: PH 451.

PH 474 - INTRO TO GENERAL RELATIVITY

Semester Hours: 3

Introduces general relativity and gravitational physics as inferred from the behavior of particles and light rays for a selection of spacetimes. Major properties of black holes, wormholes, gravitational waves. Physics First approach, and introduces new math as required for discussion of physics. Prerequisite: PH 251 and PH 301.

PH 480 - SELECTED TOPICS

Semester Hours: 1-3

Offered upon demand. Topics include physics, optics, astrophysics, and space physics. Offered all terms. Prerequisite: PH 113 and MA 201.

PH 489 - SELECTED TOPICS

Semester Hours: 1-3

Offered upon demand. Topics include physics, optics, astrophysics, astronomy, computational physics, and space physics. Offered all terms. Prerequisites: PH 113 or 116 and MA 201.

PH 499 - PHYSICS PRACTICUM

Semester Hours: 3

'Capstone' course designed to provide real-world research experience for graduating seniors. Students work individually with faculty members on projects. Requires oral presentation and final research report. Offered all terms. Required courses on the POS must be taken prior to, or concurrently with, this course.

Political Science (PSC)

PSC 101 - INTRO TO AMERICAN GOVERNMENT

Semester Hours: 3

What motivates individuals and groups to act politically? This course introduces students to political structures, decision-making, and public policy in the U.S. The role of history in the development of current institutional structures and current political developments will be considered.

PSC 102 - INTRO TO COMPARATIVE POLITICS

Semester Hours: 3

In this class we explore ways to compare countries and political systems. We study a wide variety of countries for a better understanding of political dynamics around the world. This includes countries at various stages of industrialization and democratization, in different regions of the globe.

PSC 103 - INTRO TO STATE & LOCAL GOVT

Semester Hours: 3

Surveys the principles, forms, functions, and processes of state and local governments in the context of the American federal system, with specific emphasis on the political environment. Students will better understand the major functions of and the issues facing state and local governments.

PSC 260 - INTRODUCTION TO INTERNATIONAL RELATIONS

Semester Hours: 3

Examination of the basic factors underlying the conduct of international relations, focusing on conflict and changes taking place due to globalization. This course also seeks to stimulate intellectual curiosity, enhance critical thinking, and improve oral and writing skills.

PSC 300 - INTRO SOCIAL SCIENCE STATISTIC

Semester Hours: 3

This course covers basic statistical concepts, techniques, and the language of statistics; simple statistical modeling correlation and regression analysis; and nonlinear models and categorical models. Students will apply appropriate methods to analyze real world problems.

PSC 302 - THE AMERICAN CONGRESS

Semester Hours: 3

Studies the organization and role of the Congress, its leadership, internal processes, and relationships with other parts of the political system. The goal is to understand why Congress looks and acts the way it does, whose interests are represented, and how and why policies emerge as they do. Prerequisite: PSC 101.

PSC 304 - AMERICAN PRESIDENCY

Semester Hours: 3

Examination of the institution of the American presidency, its power, and the forces that shape it. Focus on developing students' ability to think conceptually and critically about the presidency, the president's role in the political system, and American politics in general. Prerequisite: PSC 101.

PSC 309 - POLITICAL PARTIES & INT GROUPS

Semester Hours: 3

A survey of major linkages between citizens and government, this course studies the formation, organization, activities, and impacts of political parties and interest groups - and factors affecting them. Students will think critically about these institutions and their roles in the American system. Prerequisite: PSC 101.

PSC 330 - CLASSICAL POLITICAL PHILOSOPHY

Semester Hours: 3

Careful analysis of the roots of political inquiry in selected works of ancient and medieval political philosophers. Major themes include the search for a just social order, the proper relationship between the citizen and the state, and other fundamental concepts of western political institutions. Prerequisite: PSC 101 or PHL 101 or PHL 102 or PHL 202 or permission of instructor.

PSC 332 - MODERN POLITICAL PHILOSOPHY

Semester Hours: 3

Critical examination of the philosophical foundations for modern politics that emerged from the 15th through the 19th century in western Europe. Major themes include the concepts of individual rights, property, representation, majority rule, limited government, and revolution. Prerequisite: PSC 101 or PHL 101 or PHL 102 or permission of instructor.

PSC 334 - AMER POLITICAL THOUGHT

Semester Hours: 3

In-depth study of theorists, concepts and forces that have shaped American political values from the founding of the republic to the present. Major themes include the relationship between liberty and equality, rights and democracy, and industrialization and the public good. Prerequisite: PSC 101.

PSC 399 - CURRENT AFFAIRS

Semester Hour: 1

An examination of current national and international issues. Focus is on developing critical reading, listening, and writing skills. The course may be repeated up to three times.

PSC 420 - FEDERALISM & INTERGOV RELATION

Semester Hours: 3

Designed to help students navigate complex relationships among the 90,000+ government in the U.S., this course examines the framework of federalism and the tools available to governments to influence public policy outcomes. Students will investigate the impacts of these relationships on policy. Prerequisite: PSC 101.

PSC 436 - POLITICAL IDEOLOGIES

Semester Hours: 3

Critical examination of the philosophical foundations and political ethics of contemporary political ideologies. Among the major ideologies studied will be relevant examples of conservatism, liberalism, Marxism, Nazism, and religion, such as liberation theology and Islamism. Prerequisite: PSC 101.

PSC 438 - CONTEMPORARY POLITICAL THOUGHT

Semester Hours: 3

Systematic study of recent and current thinking on issues and problems of politics, social theory, and ethics with special attention to the philosophical dimension of these issues and problems.

PSC 440 - REGIONAL STUDIES

Semester Hours: 3

This class compares and examines the politics of Asia, Latin America, the Middle East, or Africa, depending on the term. We focus on select countries of themes within each region as part of our study of political structures, history, and culture, for a deeper understanding of each area. Prerequisites: PSC 101 and PSC 102.

PSC 451 - LAW, COURTS, & PUBLIC POLICY

Semester Hours: 3

Examines the role of the courts in the making of public policy in the United States, with an emphasis on the use of the courts by interest groups seeking to achieve specific policy goals. Prerequisite: PSC 101.

PSC 452 - AMER CONSTITUTIONAL LAW

Semester Hours: 3

Examination of the structure of the federal government and its powers through an analysis of leading cases from the Supreme Court. Topics include federalism, separation of powers, and the proper role and decision-making process of the Supreme Court. Prerequisite: PSC 101.

PSC 454 - CIVIL LIBERTIES

Semester Hours: 3

Examines the relationship between the government and individuals in American society through an analysis of Supreme Court cases. The focus is on contemporary questions about the rights of individuals and appropriate limits to freedom of action set by government. Prerequisite: PSC 101.

PSC 461 - ECONOMIC DEVELOPMENT

Semester Hours: 3

Understand economic development in the developing world. Examine economic transformation & social justice. Highlight domestic & international institutional, structural, & political sources of economic dynamism/lack thereof in the Global South. Prerequisites: Junior standing or higher.

PSC 462 - DECN MKNG FOREIGN & SEC PLCY

Semester Hours: 3

An examination of the history, culture, policies, and structures shaping the development of U.S. foreign and national security policies. Special attention will be placed on the roles of Congress, National Security Council, Defense Department, State Department, and the intelligence community. Prerequisite: PSC 101.

PSC 464 - AMERICAN FOREIGN POLICY

Semester Hours: 3

An examination of the substance of contemporary U.S. foreign policies and the goals the country seeks to achieve around the world. Students will attempt to evaluate the effectiveness of those policies and examine why it is often difficult for the country to achieve its goals. Prerequisite: PSC 101.

PSC 466 - NATL SECURITY STRATEGY & PLCY

Semester Hours: 3

An examination of current U.S. national security strategy and policy. The course will review current strategy and policy documents, examine specific responses to the variety of threats facing the United States, and evaluate whether those policies are effective at achieving their goals. Prerequisite: PSC 101.

PSC 470 - ISSUES IN SECURITY POLICY

Semester Hours: 3

Examination of select security-related policy issues. The content of this course will vary during different terms, and students may take the course multiple times so long as the content differs. Prerequisite: PSC 101.

PSC 480 - ADV TOPICS POLITICAL SCIENCE

Semester Hours: 3

Select topics in local, state, national and world politics. This course may be repeated for credit as long as content of the course has changed.

PSC 484 - SENIOR SEMINAR

Semester Hours: 3

This class engages students in an advanced examination of the subfields of political science that are offered by the department. The course may be repeated with different faculty for up to 6 hours of credit. Prerequisites: PSC 101 and PSC 102.

PSC 495 - INTERNSHIP IN GOVERNMENT

Semester Hours: 1-6

Students may receive academic credit for an internship with a local, state, or federal governmental agency, or with political, legal, or public policy related organizations. Prerequisite: Instructor Permission.

PSC 498 - DIRECTED READINGS & RESEARCH

Semester Hours: 3

Supervised in-depth readings and/or individual research in an area of specialized interest to both student and instructor. Open to all students who have completed 15 semester hours in Political Science and have permission of the instructor.

Professional Studies (PRO)

PRO 280 - PRIVATE PILOT GROUND SCHOOL

Semester Hours: 3

Prepares student for FAA Private Pilot written examination. Provides student with necessary knowledge to progress into primary pilot flight training. A kit for approximately \$150 must be purchased.

PRO 301 - THRY & PRAC ADULT LEARNING

Semester Hours: 3

This course presents an overview of five foundational learning theories and related research in adult education and development. The conceptual framework is centered on discovering what motivates the adult learner and the impact social perspectives have on adult learning through analysis and discussion. Students will define competencies needed for success in academic study and professional leadership, in setting educational goals, and in planning a learning experience to achieve them. Emphasis is placed on issues unique to adult re-entry students and the university services available to support nontraditional students.

PRO 310 - ACADEMIC WRITING PROFESS STUDI

Semester Hours: 3

Students will learn academic writing skills by engaging in the process of academic inquiry and argument. The course will cover a broad perspective of writing by exploring various writing and research styles used through different academic professions. Prerequisites: EH 102 or EH 105.

PRO 315 - ENGINEERING COMMUNICATION

Semester Hours: 3

Students will learn to communicate professionally in an engineering/technical environment. Students will develop written communications such as letters, memos, reports and proposals, create clear process descriptions and instructions, and deliver persuasive and effective oral presentations. Prerequisite: EH 102 or EH 103 or EH 105.

PRO 320 - INDS PERSPECT & CRITICAL THNGK

Semester Hours: 3

Interdisciplinary studies fosters foundational knowledge acquisition by which individuals draw on multiple disciplinary perspectives and integrate their insights and modes of thinking to advance the studies and the fundamental development of critical and analytical thinking skills. Complex issues are addressed from multi-faceted perspectives that stimulate problem solving, problem defining and problem posing. Emphasis is placed on how to synthesize evidence drawn from multiple sources as a basis for informed decision-making.

PRO 321 - MEDIA LITERACY

Semester Hours: 3

Investigate the interdisciplinary nature of 21st-century media. Students analyze the combined influence of production methods, semiotics, politics, ethics, and psychology on our critical understanding of advertising, propaganda, conspiracy theories, social media, and the Internet of Things. Prerequisite: EH 102.

PRO 325 - INDS RESEARCH & APPLICATIONS

Semester Hours: 3

Interdisciplinary research is a contemporary decision-making process for transcending the scope of a single discipline or program to develop insights that offer bold advances in knowledge, solutions to urgent societal problems, an edge in technological innovations, and a more integrative knowledge of multidisciplinary theories and concepts. This course introduces the primary drivers for interdisciplinary research and examines the interdisciplinary research process. Students will apply an integrated model for conducting research that draws on multiple disciplines. Prerequisites: PRO 310 and PRO 320.

PRO 331 - ENGINEERING TECH FNDNS I

Semester Hours: 3

An introduction to the Engineering Technology profession, resources and skills. Students will learn about engineering design, communication, professional ethics, and basic principles and physical laws used to understand and solve engineering related problems. Prerequisites: MA 113 or higher, EH 102 or EH 105 and PH 102 or higher.

PRO 332 - ENGINEERING TECH FNDNS II

Semester Hours: 3

A follow-on to PRO 331, the course introduces the Engineering Technology profession, resources and skills. Students will learn about computational engineering tools, graphical communication, characteristics of materials, in addition to the mathematical and statistical methods used to understand and solve engineering-related problems. Co-requisite: PRO 331 (Grade of C- or better).

PRO 333 - COMPUTER-AIDED DESIGN

Semester Hours: 3

An introduction to Computer-Aided Design (CAD) using Creo Parametric. Covers basic concepts of 3D modeling techniques and frequently used commands required to advance from a novice to an intermediate user level of Creo Parametric. Prerequisite: PRO 332 (grade of C- or better), or special permission. MAE 211 accepted as a substitute. PRO 333 does not substitute for MAE 211.

PRO 334 - PRINCIPLES OF STATICS

Semester Hours: 3

Develop an undertaking of the principles of statics. Topics include resultant and equilibrium of noncurrent and concurrent forces, force analysis of structures and machines, force systems in space, friction, centers of gravity, centroids, and movement of inertia of areas. Prerequisites: PRO 332, MA 171 and PH 102 PRO 334 can not be used as a substitute for MAE/CE 271.

PRO 335 - STRENGTH OF MATERIALS

Semester Hours: 3

Comprehend and compare the behavior of solid objects subjected to various stresses and strains. Topics include stress and strain for axial loads, shear stresses and strains in torsion members, bending and deflection of beams, combined stress using Mohr's circle columns, and structural connections. Prerequisite: PRO 334 or MAE 271 or CE 271 (all with grades of C- or better).

PRO 336 - PRINCIPLES OF DYNAMICS

Semester Hours: 3

Learn the principles of Dynamics based on two broad areas of study, Kinematics and Kinetics. Kinematics is the study of the geometry of motion. Kinetics is the study of the relation between the forces acting on a body, the mass of the body, and the motion of the body. Prerequisite: PRO 334 or MAE 271 or CE 271 (all with grades of C- or better).

PRO 341 - ELECTRICAL CIRCUITS & SYSTEMS

Semester Hours: 3

This course introduces the major topics related to electrical circuits and systems and demonstrates how electrical engineering concepts are applied in other fields and everyday products. Topics include basic circuit analysis, digital systems, electronic devices and circuits, and electromechanics. Prerequisites: PRO 332 (grade of C- or better), MA 171, PH 102.

PRO 398 - SPEC TOPICS: INTERDISC STUDIES

Semester Hours: 3

Course uses an interdisciplinary approach to draw on intersecting and divergent knowledge from a variety of scholarly disciplines in order to create an in-depth and multi-faceted understanding of a particular instructor chosen issue, topic or problem. Prerequisite: EH 102.

PRO 399 - INDEP STUDY: INTERDISC STUDIES

Semester Hours: 3

Course allows individual students to pursue an interdisciplinary topic of interest which is not otherwise available and may involve any combination of readings assignments, tutorials, lectures, papers, presentations, or field/laboratory study (determined in consultation with instructor). Prerequisite: PRO 325.

PRO 431 - FUNDAMENTALS OF MANUFACTURING

Semester Hours: 3

This course introduces the fundamentals of manufacturing, examining the selection and use of various materials, processes, and systems. Prerequisites: (PRO 333 or MAE 201) and (PRO 335 or MAE 370 or CE 370).

PRO 433 - INSTRUMENTATION & MEASUREMENT

Semester Hours: 3

This course introduces valuable topics that an engineering technologist needs to master in order to design measurement and instrumentation systems. Topic areas include the essential general characteristics of instruments, electrical measurement systems, and computerized data acquisition systems. Prerequisites: (PRO 335 or CE 270 or MAE 370) and (PRO 336 or CE 272 or MAE 272) and (PRO 341 or EE 213).

PRO 498 - INQUIRY AND LEARNING

Semester Hours: 3

Inquiry-based learning accelerates understanding, fosters critical thinking skills, and facilitates self-direction and discovery. Using this method, students will identify an interdisciplinary problem related to their approved concentration area, perform the foundational research, and formulate a research proposal. This is the first of a two-semester progression to complete a Capstone research thesis/project in PRO 499. Prerequisite: PRO 325.

PRO 499 - CAPSTONE EXP: RSCH THESIS/PROJ

Semester Hours: 3

Students majoring in Professional Studies are required to complete a senior research thesis in their approved interdisciplinary concentration. This Capstone course requires the student to demonstrate his/her ability to integrate the core knowledge and skills gained in their interdisciplinary areas of study using inquiry-based learning methods. Research is conducted and a thesis-style paper is written and orally presented. Prerequisite: PRO 498 with minimum grade of C-.

Psychology (PY)

PY 101 - GENERAL PSYCHOLOGY I

Semester Hours: 3

Introduction to methods and research findings in the field. Topics include learning, memory, cognition, human development, personality theories, and abnormal behavior. Credit for PY 101 may be obtained by either Advanced Placement (AP) or the College Level Examination Program (CLEP).

PY 102 - APPLICATIONS IN PSYCHOLOGY

Semester Hours: 3

Introduction to applied topics in psychology, such as statistical analysis, counseling, human factors, health psychology, and industrial and organizational psychology. Career opportunities are discussed. Students are required to engage in approved experiential activities such as participating in current research studies and attending lectures. Prerequisite: PY 101.

PY 201 - LIFE-SPAN DEVELOPMENT

Semester Hours: 3

Examination of the psychological, social, and physical factors that affect human behavior and development from conception to death. Prerequisite: PY 101.

PY 300 - PSYCHOLOGICAL STATISTICS

Semester Hours: 3

Introduction to psychological statistics, with an emphasis on quantitative analysis of experimental data. Topics covered include probability, descriptive statistics, and hypothesis testing. Prerequisite: MA 107 or MA 110 or MA 112 or MA 113 or MA 115 or MA 120 or MA 171. Corequisite: PY 300L.

PY 300L - PSYCHOLOGICAL STATISTICS LAB

Semester Hour: 1

This course has been changed to PY 304 effective Fall 2020 semester.

PY 301 - PERSONALITY

Semester Hours: 3

Examinations of various theories of personality with possible implications for research. Prerequisite: PY 102.

PY 302 - EXPERIMENTAL PSYCHOLOGY

Semester Hours: 4

Design and execution of experiments in psychology. Data analysis and manuscript preparation. Prerequisite: PY 102 and PY 300 and PY 300L OR AHS 300.

PY 303 - PY RESEARCH METHODS

Semester Hours: 3

Students will learn the fundamentals of psychological research - how to form research questions and hypotheses, select an appropriate design to ethically address specific research questions, and how to critically evaluate research and findings. Student will also be taught about creating surveys, interviewing and observing participants. Prerequisites: PY 101, PY 102, PY 300 and PY 300L.

PY 303L - PY RESEARCH METHODS LAB

Semester Hour: 1

This course has been changed to PY 305 effective Fall 2020 semester.

PY 304 - PSYCHOLOGICAL STATISTICS LAB

Semester Hour: 1

This course is an introduction to analyzing data with computerized statistical software. This course will provide students with a familiarity of SPSS, and the abilities to analyze experimental data, read computer statistical output and write-up statistical results. Corequisite: PY 300.

PY 305 - PY RESEARCH METHODS LAB

Semester Hour: 1

Lab associated with PY 303. Covers the design and execution of quantitative and qualitative research designs, data analysis, and manuscript preparation.

PY 316 - PERCEPTION

Semester Hours: 3

Examines sensory systems and elements of perception. Topics include vision research, audition, chemical senses, and body sensations. Prerequisite: PY 102.

PY 317 - PHILOSOPHY OF MIND

Semester Hours: 3

The problem of the nature of mind and its relationship to the physical world has been a perennial concern of philosophy. This course examines, theories, and arguments concerning the nature of mind. Prerequisite: PY 102.

PY 324 - WORK DESIGN

Semester Hours: 3

Introduces the portion of the design process that uses basic principles of methods analysis and ergonomics to fit a task to the human operator. Methods analysis topics include: work measurement, job analysis, and job evaluation. Prerequisite: PY 300 or ISE 390.

PY 330 - NONVERBAL COMMUNICATION

Semester Hours: 3

Examines the diversity of human nonverbal behavior and its influences on everyday communication experiences. Same as CM 330. Prerequisite: PY 101.

PY 333 - PY OF ADJUSTMENT & ADAPTATION

Semester Hours: 3

PY 333 will explore psychological approaches to understanding, managing, and modifying our physical and emotional well-being. Students will learn ways to apply psychological principles and concepts to enhance coping with various issues of adulthood. Relationships with others, the environment and the self will be examined. Prerequisites: PY 101 and PY 102.

PY 375 - SOCIAL PSYCHOLOGY

Semester Hours: 3

Examination of the social influences on both individual and group behavior. Topics may include attitudes, group processes, intergroup conflict, interpersonal attraction, aggression, altruism, and impression formation. Prerequisite: PY 101 or SOC 100.

PY 399 - PROFESSIONAL DEV FOR PSY MAJOR

Semester Hour: 1

Development of skills related to graduate work and to occupations in psychology. Career and internship exploration, resume and graduate school exploration. Exposure to work and research related topics, such as teamwork and ethics. Prerequisite: PY 102.

PY 400 - INTRO TO CLINICAL & COUNSELING

Semester Hours: 3

PY 400 introduces clinical/counseling psychology and professional psychology. History of diagnosis and treatment, theoretical models in counseling, contemporary practice models, research basis of clinical/counseling psychology, empirically validated therapies, and doctoral program models are covered. Prerequisite: PY 101 and Sophomore standing or higher.

PY 402 - INDUSTRIAL & ORGANIZA PSY

Semester Hours: 3

Application of basic principles of learning, motivation, and perception to typical industrial and organizational problems. Open to students who have completed 15 hours of psychology. Prerequisite: PY 102.

PY 403 - HUMAN FACTORS PSYCHOLOGY

Semester Hours: 3

Human performance in human-technology-environment systems. Includes consideration of human capabilities and limitations as related to controls and displays. Open to students who have completed 15 hours of psychology. Prerequisite: PY 102.

PY 404 - THEORIES OF COUNSELING

Semester Hours: 3

This course is designed to introduce theories of psychotherapy and the process of psychotherapy and counseling. This course is a survey of counseling/psychotherapy models and techniques with emphasis on Empirically Validated Therapies (EVT) and traditional models with substantial support in the research and clinical literature.

PY 405 - PSYCHOPHARMACOLOGY

Semester Hours: 3

Introduction to drug classification and action with emphasis on physiological psychological interactions. Open to students who have completed 15 hours of psychology. Prerequisite: PY 102.

PY 406 - PSYCHOLOGY OF WOMEN

Semester Hours: 3

Examines theory and research in the psychological functioning of women, both in the United States and other nations. Topics include achievement and education, mental and physical health issues, and victimization of women. Open to students who have completed 15 hours of psychology. Senior Standing Prerequisite: PY 102.

PY 407 - CROSS-CULTURAL PSYCHOLOGY

Semester Hours: 3

Examines psychological similarities and differences between members of industrialized and non-industrialized cultures. Comparisons will include development, social interaction, and perception. Open to students who have completed 15 hours of psychology. Senior Standing. Prerequisite: PY 102.

PY 408 - TEAMWORK & TEAM PROCESSES

Semester Hours: 3

This course provides an introduction to teams and teamwork processes. The foundation of the course is research-based; topics will be approached from the context of empirical research. The types of research designs that are typically used in team research are addressed. Junior Standing.

PY 409 - PSYCHOLOGY OF AGING

Semester Hours: 3

PY 409 examines psychological processes in adulthood and aging. Emphasis is placed on contemporary theories, methodological issues, and how psychological, biological, social, and environmental factors interact to predict growth, maintenance, or decline in abilities throughout adulthood and aging. Prerequisite: PY 101.

PY 410 - TASK ANALYSIS & PROTOTYPING

Semester Hours: 3

This course introduces students to methods for analyzing user actions as they interact with software and tools to complete tasks. Students apply a range of prototype techniques from fast, low-fidelity prototypes to interactive high-fidelity prototypes. Prerequisite: Junior Standing or higher.

PY 414 - HUMAN RESEARCH:LEARNING

Semester Hours: 3

Analysis of learning principles from simple relationships with animals to the complexities of human language and problem solving. Prerequisite: PY 102.

PY 415 - DEVELOPMENTAL PSYCHOLOGY

Semester Hours: 3

Examines sensory systems and elements of perception. Topics include vision research, audition, chemical senses, and body sensations. Prerequisite: PY 102.

PY 420 - SPECIAL TOPICS

Semester Hours: 3

Pre-announced special areas in seminar discussion, laboratory work, or practicum. May be taken twice for credit. Open to students who have completed 15 hours of psychology. Prerequisite: PY 102.

PY 422 - INDIVIDUAL RESEARCH

Semester Hours: 3

With advice of instructor, design and execution of original experiment in psychology. May be taken twice for credit. Open to students who have completed 15 hours of psychology. Prerequisite: PY 102.

PY 426 - HISTORY & SYSTEMS IN PSY

Semester Hours: 3

Survey of psychological theory and experimentation regarding human behavior and mental processes from ancient times to the present. Open to students who have completed 15 hours of psychology. Prerequisite: PY 102.

PY 430 - PSYCHOMETRICS

Semester Hours: 3

History and development of psychological testing with special emphasis given to both theory and process of effective evaluation. Prerequisite: PY 300.

PY 434 - PSYCHOLOGY AND LAW

Semester Hours: 3

This seminar is a survey of the major topics represented in the field of Psychology and Law. We will focus on how psychological research can contribute to a better understanding of issues related to law. Open to students who have completed 15 hours of psychology. Prerequisite: PY 302.

PY 435 - PSYCHOPATHOLOGY

Semester Hours: 3

Survey of major psychological approaches to conceptualizing abnormal behavior, with discussion of present diagnostic categories of psychological disorders. Open to students who have completed 15 hours of psychology. Prerequisite: PY 102.

PY 436 - BIOLOGICAL PSYCHOLOGY

Semester Hours: 3

Neural and endocrinological systems underlying behavior. Open to students who have completed 15 hours of psychology. Prerequisites: (either a or b): (a) 15 hrs of PY or approval of instructor; (b) BYS 119 and BYS 120 and 6 hours of PY or approval of instructor. Same as BYS 436.

PY 437 - PSYCHOBIOLOGY STRESS & ILLNESS

Semester Hours: 3

Overview of physiological stress responses and their influence on health behavior and illness. Open to students who have completed 15 hours of psychology. Prerequisite: PY 102.

PY 480 - COGNITION

Semester Hours: 3

Information processing: how information is acquired, encoded, organized, stored, and retrieved. This process will be applied to specific areas of psychology such as language, learning, or personality. Prerequisite: PY 102.

PY 488 - PY SERVICES INTERNSHIP

Semester Hours: 1-3

This course provides a supervised experience in a professional environment for students to apply their psychological skills to projects outside the classroom, facilitate their entry into the job market in psychological services after graduation, and enhance their pre-professional experience. Prerequisites: 18 hrs of Psychology courses; junior or senior standing; minimum 2.5 GPA in major, chair's approval.

PY 490 - READINGS IN PSYCHOLOGY

Semester Hours: 3

Supervised in-depth readings in area of particular interest to student. May be taken twice for credit. Open to students who have completed 15 hours of psychology. Prerequisite: PY 102.

PY 491 - SPECIAL TOPICS IN PSYCHO

Semester Hour: 1

Pre-announced special areas in seminar discussion, laboratory work, or practicum. May be taken twice for credit. Open to students who have completed 15 hours of psychology. Prerequisite: PY 102.

PY 492 - SPECIAL TOPICS IN PSYCHO

Semester Hours: 2

Pre-announced special areas in seminar discussion, laboratory work, or practicum. May be taken twice for credit. Open to students who have completed 15 hours of psychology. Prerequisite: PY 102.

PY 498 - HUMAN RESEARCH I

Semester Hours: 3

Capstone course for the PY major. Human behavior observation and/or experimentation. Students engage in data collection and analysis, and report their findings. Offered Fall Semester only. Prerequisite: PY 302.

PY 499 - HUMAN RESEARCH II

Semester Hours: 3

Continuation of PY 498. Open to students who have completed 15 hours of psychology. Prerequisite: PY 498 and approval of instructor. Offered Spring Semester only.

Sociology (SOC)

SOC 100 - INTRO TO SOCIOLOGY

Semester Hours: 3

An introduction to the critical and scientific study of society, culture, social institutions and social change. Illuminates the social and cultural context of our lives and is useful for exploring contemporary social issues, problems and change in society.

SOC 102 - ANALYSIS OF SOCIAL PROBLEMS

Semester Hours: 3

Application of the sociological perspective to understanding the 'social problems process.' Among other things, the course addresses how some troubling social conditions come to be identified as 'problems' while others do not, as well as how some 'solutions' (e.g. policies) are implemented while others are not.

SOC 103 - INTRO TO CRIMINOLOGY

Semester Hours: 3

A broad introduction to the sociological study of crime and the criminal justice system in the United States exploring sources of crime, measurement of crime, theories of crime, and the criminal justice system.

SOC 105 - INTRO CULTURAL ANTHROPOLOGY

Semester Hours: 3

Cultural anthropology is one of the four sub-fields of anthropology concerned with a deeper understanding of cultural differences. This course examines cultural diversity in human behavior, social institutions, belief systems, and cultural change from a global and comparative perspective.

SOC 206 - MARRIAGE AND FAMILY

Semester Hours: 3

Explores family forms and functions across history and across cultures. Students will learn how the family affects and is affected by other social institutions, recent trends in the American family, the contexts in which marriage and families evolve, and key inequalities within and between families. Prerequisite: SOC 100.

SOC 301 - RESEARCH METHODS

Semester Hours: 3

The object of this course is for students to be able to read, interpret, and explain scientific research in social science. Course covers key elements and process of sociological research methods, both qualitative and quantitative.

SOC 302 - SOCIOLOGICAL THEORY

Semester Hours: 3

This course traces the development of major trends of sociological theory, past and present, and major theoretical problem areas. It also addresses how the socio-historical context within which the texts were written influences the issues and ideas expressed. Prerequisite: SOC 100.

SOC 303 - STATISTICS/SOCIAL SCIENCES

Semester Hours: 3

Introduction to the basic quantitative data analysis techniques used by social scientists. Explore the ways researchers use statistics to examine and test ideas about the social world. In the lab, students learn how to use the statistical software SPSS to analyze social science datasets. Prerequisite: SOC 100 and one of the following math courses: MA 107, MA 110, MA 112, MA 113, MA 115, MA 120, MA 171.

SOC 304 - STATISTICS LAB

Semester Hour: 1

SOC 306 - SOCIOLOGY OF GENDER

Semester Hours: 3

Explores how social relationships create, structure and reinforce gender differences and inequalities. Students will learn about the social construction of gender, gender socialization, gender roles, and gender inequalities in income, poverty, occupation, and violence. Prerequisite: SOC 100.

SOC 307 - SOCIOLOGY OF LAW

Semester Hours: 3

This course examines the relationship between law and society from a variety of theoretical perspectives. Topics include the social organization of legal institutions, cultural meanings of law, and social interactions among different actors in the legal context (police, lawyers, judges, legislators, etc). Prerequisite: SOC 100.

SOC 309 - SOCIOLOGY OF SEXUALITY

Semester Hours: 3

A research based study of sexuality focusing on how it is constructed, experienced, challenged, and changed within society. Upon completion of the course students will be able to recognize, understand, and articulate how society both structures and is structured by sexuality. Prerequisite: SOC 100.

SOC 313 - QUALITATIVE RESEARCH METHODS

Semester Hours: 3

Teaches ethnography, interviewing, focus groups, and content analysis. Includes an in-class data analysis practicum. Upon completion, students will be able to understand, articulate, and assess qualitative methods as well as independently collect, analyze, and report findings from qualitative data. Prerequisite: SOC 100.

SOC 314 - DATA ANALYSIS

Semester Hours: 3

Quantitative analysis of real world data on social issues using the SPSS program. Prerequisite: SOC 303 and SOC 304 or equivalent and SOC 301 or permission of instructor.

SOC 319 - DEVIANCE & SOCIAL CONTROL

Semester Hours: 3

Examines several approaches to studying deviant behavior and its social control, with emphasis on the social construction of deviance and societal reactions to it. The focus is generally on deviation and control in the U.S. Prerequisite: SOC 100.

SOC 320 - SOCIOLOGY OF RELIGION

Semester Hours: 3

Study of religion as a social phenomenon. The course examines sociological theories of religious behavior, religious beliefs, religion as a social institution, religious organization, new religious movements, and religion and social change.

SOC 330 - RACE AND ETHNICITY

Semester Hours: 3

Examines the historical relationship between race, ethnicity and economic class/opportunity; and the social construction of ethnicity and race. The emphasis is on race and ethnicity in the U.S. with some discussion of international issues. Prerequisite: SOC 100.

SOC 340 - SPECIAL TOPICS

Semester Hours: 1-3

Nontraditional topics of current sociological interest. Title of course and number of credit hours when offered will appear in course schedule along with prerequisites necessary for admission to course. May be taken more than once for credit as long as subtitles differ. Prerequisite: SOC 100.

SOC 350 - SOCIAL STRATIFICATION

Semester Hours: 3

This course explores the causes and consequences of social stratification (focusing on economic inequality) in the United States, including: wealth and income disparities, labor markets, elites/power, impact of gender and race, privilege and oppression, and economic and social welfare policy. Prerequisite: SOC 100.

SOC 369 - ENVIRONMENTAL SOCIOLOGY

Semester Hours: 3

Examines the ways in which society and the natural environment interact and shape each other. This course engages with the major debates in the field of environmental sociology in order to better understand the challenges and options humans face as we head further into global environmental crisis. Prerequisite: SOC 100.

SOC 375 - SOCIAL PSYCHOLOGY

Semester Hours: 3

Fundamental principles of group processes, social influence, and group structure. Development of group solidarity, cohesion, intergroup conflict and cooperation, communication, leadership, opinion, propaganda, and suggestion. Prerequisites: SOC 100 or PY 101.

SOC 376 - MASS MEDIA IN AMERICA

Semester Hours: 3

Mass communication theory, history of American mass media, and criticism of contemporary forms and functions of mass media of communication in the U.S. Prerequisite: SOC 100.

SOC 382 - WHITE COLLAR CRIME

Semester Hours: 3

This course explores white collar crime in depth, considering both how it is defined and theoretical perspectives about why it occurs. Broadly, the course considers occupational crimes (e.g. embezzlement & employee theft), corporate crimes (e.g., securities fraud & price fixing), and political crimes (e.g., state corruption & repression). Students also discuss its costs to society, identifying both perpetrators and victims. Prerequisites: SOC 100 or SOC 103.

SOC 390 - READINGS & INDIVIDUAL RES

Semester Hours: 3

Supervised readings or in-depth research or both in area of specialized interest to student or instructor. May be taken twice for credit with advisor's approval. Prerequisite: SOC 100.

SOC 395 - COMMUNITY SERVICES INTERNSHIP

Semester Hours: 3

An experiential-learning course for students who envision working in social service organizations. Internship opportunity is initiated by student and course includes an academic component of readings and assignments agreed upon by student, organizational representative and the Internship Coordinator. Prerequisite: SOC 100.

SOC 425 - SOCIOLOGY OF EDUCATION

Semester Hours: 3

This course examines education systems and policies from a sociological perspective. We ask what and how students learn, the function of schools in society, results of recent policy decisions, and how educational systems interact with political, economic, cultural and family institutions. Prerequisite: SOC 100 and Junior or Senior Standing.

SOC 431 - ADVANCED SPECIAL TOPICS

Semester Hours: 3

Special topics of current sociological interest. Course title, credit hours and prerequisites will appear in course schedule. May be taken more than once for credit as long as subtitles differ. Different from SOC 340 Special Topics in terms of level of expectations and/or, prerequisites. Prerequisite: SOC 100.

SOC 435 - SOCIOLOGY OF SOCIAL MOVEMENTS

Semester Hours: 3

This course focuses on a variety of issues related to social movements, including questions about the origins and causes of social movements, the cultural, social and political contexts that impact movements, how movements mobilize people, and the use of strategies and tactics. Prerequisite: SOC 100 AND EITHER SOC 202 OR 300 OR 301.

SOC 444 - SOCIOLOGY OF CULTURE

Semester Hours: 3

Examines the cultural dimensions of important social processes including race, class, gender, power, and resistance. Theoretical and empirical analyses of both high and popular cultural forms and processes of cultural production in various social settings. Prerequisite: SOC 100.

SOC 469 - ENVIRONMENTAL JUSTICE

Semester Hours: 3

Examination of (1) how social, economic, and political processes at the local and global levels contribute the distribution of both environmental 'goods' (e.g., clean air and water) and environmental 'bad's (e.g., toxic waste and pollution); (2) the principles and strategies of the environmental justice movement; (3) the interrelations between local and global level processes and their impact upon environmental inequality and the efforts and opportunities of the environmental justice movement. Prerequisites: SOC 100.

SOC 495 - SENIOR CAPSTONE SEMINAR

Semester Hours: 3

This course allows senior sociology majors to transition from being consumers of sociological knowledge, to being producers and practitioners. Students can choose one of two tracks for this course: completing either an independent research project or an internship at a local social service organization. Prerequisite: SOC 301.

Statistics (ST)

ST 281 - ELEMENTS OF STAT ANALYSIS

Semester Hours: 3

Descriptive statistics, fundamentals of probability theory, fundamentals of statistical inference, including estimation and hypothesis testing, and use of typical statistical package such as MINITAB. Prerequisites: MA 113 or MA 115 or Level 2 Placement.

ST 287 - APPLIED STATISTICS I

Semester Hours: 3

ST 487 - INTRO TO MATH STATISTICS

Semester Hours: 3

Brief review of basic probability theory, sampling distributions, estimations, hypothesis testing, experimental design, correlation and regression, analysis of variance, and nonparametric statistics. Prerequisites: MA 201 and either MA 385 or ISE 390.

Theatre (TH)

TH 100 - STAGECRAFT

Semester Hours: 3

This course will provide students with the basic knowledge of stage construction, its practices, and implementation. Additional hands-on experience will be gained by working outside of class hours in the scene shop assisting in the construction and installation of main-stage productions.

TH 101 - THEATRE PRACTICUM

Semester Hour: 1

TH 110 - VOICE AND DICTION

Semester Hours: 3

Examines and practices methods of adjusting vocal articulation, tone, pitch, pace, volume, resonance, and pronunciation for improving or changing voice quality and accents. Understanding the vocal instrument prepares students for acting and for positive self-presentation in the real world.

TH 122 - THEATRE APPRECIATION

Semester Hours: 3

Introductory survey of theater art focusing on understanding performance components and genres. Satisfies fine arts elective. Offered every term.

TH 123 - INTRO TO FILM STUDIES

Semester Hours: 3

Students develop a critical understanding of how the 'language' of film uses image and sound to produce meaning and pleasure, and to elicit audience response in order to generate what constitutes meaning. Concentrating on film form and style, the course teaches students to engage cinema in relation to narrative, mise-en-scene, cinematography, editing, sound, and genre.

TH 150 - SCRIPT ANALYSIS

Semester Hours: 3

This course is a hands-on look into script analysis, using plays from the western theatre canon, some of which will be produced by UAH Theatre during the school year. There will be individual and group work in script analysis, culminating in a full script analysis project at the end of the semester.

TH 180 - READER'S THEATRE

Semester Hours: 3

This course is designed to explore play text within the theatre. Students will work first hand with plays and present staged readings. This course is open to all majors.

TH 200 - PLAYWRITING

Semester Hours: 3

Students will create original short, theatrical works as they examine and experiment with multiple narrative techniques. Students will work independently and collaboratively to experience the full process of drafting, hearing the words aloud, and revising original works. Works will be read aloud; student and faculty feedback will be given.

TH 201 - THEATRE PRACTICUM

Semester Hour: 1

UAH Theatre offers students a number of opportunities to work on and crew productions. Practicum allows students to earn required class credit while engaged in these activities.

TH 210 - WRITING FOR VISUAL MEDIA

Semester Hours: 3

This course offers an introduction to scriptwriting for a variety of media: commercials, PSAs, fiction films, documentaries, and the web. The art of 'visual writing' is emphasized. Students produce scripts on their own while contributing to and critiquing the work of their fellow classmates. ed, communication medium. Prerequisites: EH 101, EH 102.

TH 221 - ACTING

Semester Hours: 3

This course explores the foundations of acting through an understanding of basic techniques including scene study, script analysis, improvisation, and physical and vocal work. Offered every semester.

TH 225 - ELEMENTS OF THEATRE PRODUCTION

Semester Hours: 3

This course is designed to give students the opportunity to explore the design components of theatre including scenery, costumes, lighting and sound through class projects and practical application. Offered every Spring. Prerequisite: TH 122 or permission of instructor.

TH 250 - STAGE MAKEUP

Semester Hours: 3

Course will cover basic stage makeup application techniques for both the actor and the makeup artist. Course will also explore 3D makeup techniques and character analysis for makeup design. Theatre Majors only, or permission of instructor.

TH 251 - COSTUME FUNDAMENTALS

Semester Hours: 3

The purpose of this course is to learn how to function in the costume shop. Students will learn basic hand and machine sewing skills for constructing and completing a costume. Students will also gain an understanding of basic pattern making skills and how costumes are created for Theatre.

TH 260 - VIDEO PRODUCTION

Semester Hours: 3

This course provides students with an opportunity to experience the process of video production through creative projects designed to stimulate the visual artist, summon the storyteller and create the video editor.

TH 275 - DOCUMENTARY FILM

Semester Hours: 3

Through readings, screenings, discussion, and practice, students will become acquainted with various approaches to documentary film and video in theory and practice. Focus will be on the ethical, rhetorical, and creative choices that form conventions and modes documentary filmmakers have developed in their practice and critics have used to describe and analyze how documentaries communicate. Students will experiment with some of these choices by working on their own short documentary projects.

TH 301 - THEATRE PRACTICUM

Semester Hour: 1

UAH Theatre offers students a number of opportunities to work on and crew productions. Practicum allows students to earn required class credit while engaged in these activities.

TH 321 - ACTING II

Semester Hours: 3

Acting II is a Stanislavsky-based class which will further the growth of skills learned in Acting I, as it applies to more complex characterization. Class work will include sensory exercises, relaxation, concentration, imagination, improvisation, character analysis, and scene work. Prerequisite: TH 221.

TH 322 - THEATRE HISTORY I

Semester Hours: 3

Explores the development of theater art from its origins to French neoclassicism and Moliere with particular emphasis on the Greeks, Shakespeare, and his contemporaries. Offered every two years.

TH 323 - THEATRE HISTORY II

Semester Hours: 3

Explores the development of theatre art from the 17th to the 20th century, with particular emphasis on the English Restoration, early Realism and the American masters. Offered every two years.

TH 324 - MODERN AMERICAN THEATRE

Semester Hours: 3

This course is a seminar-style study of current American theatre and plays written in the 21st century. To that end, we will read and write about 8 current American plays, and other articles from theatre journals. At the end of the class, students will understand and be able to explicate in writing, spoken presentation, and/or through creative activity, the present, and possible future impacts of current American theatre on American society.

TH 330 - STAGE MANAGEMENT

Semester Hours: 3

This course concerns the role of the Stage Manager in theatrical productions. It focuses on the stage manager's duties, responsibilities, and procedures from pre-production to post-production. It explores the functions of various members of the production team and how the stage manager's interaction with each member of this team varies. It considers the role of the stage manager as the hub of communication for a production. Prerequisites: TH 122 and TH 225.

TH 334 - HISTORY OF AMERICAN CINEMA

Semester Hours: 3

Investigates the American cinema as a cultural artifact by studying cultural and historical context of representations, audiences, aesthetics and industry practices in American cinema from its beginning (1895) to present.

TH 340 - SPECIAL TOPICS IN THEATRE

Semester Hours: 3

Topics announced in advance. Representative topics include playwriting, directing, and ancient Greek theatre. May be repeated twice for credit.

TH 355 - SCENE DESIGN

Semester Hours: 3

This class introduces students to the many facets, both artistic and engineering-based, of scene design for the theatre including: history, research, design, stage, direction, technical direction, scenic art and props. Prerequisites: TH 100 and TH 225.

TH 360 - VIDEO PRODUCTION II

Semester Hours: 3

Advanced Video Production is an intensive video production course designed to integrate film theory and practice. Students will learn the technical and artistic necessities of the film and video medium. Through immersive lectures, workshops, projects, and exercises, students will gain valuable experience and know-how in this exciting, fast-paced, communication medium. Prerequisite: TH 260.

TH 365 - COSTUME DESIGN

Semester Hours: 3

The purpose of this course is to learn the intricacies of costume design and how it fits in the full vision of a Theatrical Production. The importance of the artist's vision and the practical use must all be addressed when designing a show. Each student will learn to develop their own style and voice as an artist and how to work in the theatre. Prerequisite: TH 225.

TH 375 - SOUND DESIGN

Semester Hours: 3

This course offers an exploration of the sound design process for the theatre. Script analysis and creating a design concept will underline the structure of the course. The students will have the opportunity to use a DAW (digital audio workstation) and various computer software programs including QLab. The course includes an overview of digital audio data structures, 'plug-ins', processing, equalization and standard solutions for interfacing external devices with a computer. The students will participate in two productions and gain valuable hands-on experience. There will be an emphasis on the creative possibilities of sound design for the theatre and multimedia. Prerequisites: TH 225.

TH 390 - TEACHING THEATRE

Semester Hours: 3

This course is designed to help students develop the skills required to coach and direct student actors, focusing on best practices in teaching the fundamentals of directing, including various assessment rubrics and adapting activities to different age groups. The course emphasizes learning by doing. Prerequisite: TH 221.

TH 400 - INTERNSHIP IN THEATRE

Semester Hours: 0.5-3

Practical experience in the workplace allows the student to apply principles, theories, and skills learned in Theatre Program courses. Arranged by the student with consent of the director of the Theatre Program, the student meets regularly with a faculty advisor, keeps a log of activities, and submits a report on the internship. Prerequisite: Senior Standing with TH major, and permission of instructor.

TH 401 - INTERNSHIP IN VIDEO

Semester Hours: 3

Students receive practical, production experience in the engagement of a creative project where they are able to apply principles, theories, and production skills learned from previous video courses and/or other course work.

TH 421 - ACTING III

Semester Hours: 3

This class explores non-realist acting techniques, as a way to expand understanding of different performance and period styles. Students will work in historical periods from the Italian and Elizabethan renaissances and more contemporary styles. Prerequisite: TH 321.

TH 425 - THEATRE MAINSTAGE

Semester Hours: 1-3

This course provides students with an opportunity to experience the complete process of theatre including such elements as: direction, acting, design, tech and management. The class will produce two full length plays. Students will be auditioned to determine role in each production. Some will serve critical production roles such as design, direction, and management while others will act in one or both productions. In certain instances, a student actor may appear in both plays. Offered every semester. Can be taken two semesters for maximum credit of 6 hours.

TH 431 - SENIOR CAPSTONE THEATRE

Semester Hours: 3

Senior capstone course involving either a scholarly project or an approved communication-intensive internship combined with a comprehensive examination. Prerequisites: senior standing with TH major, and approval of instructor.

TH 465 - DIRECTING

Semester Hours: 3

In this course, students will develop their skills in theatrical directing and production using script analysis, visual composition, design, and communication. Students will complete hands-on directing scene projects, supplemented with written analysis, dramaturgical research, and design images. Prerequisites: TH 150, and TH 322 or TH 323.

TH 475 - PORTFOLIO

Semester Hours: 3

This course explores the current state of the entertainment industry's job market. Students from design, performance, video production, and dramaturgy build and refine the materials they will need to be employed within the entertainment industry. Prerequisites: TH 421, or TH 390, or TH 355, or TH 322 & TH 323.

TH 480 - DRAMATURGY

Semester Hours: 3

Study of the fundamental skills and practical collaborative processes needed to dramaturg a work of theater. Prerequisites: TH 150 and either TH 322 or TH 323.

Womens and Gender Studies (WGS)

WGS 200 - INTRO WOMEN'S & GENDER STUDIES

Semester Hours: 3

Focusing on gender as a fundamental category of meaning, the course will introduce methods and approaches to Women's and Gender Studies in a variety of disciplines, examining the pervasive and often unacknowledged ways that gender changes our social institutions, individual knowledge, and interpersonal relationships. The course includes guest lectures by many of our faculty teaching courses in the Women's and Gender Studies minor.

WGS 340 - SPECIAL TOPICS

Semester Hours: 1-3

Pre-announced special areas addressed in seminar format, laboratory work, or practicum. May be taken twice for credit. Prerequisite: WGS 200.

WGS 499 - INDEPENDENT STUDY

Semester Hours: 1-3

Prerequisite: WGS 200.

World Languages and Cultures (WLC)

WLC 101A - INTRO FOREIGN LANG I: ARABIC

Semester Hours: 3

Teaches beginning listening, speaking, reading and writing within cultural contexts. Conducted in the target language. No prerequisites.

WLC 101F - INTRO FOREIGN LANG I:FRENCH

Semester Hours: 3

Teaches beginning listening, speaking, reading and writing within cultural contexts. Conducted in the target language. No prerequisites.

WLC 101G - INTRO FOREIGN LANG I:GERMAN

Semester Hours: 3

Teaches beginning listening, speaking, reading and writing within cultural contexts. Conducted in the target language. No prerequisites.

WLC 101J - INTRO FOREIGN LANG I:JAPANESE

Semester Hours: 3

Teaches beginning listening, speaking, reading and writing within cultural contexts. Conducted in the target language. No prerequisites.

WLC 101MS - INTRO TO MEDICAL SPANISH

Semester Hours: 3

Teaches beginning listening, speaking, reading and writing within cultural contexts with special emphasis on medical terminology and tasks. Conducted in the target language. No prerequisites.

WLC 101R - INTRO FOREIGN LANG I:RUSSIAN

Semester Hours: 3

Teaches beginning listening, speaking, reading and writing within cultural contexts. Conducted in the target language. No prerequisites.

WLC 101S - INTRO FOREIGN LANG I: SPANISH

Semester Hours: 3

Teaches beginning listening, speaking, reading and writing within cultural contexts. Conducted in the target language. No prerequisites.

WLC 102A - INTRO FOREIGN LANG II: ARABIC

Semester Hours: 3

Teaches beginning listening, speaking, reading, and writing within cultural contexts. Conducted in the target language. Prerequisites: WLC 101A or placement by exam.

WLC 102F - INTRO FOREIGN LANG II:FRENCH

Semester Hours: 3

Teaches beginning listening, speaking, reading, and writing within cultural contexts. Conducted in the target language. Prerequisites: WLC 101F or placement by exam.

WLC 102G - INTRO FOREIGN LANG II:GERMAN

Semester Hours: 3

Teaches beginning listening, speaking, reading, and writing within cultural contexts. Conducted in the target language. Prerequisites: WLC 101G or placement by exam.

WLC 102J - INTRO FOREIGN LANG II:JAPANESE

Semester Hours: 3

Teaches beginning listening, speaking, reading, and writing within cultural contexts. Conducted in the target language. Prerequisites: WLC 101J or placement by exam.

WLC 102MS - INTRO TO MEDICAL SPANISH II

Semester Hours: 3

Teaches beginning listening, speaking, reading, and writing within cultural contexts with special emphasis on medical terminology and tasks. Conducted in the target language. Prerequisites: WLC 101MS.

WLC 102R - INTRO FOREIGN LANG II:RUSSIAN

Semester Hours: 3

Teaches beginning listening, speaking, reading, and writing within cultural contexts. Conducted in the target language. Prerequisites: WLC 101R or placement by exam.

WLC 102S - INTRO FOREIGN LANG II:SPANISH

Semester Hours: 3

Teaches beginning listening, speaking, reading, and writing within cultural contexts. Conducted in the target language. Prerequisites: WLC 101S or placement by exam.

WLC 199A - SPECIAL TOPICS

Semester Hours: 3

Study of special topics in world languages, literature, or culture on campus or abroad. Prerequisites: Placement by exam.

WLC 199F - SPECIAL TOPICS

Semester Hours: 3

Study of special topics in foreign language, literature, or culture on campus or abroad. Prerequisites: Placement by exam.

WLC 199G - SPECIAL TOPICS

Semester Hours: 3

Study of special topics in foreign language, literature, or culture on campus or abroad. Prerequisites: Placement by exam.

WLC 199J - SPECIAL TOPICS

Semester Hours: 3

Study of special topics in world languages, literature, or culture on campus or abroad. Prerequisites: Placement by exam.

WLC 199R - SPECIAL TOPICS

Semester Hours: 3

Study of special topics in foreign language, literature, or culture on campus or abroad. Prerequisites: Placement by exam.

WLC 199S - SPECIAL TOPICS

Semester Hours: 3

Study of special topics in foreign language, literature, or culture on campus or abroad. Prerequisites: Placement by exam.

WLC 201A - INTERM FOREIGN LANG I: ARABIC

Semester Hours: 3

Teaches intermediate listening, speaking, reading, and writing within cultural contexts. Conducted in the target language. Prerequisite: WLC 102A or placement by exam.

WLC 201F - INTERM FOREIGN LANG:FRENCH

Semester Hours: 3

Teaches intermediate listening, speaking, reading, and writing within cultural contexts. Conducted in the target language. Prerequisite: WLC 102F or placement by exam.

WLC 201G - INTERM FOREIGN LANG:GERMAN

Semester Hours: 3

Teaches intermediate listening, speaking, reading, and writing within cultural contexts. Conducted in the target language. Prerequisite: WLC 102G or placement by exam.

WLC 201J - INTERM FOREIGN LANG: JAPANESE

Semester Hours: 3

Teaches intermediate listening, speaking, reading, and writing within cultural contexts. Conducted in the target language. Prerequisite: WLC 102J or placement by exam.

WLC 201R - INTERM FOREIGN LANG:RUSSIAN

Semester Hours: 3

Teaches intermediate listening, speaking, reading, and writing within cultural contexts. Conducted in the target language. Prerequisite: WLC 102R or placement by exam.

WLC 201S - INTERM FOREIGN LANG:SPANISH

Semester Hours: 3

Teaches intermediate listening, speaking, reading, and writing within cultural contexts. Conducted in the target language. Prerequisite: WLC 102S or placement by exam.

WLC 202A - INTERM FOREIGN LANG II: ARABIC

Semester Hours: 3

Teaches listening, speaking, reading and writing within cultural contexts. Conducted in the target language. Prerequisites: WLC 201A or placement by exam.

WLC 202F - INTERM FOREIGN LANG II:FRENCH

Semester Hours: 3

Teaches listening, speaking, reading and writing within cultural contexts. Conducted in the target language. Prerequisites: WLC 201F or placement by exam.

WLC 202G - INTERM FOREIGN LANG II:GERMAN

Semester Hours: 3

Teaches listening, speaking, reading and writing within cultural contexts. Conducted in the target language. Prerequisites: WLC 201G or placement by exam.

WLC 202J - INTERM FORGN LANG II:JAPANESE

Semester Hours: 3

Teaches listening, speaking, reading and writing within cultural contexts. Conducted in the target language. Prerequisites: WLC 201J or placement by exam.

WLC 202R - INTERM FOREIGN LANG II:RUSSIAN

Semester Hours: 3

Teaches listening, speaking, reading and writing within cultural contexts. Conducted in the target language. Prerequisites: WLC 201R or placement by exam.

WLC 202S - INTERM FOREIGN LANG II:SPANISH

Semester Hours: 3

Teaches listening, speaking, reading and writing within cultural contexts. Conducted in the target language. Prerequisites: WLC 201S or placement by exam.

WLC 204 - INTERNATIONAL CINEMA

Semester Hours: 3

Analyzes foreign language films centered on changing themes, such as gender issues, family, religion, children and society, the arts. Conducted in English. No prerequisite.

WLC 301A - CONVERSATION: ARABIC

Semester Hours: 3

Teaches conversational communication through cultural texts and media. Conducted in the target language. Prerequisite: WLC 202A or placement by instructor. Prerequisite: WLC 202A.

WLC 301F - CONVERSATION:FRENCH

Semester Hours: 3

Teaches conversational communication through cultural texts and media. Conducted in the target language. Prerequisite: WLC 202F or placement by exam.

WLC 301G - CONVERSATION:GERMAN

Semester Hours: 3

Teaches conversational communication through cultural texts and media. Conducted in the target language. Prerequisite: WLC 202G or placement by exam.

WLC 301J - CONVERSATION:JAPANESE

Semester Hours: 3

Teaches conversational communication through cultural texts and media. Conducted in the target language. Prerequisite: WLC 202J or placement by exam.

WLC 301R - CONVERSATION:RUSSIAN

Semester Hours: 3

Teaches conversational communication through cultural texts and media. Conducted in the target language. Prerequisite: WLC 202R or placement by exam.

WLC 301S - CONVERSATION:SPANISH

Semester Hours: 3

Teaches conversational communication through cultural texts and media. Conducted in the target language. Prerequisite: WLC 202S or placement by exam.

WLC 302F - COMPOSITION:FRENCH

Semester Hours: 3

Teaches writing skills through cultural texts and media. Conducted in the target language. Prerequisite: WLC 202F or placement by exam.

WLC 302G - COMPOSITION:GERMAN

Semester Hours: 3

Teaches writing skills through cultural texts and media. Conducted in the target language. Prerequisite: WLC 202G or placement by exam.

WLC 302R - COMPOSITION:RUSSIAN

Semester Hours: 3

Teaches writing skills through cultural texts and media. Conducted in the target language. Prerequisite: WLC 202R or placement by exam.

WLC 302S - COMPOSITION:SPANISH

Semester Hours: 3

Teaches writing skills through cultural texts and media. Conducted in the target language. Prerequisite: WLC 202S or placement by exam.

WLC 303F - FOREIGN LANG LIFE & PROF:FRENC

Semester Hours: 3

Teaches foreign language skills for careers in business, technology, politics, etc. Conducted in the target language. Prerequisite: WLC 202F or by placement.

WLC 303G - FOREIGN LANG LIFE & PROF:GERMA

Semester Hours: 3

Teaches foreign language skills for careers in business, technology, politics, etc. Conducted in the target language. Prerequisite: WLC 202G or by placement.

WLC 303R - FOREIGN LANG LIFE & PROF:RUSSI

Semester Hours: 3

Teaches foreign language skills for careers in business, technology, politics, etc. Conducted in the target language. Prerequisite: WLC 202R or by placement.

WLC 303S - FOREIGN LANG LIFE & PROF:SPANI

Semester Hours: 3

Teaches foreign language skills for careers in business, technology, politics, etc. Conducted in the target language. Prerequisite: WLC 202S or by placement.

WLC 304F - CULTURE:FRENCH

Semester Hours: 3

Teaches the arts, histories, social customs, and values of the target culture. Conducted in the target language. Prerequisites: WLC 301F or WLC 302F.

WLC 304G - CULTURE:GERMAN

Semester Hours: 3

Teaches the arts, histories, social customs, and values of the target culture. Conducted in the target language. Prerequisites: WLC 301G or WLC 302G.

WLC 304R - CULTURE:RUSSIAN

Semester Hours: 3

Teaches the arts, histories, social customs, and values of the target culture. Conducted in the target language. Prerequisites: WLC 301R or WLC 302R.

WLC 304S - CULTURE:SPANISH

Semester Hours: 3

Teaches the arts, histories, social customs, and values of the target culture. Conducted in the target language. Prerequisites: WLC 301S or WLC 302S.

WLC 305F - INTRO TO LITERATURE:FRENCH

Semester Hours: 3

Introduces the literature of the target language in cultural contexts. Conducted in the target language. Prerequisite: WLC 301F or WLC 302F.

WLC 305G - INTRO TO LITERATURE:GERMAN

Semester Hours: 3

Introduces the literature of the target language in cultural contexts. Conducted in the target language. Prerequisite: WLC 301G or WLC 302G.

WLC 305R - INTRO TO LITERATURE:RUSSIAN

Semester Hours: 3

Introduces the literature of the target language in cultural contexts. Conducted in the target language. Prerequisite: WLC 301R or WLC 302R.

WLC 305S - INTRO TO LITERATURE:SPANISH

Semester Hours: 3

Introduces the literature of the target language in cultural contexts. Conducted in the target language. Prerequisite: WLC 301S or WLC 302S.

WLC 404F - TEXTS & CONTEXTS:SEM LIT:FRENC

Semester Hours: 3

In-depth study of authors, genres, or movements in cultural contexts. Conducted in the target language. May be repeated when taught with a different topic. Prerequisite: WLC 301F or WLC 302F.

WLC 404G - TEXTS & CONTEXTS:SEM LIT/GERMA

Semester Hours: 3

In-depth study of authors, genres, or movements in cultural contexts. Conducted in the target language. May be repeated when taught with a different topic. Prerequisite: WLC 301G or WLC 302G.

WLC 404R - TEXTS & CONTEXTS:SEM LIT:RUSSI

Semester Hours: 3

In-depth study of authors, genres, or movements in cultural contexts. Conducted in the target language. May be repeated when taught with a different topic. Prerequisite: WLC 301R or WLC 302R.

WLC 404S - TEXTS & CONTEXTS:SEM LIT:SPANI

Semester Hours: 3

In-depth study of authors, genres, or movements in cultural contexts. Conducted in the target language. May be repeated when taught with a different topic. Prerequisite: WLC 301S or WLC 302S.

WLC 409 - SR SEM: COMPARATIVE LANG & CUL

Semester Hours: 3

The senior seminar will explore a special topic relevant to all world languages and cultures; examples include but are not limited to education, family, fine arts and music, food, politics. Students will compare their own language and culture to other languages and cultures, develop connections to other languages and disciplines, and cultivate an understanding of and appreciation for world cultures and communities with the aim of understanding that there are multiple ways of viewing the world. This is the capstone course for majors who opt out of completing an international internship (WLC 410). Prerequisites: Two 300-level WLC courses and senior standing.

WLC 410 - INT'L INTERN:COMP LANG/CULT

Semester Hours: 3-6

Capstone for majors, offering practical experience in commercial or public organizations domestically or abroad. Conducted in English. Prerequisite: WLC 303.

WLC 499F - INDEPENDENT STUDY:FRENCH

Semester Hours: 3

Independent study and/or study abroad. Prerequisite: WLC 202F.

WLC 499G - INDEPENDENT STUDY:GERMAN

Semester Hours: 3

Independent study and/or study abroad. Prerequisite: WLC 202G.

WLC 499R - INDEPENDENT STUDY:RUSSIAN

Semester Hours: 3

Independent study and/or study abroad. Prerequisite: WLC 202R.

WLC 499S - INDEPENDENT STUDY:SPANISH

Semester Hours: 3

Independent study and/or study abroad. Prerequisite: WLC 202S.

Faculty

Faculty

(Date refers to original appointment to the university.)

A

Adams, Ellise, Professor, Nursing, 2006, PhD, Texas Women's University.

Adams, Marsha, Dean and Professor, Nursing, 2014, PhD, University of Alabama at Birmingham.

Adan, Drew, Librarian II, Library, 2017, MLIS, Simmons Graduate School of Library and Information Science.

Adcock, Lawana, Lecturer, Biological Sciences, 2016, PhD, Alabama AM University.

Ai, Shangbing, Professor, Math, 2002, PhD, University of Pittsburgh.

Al-Hamdan, Ashraf, Clinical Associate Professor, Civil and Environmental Engineering, 2007, PhD, University of Illinois at Chicago.

Alewine, Henry, Associate Professor, Accounting, 2010, PhD, University of Kentucky.

Alexander, Susan, Associate Professor, Nursing, 2009, DNP, University of Alabama in Huntsville.

Allen, David, Professor, Economics, 1994, PhD, University of Arkansas.

Allen, Mary Beth, Lecturer, Computer Science, 2017, M.S., Auburn University.

Allport, Christopher, Associate Professor, Accounting, 2005, PhD, Virginia Tech.

Amiri, Azita, Associate Professor, Nursing, 2012, PhD, University of Alabama at Birmingham.

Anderson, Michael, Professor, Civil and Environmental Engineering, 1998, PhD, Iowa State University.

Argentina, Vincent, Associate Professor, Art, Art History Design, 2014, MFA, University of Georgia.

Armentrout, Daniel, Clinical Associate Professor, Mechanical and Aerospace Engineering, 2012, PhD, University of Denver.

Aultman, Anna, Clinical Assistant Professor, Nursing, 2018, MSN, University of Alabama.

Avery, Atiya, Clinical Assistant Professor, Information Systems, 2019, PhD, University of Illinois at Chicago.

Aygun, Ramazan, Associate Professor, Computer Science, 2003, PhD, New York State University.

B

Baginski, Melissa, Clinical Assistant Professor, Nursing, 2009, MSN, University of Virginia.

Bail, Jennifer, Assistant Professor, Nursing, 2020, PhD, University of Alabama in Birmingham.

Baird, James, Professor, Chemistry, 1982, PhD, Harvard.

Baker, Karen, Lecturer, Theatre, 2018, MFA, University of Alabama.

Baldwin, Katie, Associate Professor, Art, Art History Design, 2013, MFA, University of the Arts, Pennsylvania.

Balla, Angela, Associate Professor, English, 2006, PhD, University of Michigan-Ann Arbor.

Banish, R. Michael, Associate Professor, Chemical and Materials Engineering, 1999, PhD, University of Utah.

Bao, Yeqing, Associate Graduate Dean, Professor, Marketing, 2001, PhD, Virginia Polytechnic Institute and State University.

Bao, Yongchuan, Associate Professor, Marketing, 2014, PhD, University of Southern California.

Barnby, Elizabeth, Clinical Associate Professor, Nursing, 2009, DNP, University of Alabama in Huntsville.

Barnes, Dilcu, Clinical Assistant Professor of Management Science, Management Science, 2017, PhD, Auburn University.

Barnes, Dilcu, Clinical Assistant Professor of Management Science, Management, 2017, PhD, Auburn University.

Baudry, Jerome, Chan Chair and Professor, Biological Sciences, 2017, PhD, University of Paris - Sorbonne.

Baun, Dylan, Assistant Professor, History, 2016, PhD, The University of Arizona.

Beal, Aubrey, Assistant Professor, Electrical and Computer Engineering, 2019, PhD, Auburn University.

Beck, Monica, Assistant Professor, Nursing, 2009, MSN, University of Alabama in Huntsville.

Berbrier, Mitchell, Professor, Sociology, 1996, PhD, Marquette University.

Berkowitz, David, Graduate Dean and Professor, Marketing, 1996, PhD, University of Alabama.

Betancourt, José, Associate Professor, Art, Art History Design, 2006, MFA, Hunter College.

Bianchi, Ann, Associate Professor, Nursing, 2007, PhD, Texas Women's University.

Bitzer, Phillip, Associate Professor, Atmospheric Science, 2011, PhD, University of Alabama in Huntsville.

Blackmon, James, Research Professor, Mechanical and Aerospace Engineering, 2001, PhD, University of California.

Bolen, Ron, Clinical Instructor, Nursing, 2017, MSN, University of Alabama.

Bonamente, Massimiliano, Professor, Physics, 2002, PhD, University of Alabama in Huntsville.

Bowman, Elizabeth, Senior Lecturer, Math, 2001, MA, University of Alabama in Huntsville.

Bowman, Ronald, Senior Lecturer, Electrical and Computer Engineering, 2005, MSEE, Clemson University.

Boykin, Timothy, Professor, Electrical and Computer Engineering, 1992, PhD, Stanford University.

Brothers, Rebecca, Librarian I, Library, 2017, MA, University of Washington.

Bruzek, Jennifer, Assistant Professor, Education, 2019, PhD, University of Kansas.

Budisalih, Kimberley, Clinical Assistant Professor, Nursing, 2017, MSN, Samford University.

Buksa, Irena, Associate Professor, World Languages and Cultures, 1990, DA, Syracuse.

Burel, Joshua, Assistant Professor, Music, 2017, DM, Florida State University.

Burnett, John, Associate Professor, Finance, 1992, PhD, University of Alabama.

Burns, Laird, Associate Professor, Management Science, 2009, PhD, Michigan State University.

Burns, Laird, Associate Professor, Management, 2009, PhD, Michigan State University.

Burrows, Janice, Lecturer, Math, 2018, MS, Texas AM University.

Byrne, Heather-Lee, Librarian I, Library, 2019, MLIS, Drexel University.

C

Carey, Lawrence, Professor, Atmospheric Science, 2012, PhD, Colorado State University.

Carey, Matthew, Assistant Professor, Music, 2016, DMA, Texas Tech University.

Carmen, Christina, Clinical Associate Professor, Mechanical and Aerospace Engineering, 2006, PhD, University of Alabama in Huntsville.

Cassibry, Jason, Associate Professor, Mechanical and Aerospace Engineering, 2004, PhD, University of Alabama in Huntsville.

Cate-Gibson, Stephanie Ryan, Senior Lecturer, Intensive Language Center, 2009, MA, North Carolina Central University.

Choup, Anne Marie, Associate Professor, Political Science, 2007, PhD, University of North Carolina at Chapel Hill.

Christopher, Sundar, Professor, Atmospheric Science, 1997, PhD, Colorado State.

Christy, John, Interim Dean and Distinguished Professor, Atmospheric Science, 1991, PhD, Illinois.

Chronis, Themistoklis, Clinical Assistant Professor, Physics, 2017, PhD, University of Connecticut.

Chung, Haeyong, Assistant Professor, Computer Science, 2015, PhD, Virginia Tech.

Clemmons, Tammy, Clinical Instructor, Nursing, 2006, MSN, University of Alabama in Huntsville.

Cling, Andrew, Associate Dean and Professor, Philosophy, 1988, PhD, Vanderbilt.

Coe, David, Associate Professor, Electrical and Computer Engineering, 2002, PhD, Georgia Institute of Technology.

Coffey, Sharon, Clinical Assistant Professor, Nursing, 2016, DNP, University of Alabama in Huntsville.

Coley, Lorenzo, Lecturer, Mechanical and Aerospace Engineering, 2018, MS, Mississippi State University.

Collopy, Paul, Professor, Industrial Systems Engineering, 2013, PhD, Stanford University.

Connors, Ryan T., Assistant Professor, Kinesiology, 2015, PhD, Middle Tennessee State University.

Conway, Joseph, Associate Professor, English, 2011, PhD, Washington University in St. Louis.

Cooper, Judy, Lecturer, Biological Sciences, 2015, M.S., University of Alabama in Huntsville.

Craw, Michael, Assistant Professor, Kinesiology, 2019, PhD, University of Tasmania.

Crook, Genevieve, Lecturer, Math, 1989, MA, University of Alabama in Huntsville.

Cross, Heather, Senior Lecturer, English, 2007, MA, University of Alabama in Huntsville.

Cruz-Vera, Luis, Associate Professor, Biological Sciences, 2007, PhD, CINVESTAV-IPN, Mexico.

Culumber, Zachary, Assistant Professor, Biological Sciences, 2018, PhD, Texas AM University.

Curtis, Christine, Provost, Professor, Chemical and Materials Engineering, 2014, PhD, Florida State University.

D

Darnell, Amy, Clinical Instructor, Nursing, 2020, MSN, Auburn University.

Davis, Rebecca, Clinical Assistant Professor, Nursing, 2009, MSN, University of Alabama in Huntsville.

Dawson, Darren, President and Professor, Electrical and Computer Engineering, 2019, PhD, Georgia Tech University.

D'Costa, Anthony, Eminent Scholar and Professor, Economics, 2018, PhD, University of Pittsburgh.

Delugach, Harry, Associate Professor, Computer Science, 1990, PhD, University of Virginia.

Deverapalli, Chakri, Director IT, Lecturer, Information Systems, 2008, MBA, University of Alabama in Huntsville.

Diagana, Toka, Professor, Math, 2018, PhD, University of Claude Bernard - Lyon 1, France.

Dillihunt, Monica, Associate Professor, Education, 2004, PhD, Howard University.

Doty, Johnna, Senior Lecturer, Music, 2012, MFA, Boston University.

Doty, Johnna, Senior Lecturer, Theatre, 2012, MFA, Boston University.

Duan, Lingze, Professor, Physics, 2007, PhD, University of Maryland.

E

Elliott, Jeremy M., Assistant Professor, Kinesiology, 2015, PhD, University of Georgia.

Elmore, Elizabeth, Clinical Assistant Professor, Nursing, 2019, DNP, The University of Alabama in Huntsville.

Emich, Cheryl, Clinical Assistant Professor, Nursing, 2013, MSN, University of Alabama.

English, Jennifer, Associate Dean and Associate Professor, Electrical and Computer Engineering, 2000, PhD, Georgia Institute of Technology.

Etz Korn, Letha, Professor, Computer Science, 1993, PhD, University of Alabama in Huntsville.

F

Fahimi, Farbod, Associate Professor, Mechanical and Aerospace Engineering, 2010, PhD, Sharif U Tech, Tehran.

Fikes, David, Lecturer, Mechanical and Aerospace Engineering, 2016, MS, University of Tennessee - Knoxville.

Fischer, Jeremy, Associate Professor, Philosophy, 2014, PhD, University of Washington.

Florinski, Vladimir, Associate Professor, Space Science, 2008, PhD, University of Arizona.

Fong, Eric, Professor, Management, 2004, PhD, University of Florida.

Foster, John, Department Chair, Chemistry, 2017, PhD, Aston University.

Foster, Melissa, Clinical Assistant Professor, Nursing, 2012, DNP, University of Alabama in Huntsville.

Frederick, Robert, Professor, Mechanical and Aerospace Engineering, 1991, PhD, Purdue.

Frendi, Kader, Professor, Mechanical and Aerospace Engineering, 1999, PhD, Brown University.

Friedman, Susan, Senior Lecturer, English, 2008, PhD, University of South Florida.

Frith, Karen, Associate Dean and Professor, Nursing, 2007, PhD, Georgia State University.

Frost, Alanna, Associate Professor, English, 2008, PhD, University of Louisville.

G

Gaede, Rhonda, Associate Professor, Electrical and Computer Engineering, 1992, PhD, University of Texas-Austin.

Gandila, Andrei, Associate Professor, History, 2013, PhD, University of Florida.

Gentry, Sheila, Clinical Instructor, Nursing, 2018, MSN, University of Alabama in Huntsville.

Gholston, Sampson, Professor, Industrial Systems Engineering, 1997, PhD, University of Alabama in Huntsville.

Gilchrist-Petty, Eletra, Professor, Communication Arts, 2008, PhD, University of Memphis.

Goebel, Rolf, Distinguished Professor, World Languages and Cultures, 1985, PhD, University of Maryland.

Gorur, Ravi, Professor, Electrical and Computer Engineering, 2015, PhD, University of Windsor.

Graves, Sara, University Professor, Computer Science, 1978, PhD, University of Alabama in Huntsville.

Greene, Jason, Dean and Professor, Finance, 2016, PhD, Indiana University.

Greer, Anthony, Lecturer, Communication Arts, 2019, MA, University of Alabama.

Gregory, Don, Distinguished Professor, Physics, 1992, PhD, University of Alabama in Huntsville.

Griffin, Robert, Associate Professor, Atmospheric Science, 2012, PhD, Penn State University.

Grimsley, Reagan, Librarian III, Library, 2017, MA, The University of Southern Mississippi.

Guerin, Amy, Assistant Professor, Theatre, 2016, MFA, University of Houston.

Guerra, Donna, Clinical Assistant Professor, Nursing, 2015, EdD, University of Alabama in Huntsville.

Gunn, Sinceree, Senior Lecturer, English, 2003, MA, University of Alabama in Huntsville.

Guo, Junpeng, Professor, Electrical and Computer Engineering, 2005, PhD, University of Illinois.

Gupta, Jatinder, Eminent Scholar and Professor, Information Systems, 2002, PhD, Texa Tech University.

Gyasi, Kwaku, Associate Professor, World Languages and Cultures, 1999, PhD, Ohio State University.

H

Hamilton, Frances, Assistant Professor, Education, 2014, PhD, Tennessee State University.

Han, Qingyuan, Associate Professor, Atmospheric Science, 1997, PhD, Columbia University.

Hannah, Linda, Lecturer, Psychology, 2019, MS, University of Central Texas, Killeen.

Harfouch, John, Assistant Professor, Philosophy, 2014, PhD, Penn State University.

Harwell, David, Professor, Theatre, 2005, MFA, University of Illinois.

Hazeli, Kavan, Assistant Professor, Mechanical and Aerospace Engineering, 2016, PhD, Drexel University.

Hazelwood, Rebecca, Lecturer, English, 2018, PhD, University of Louisiana at LaFayette.

Heikes, Deborah, Professor, Philosophy, 1998, PhD, University of Illinois.

Hile, Kimberly, Assistant Professor, Education, 2017, PhD, University of Illinois.

Hite, Dennis, Senior Lecturer, Electrical and Computer Engineering, 2005, MSE, University of Alabama in Huntsville.

Ho, Fat, Professor, Electrical and Computer Engineering, 1980, PhD, Southern Illinois University.

Hollingsworth, Angela, Clinical Assistant Professor, Nursing, 2016, DNP, University of South Alabama.

Hollingsworth, Donald (Keith), Professor, Mechanical and Aerospace Engineering, 2011, PhD, Stanford University.

Hoy, Haley, Professor, Nursing, 2006, PhD, Vanderbilt University.

Hsu, Liwu, Associate Professor, Marketing, 2012, PhD, Boston University.

Hu, Leiqiu, Assistant Professor, Atmospheric Science, 2017, PhD, University of Kansas, Lawrence.

Hu, Qiang, Associate Professor, Space Science, 2012, PhD, Dartmouth.

Huang, Wenzhang, Professor, Math, 1994, PhD, Claremont Graduate School.

Hubbell, Gaines, Assistant Professor, English, 2015, PhD, Rensselaer Polytechnic Institute.

Hunter, Amy, Clinical Assistant Professor, Nursing, 2014, DNP, University of Alabama in Huntsville.

Hunter, Noelle, Lecturer, Political Science, 2019, PhD, West Virginia University.

J

Jayawardena, Surangi, Assistant Professor, Chemistry, 2017, PhD, University of Massachusetts-Lowell.

Johnson, David, Associate Professor, History, 2005, PhD, Washington University in St. Louis.

Johnson, David, Associate Professor, World Languages and Cultures, 2005, PhD, Washington University in St. Louis.

Johnson, Kathryn, Professor, Art, Art History Design, 2003, MFA, University of Georgia.

Johnson, Molly, Associate Professor, History, 2003, PhD, University of Illinois.

Johnson, Terri, Senior Lecturer, Math, 2011, PhD, University of Alabama in Huntsville.

Joiner, Laurie, Associate Professor, Electrical and Computer Engineering, 1998, PhD, Clemson University.

Jones, Keith, Associate Professor, Art, Art History Design, 1996, MFA, Louisiana Tech University.

Jones, Nicholaos, Professor, Philosophy, 2007, PhD, Ohio State University.

Jovanov, Emil, Associate Professor, Electrical and Computer Engineering, 1998, PhD, University of Belgrade.

Joyce, Lillian, Associate Professor, Art, Art History Design, 1997, PhD, University of California, Los Angeles.

K

Kaiura, Leslie, Associate Professor, World Languages and Cultures, 2007, PhD, University of Virginia.

Kang, Chang-kwon, Associate Professor, Mechanical and Aerospace Engineering, 2013, PhD, University of Michigan.

Kanistras, Konstantinos, Assistant Professor, Mechanical and Aerospace Engineering, 2017, PhD, University of Denver.

Kansakar, Siroj, Lecturer, Math, 2012, PhD, University of Alabama in Huntsville.

Keller, Karl, Senior Lecturer, World Languages and Cultures, 2007, MA, University of Alabama.

Knight, Kyle, Associate Professor, Sociology, 2012, PhD, Washington State University.

Knupp, Kevin, Professor, Atmospheric Science, 1991, PhD, Colorado State University.

Kulick, Jeffrey, Professor, Electrical and Computer Engineering, 1990, PhD, University of Pennsylvania.

Kyle, David, Lecturer, Education, 2004, M.A., University of North Alabama.

L

Lakin, Tracy, Clinical Assistant Professor, Nursing, 2019, DNP, The University of Alabama in Huntsville.

Lampley, Sandra, Assistant Professor, Education, 2016, PhD, Middle Tennessee State.

Landrum, David, Associate Professor, Mechanical and Aerospace Engineering, 1992, PhD, North Carolina State University.

Lane, Sean, Dean and Professor, Psychology, 2018, PhD, Kent State University.

Lanius, Candice, Assistant Professor, Communication Arts, 2016, PhD, Rensselaer Polytechnic Institute.

Lanz, Amelia, Associate Dean and Clinical Assistant Professor, Nursing, 2012, EdD, University of Alabama in Huntsville.

Le Roux, Jakobus, Associate Professor, Space Science, 2008, PhD, Potchefstroom.

Lee, Shanhu, Associate Professor, Atmospheric Science, 2015, PhD, University of Tokyo.

Lee, Yeolan, Associate Professor, Management, 2013, PhD, Ohio State University.

Lei, Yu, Associate Professor, Chemical and Materials Engineering, 2013, PhD, U of Ill, Chicago (UIC).

Lenahan, Shelley, Senior Lecturer, Math, 2004, MA, Texas AM.

Li, Gang, Professor, Space Science, 2008, PhD, Indiana University-Bloomington.

Li, Xiaotong, Professor, Information Systems, 2001, PhD, University of Mississippi.

Lieu, Richard, Distinguished Professor, Physics, 1995, PhD, Imperial College - London.

Ligrani, Phillip, Eminent Scholar and Professor, Mechanical and Aerospace Engineering, 2014, PhD, Stanford University.

Lin, Mark, Associate Professor, Mechanical and Aerospace Engineering, 2000, PhD, Virginia Polytechnic Institute.

Lindquist, Robert, Interim Vice President for Research and Economic Development and Professor, Electrical and Computer Engineering, 2003, PhD, Pennsylvania State University.

Lioce, Bonnie (Lori), Clinical Professor, Nursing, 2014, DNP, University of Alabama in Huntsville.

Liu, Jianqing, Assistant Professor, Electrical and Computer Engineering, 2018, PhD, University of Florida.

Liu, Junjun, Assistant Professor, Accounting, 2020, PhD, Arizona State University.

Love-Rutledge, Sharifa, Assistant Professor, Chemistry, 2017, PhD, The University of Alabama.

Lynch, Thuy, Assistant Professor, Nursing, 2017, PhD, University of Alabama.

M

Ma, Rui, Assistant Professor, Civil and Environmental Engineering, 2019, PhD, Rensselaer Polytechnic Institute.

MacKenzie, William (Ivey), Associate Professor, Management, 2010, PhD, University South Carolina.

Magnuson, Roy, Associate Professor, Biological Sciences, 1999, PhD, Massachusetts Institute of Technology.

Mahafza, Hamsa, Lecturer, Education, 2017, PhD, University of Texas at San Antonio.

Mahalingam, Brinda, Clinical Associate Professor, Economics, 2012, PhD, University of Colorado.

Mahalingam, Shankar, Dean and Distinguished Professor, Mechanical and Aerospace Engineering, 2010, PhD, Stanford University.

Maier, Linda, Professor, World Languages and Cultures, 1993, PhD, University of Virginia.

Malak, Natalie, Assistant Professor, Economics, 2018, PhD, McMaster University.

Manasco, Michael, Librarian II, Library, 2012, MLIS, University of Alabama.

Marinova, Sophia, Associate Professor, Management, 2014, PhD, University of Maryland.

Marschalk, Lacy, Lecturer, English, 2014, PhD, Auburn University.

Mathis, Shannon L., Assistant Professor, Kinesiology, 2011, PhD, Middle Tennessee State University.

Mayeur, Jason, Assistant Professor, Mechanical and Aerospace Engineering, 2018, PhD, Georgia Institute of Technology.

McDavid, Nicole, Lecturer, Communication Arts, 2015, MA, Auburn University.

McGinnis, Michael, Lecturer, English, 2015, PhD, Wayne State University.

Meade, Whitney, Clinical Assistant Professor, Education, 2011, PhD, Auburn University.

Mecikalski, John, Professor, Atmospheric Science, 2004, PhD, University of Wisconsin-Milwaukee.

Mendelson, Tobias, Clinical Assistant Professor, Accounting, 2017, JD, Samford University.

Mendenhall, Eric, Associate Professor, Biological Sciences, 2013, PhD, University of Minnesota.

Menon, Vineetha, Assistant Professor, Computer Science, 2017, PhD, Mississippi State University.

Mesmer, Bryan, Associate Professor, Industrial Systems Engineering, 2014, PhD, University of Buffalo.

Messimer, Sherri, Associate Professor, Industrial Systems Engineering, 1989, PhD, Texas AM.

Milenkovic, Aleksander, Professor, Electrical and Computer Engineering, 2001, PhD, University of Belgrade.

Miller, James, Professor, Physics, 1994, PhD, Maryland.

Mohr, John, Lecturer, History, 2018, PhD, Auburn University.

Mok, Wai Yin, Professor, Information Systems, 2001, PhD, Brigham Young University.

Moore, David, Director and Librarian III, Library, 2002, MLS, University of Alabama.

Morales, Claudio, Professor, Math, 1982, PhD, University of Iowa.

Morgan, Tracie, Clinical Assistant Professor, Nursing, 2016, MSN, University of Alabama in Huntsville.

Morphew, S. Melissa, Clinical Associate Professor, Professional and Continuing Studies, 2016, PhD, University of Georgia.

Morris, Tommy, Professor, Electrical and Computer Engineering, 2015, PhD, Southern Methodist.

Morrison, Katherine, Clinical Instructor, Nursing, 2017, MSN, Samford.

Mukherjee, Anusree, Assistant Professor, Chemistry, 2013, PhD, University of Minnesota.

Mukherjee, Tathagata, Assistant Professor, Computer Science, 2018, PhD, Florida State University.

Mullins, Frank, Associate Professor, Management, 2017, PhD, Syracuse University.

N

Nair, Udaysankar, Associate Professor, Atmospheric Science, 2011, PhD, Colorado State University.

Nelson, George, Associate Professor, Mechanical and Aerospace Engineering, 2012, PhD, Georgia Tech.

Neuschatz, Jeffrey, Distinguished Professor, Psychology, 2000, PhD, Binghamton University.

Newchurch, Michael, Professor, Atmospheric Science, 1994, PhD, Georgia Institute of Technology.

Newman, Timothy, Professor, Computer Science, 1994, PhD, Michigan State.

Ng, Joseph, Professor, Biological Sciences, 1998, PhD, University of California, Riverside.

Ng, Ka Man (Melody), Associate Professor, Music, 2013, DMA, University of Wisconsin.

Ng, Yeow Chye, Associate Professor, Nursing, 2013, PhD, University of Alabama at Birmingham.

Niemiller, Denise, Lecturer, Biological Sciences, 2017, PhD, University of Tennessee Knoxville.

Niemiller, Matthew, Assistant Professor, Biological Sciences, 2017, PhD, University of Tennessee.

Noletto, Colleen, Lecturer, English, 2016, PhD, Catholic University of America.

O

O'Brien, Jason, Associate Professor, Education, 2008, PhD, University of South Florida.

O'Keefe, Louise, Associate Professor, Nursing, 2006, PhD, University of Alabama at Birmingham.

Olson, Charlotte, Librarian III, Library, 2007, MFA, University of Florida.

O'Neal, Pamela, Professor, Nursing, 2005, PhD, Virginia Commonwealth University.

Ong, Belinda, Librarian III, Library, 2004, PhD, University of Kentucky.

Orman, Wafa, Associate Dean and Associate Professor, Economics, 2008, PhD, University of Arizona.

Osuga, Amalia, Assistant Professor, Music, 2018, DMA, University of Oregon.

P

Pacino, Nicole, Associate Professor, History, 2013, PhD, University of California, Santa Barbara.

Palmer, Jennifer, Clinical Instructor, Nursing, 2015, EdD, University of Alabama.

Pan, David, Associate Professor, Electrical and Computer Engineering, 2002, PhD, University of Southern California.

Park, Jae, Associate Professor, Information Systems, 2015, PhD, George Mason University.

Patnayakuni, Ravi, Associate Professor, Information Systems, 2004, DBA, Southern Illinois University.

Patterson, LaToya, Clinical Instructor, Nursing, 2014, MSN, University of Alabama in Huntsville.

Pekker, Mark, Professor, Math, 1987, PhD, Cornell.

Petnga, Leonard, Assistant Professor, Industrial Systems Engineering, 2017, PhD, University of Maryland.

Petty, Mikel, Associate Professor, Computer Science, 2005, PhD, University of Central Florida.

Pogorelov, Nikolai, Distinguished Professor, Space Science, 2008, PhD, Russian Academy of Sciences.

Poole, Jarmel, Clinical Instructor, Nursing, 2017, MSN, University of North Alabama.

Pottenger, John, Professor, Political Science, 1986, PhD, University of Maryland.

Pour, Maria, Assistant Professor, Electrical and Computer Engineering, 2015, PhD, University of Manitoba.

Preece, Robert, Associate Professor, Space Science, 2001, PhD, University of Maryland at College Park.

Preston, Kevin, Lecturer, Computer Science, 2018, MS, The University of Alabama in Huntsville.

Price, Jodi, Professor, Psychology, 2008, PhD, Georgia Institute of Technology.

Primeau, Marlana, Clinical Associate Professor, Nursing, 2004, DNP, University of Alabama in Huntsville.

Q

Que, Tingting, Assistant Professor, Finance, 2014, PhD, University of Iowa.

Quick, Beth, Dean and Professor, Education, 2013, Ed.D, Vanderbilt University.

R

Ragsdale, Christopher, Professor, Music, 2006, DMA, University of Miami, Florida.

Rahman, Tauhidur, Assistant Professor, Electrical and Computer Engineering, 2017, PhD, University of Florida.

Ramachandran, Kerrin, Lecturer, Intensive Language Center, 2011, MA, University of Alabama in Huntsville.

Ranganath, Heggere, Professor, Computer Science, 1982, PhD, Auburn University.

Rani, Sarma, Associate Professor, Mechanical and Aerospace Engineering, 2011, PhD, U of Illinois-Urbana-Champaign.

Ravindran, Sivaguru, Professor, Math, 1999, PhD, Simon Fraser University, British Columbia.

Ray, Biswajit, Assistant Professor, Electrical and Computer Engineering, 2016, PhD, Purdue University.

Reno, Alyssum, Clinical Instructor, Kinesiology, 2019, MS, The University of North Alabama.

Reynolds, Charles, Clinical Instructor, Nursing, 2020, MSN, University of Alabama in Birmingham.

Reynolds, Mark, Clinical Associate Professor, Nursing, 2009, DNP, University of Alabama in Huntsville.

Robertshaw, Joseph, Lecturer, English, 2018, PhD, Bowling Green State University.

Roh, Kyung-Ho, Assistant Professor, Chemical and Materials Engineering, 2016, PhD, University of Michigan.

Roller, Sarah, Assistant Professor, Education, 2016, PhD, Michigan State.

Rose-Green, Ena, Associate Professor, Accounting, 2008, PhD, Florida State University.

S

Sadeghi, Seyed, Associate Professor, Physics, 2007, PhD, University of British Columbia.

Salman, Abdullahi, Assistant Professor, Civil and Environmental Engineering, 2018, PhD, Michigan Technological University.

Sanders, Carolyn, Professor, Music, 1990, DM, Florida State University.

Saunders, John, Lecturer, Communication Arts, 2017, PhD, The Pennsylvania State University.

Schneider, Judith, Professor, Mechanical and Aerospace Engineering, 2015, PhD, University of California-Davis.

Scholz, Carmen, Professor, Chemistry, 1998, PhD, University of Technology, Dresden Germany.

Schwertfeger, Ron, Librarian II, Library, 2014, MA, University of Alabama.

Sears, Christine, Associate Professor, History, 2007, PhD, University of Delaware.

Seemann, Eric, Associate Professor, Psychology, 2003, PhD, Louisiana Tech University.

Sever, Thomas, Professor, Atmospheric Science, 2008, PhD, University of Colorado-Boulder.

Sheldon, Pavica, Professor, Communication Arts, 2011, PhD, Louisiana State University.

Shen, Milton, Associate Professor, Accounting, 2011, PhD, University of Kentucky.

Shotorban, Babak, Professor, Mechanical and Aerospace Engineering, 2008, PhD, University Illinois-Chicago.

Showalter, Darlene, Clinical Associate Professor, Nursing, 1998, DNP, University of Alabama in Huntsville.

Shrader, Amelia, Clinical Instructor, Nursing, 2020, MSN, University of Alabama in Huntsville.

Sims, Jennifer, Assistant Professor, Sociology, 2017, PhD, University of Wisconsin - Madison.

Sirbaugh, Megan, Lecturer, Atmospheric Science, 2019, MS, University of North Carolina - Charlotte.

Skelley, Dana, Assistant Professor, Education, 2017, EdD, The University of Memphis.

Slavin, Laura, Librarian III, Library, 2017, MA, Lincoln Memorial University School of Business.

Smeal, Mary Alice, Lecturer, Math, 2015, PhD, Auburn University.

Smith, Derrick, Associate Dean and Associate Professor, Education, 2008, EdD, Texas Tech University.

Smith, Eric, Professor, English, 2006, PhD, University of Florida.

Smith, Kelly, Lecturer, History, 2018, PhD, University of Cincinnati.

Smith, Laura, Assistant Professor, Art, Art History Design, 2019, PhD, University of Georgia.

Smith, Lenora, Clinical Assistant Professor, Nursing, 2013, PhD, Medical University of South Carolina.

Smith, Miranda, Clinical Instructor, Nursing, 2018, MNED, University of North Alabama.

Snow, Mary, Senior Lecturer, Chemistry, 2005, MS, University of Alabama in Huntsville.

Sommerkamp, Sandy, Clinical Assistant Professor, Nursing, 2011, MSN, Jacksonville State University.

Spencer, Sharon, Clinical Assistant Professor, Nursing, 2012, MSN, University of New Orleans.

Stallsmith, Bruce, Associate Professor, Biological Sciences, 1999, PhD, University of Massachusetts.

Steidl, Christina, Associate Professor, Sociology, 2012, PhD, Emory University.

Storer, Sallyann, Clinical Assistant Professor, Nursing, 2017, DNP, University of Alabama in Huntsville.

Strong, Carol, Lecturer, Physics, 1993, PhD, University of Alabama in Huntsville.

Subramanian, Anu, Professor, Chemical and Materials Engineering, 2018, PhD, Virginia Tech.

Sullivan, Veronica, Clinical Assistant Professor, Nursing, 2017, DNP, University of Alabama in Huntsville.

Sun, Ming, Associate Professor, Physics, 2014, PhD, Harvard.

Swain, James, Professor, Industrial Systems Engineering, 1992, PhD, Purdue.

Sysoeva, Tatyana, Assistant Professor, Biological Sciences, 2018, PhD, The Pennsylvania State University.

T

Tan, Yi, Assistant Professor of Management Science, Management Science, 2020, PhD, University of Kansas.

Tan, Yi, Assistant Professor of Management Science, Management, 2020, PhD, University of Kansas.

Tantaris, Richard, Lecturer, Mechanical and Aerospace Engineering, 2017, PhD, Vanderbilt University.

Taylor, Chris, Associate Professor, Art, Art History Design, 2014, MFA, Alfred University.

Taylor, W. Joseph, Associate Professor, English, 2010, PhD, University of Texas.

Tenhundfeld, Nathan, Assistant Professor, Psychology, 2019, PhD, Colorado State University.

Thomas, Chad, Associate Professor, English, 2011, PhD, University of Michigan.

Thomas, Chad, Associate Professor, Theatre, 2011, PhD, University of Michigan.

Thomas, Dale, Eminent Scholar and Professor, Industrial Systems Engineering, 2015, PhD, University of Alabama in Huntsville.

Thomson, Robert, Assistant Professor, Sociology, 2019, PhD, Baylor University.

Thornton, Tracy, Clinical Assistant Professor, Nursing, 2013, MSN, University of Alabama in Huntsville.

Torres, Aurora, Assistant Professor, Psychology, 1995, PhD, University of Oklahoma.

Torres-Diaz, Isaac, Assistant Professor, Chemical and Materials Engineering, 2019, PhD, University of Puerto Rico at Mayaguez.

Tseng, Fan, Department Chair and Professor of Management Science, Management Science, 1984, PhD, University of Texas.

Tseng, Fan, Department Chair and Professor of Management Science, Management, 1984, PhD, University of Texas.

Tsimika-Chronis, Evdoxia, Lecturer, Intensive Language Center, 2018, MA, Boston University.

Twigg, Pamela, Lecturer, Chemistry, 2014, PhD, Florida State University.

V

Vadrevu, Anuradha, MA, Math, 2017, MA, Mississippi State University.

Veasey, Roxie, Senior Lecturer, Art, Art History Design, 2005, MFA, University of Georgia.

Verlaan, Wolfram, Department Chair and Associate Professor, Education, 2012, PhD, Texas AM.

Vogler, Bernhard, Associate Professor, Chemistry, 2001, PhD, University of Tuebingen.

W

Waddell, Emanuel, Associate Professor, Chemistry, 2004, PhD, Louisiana State University.

Wade, Ryan, Senior Lecturer, Atmospheric Science, 2014, MS, University of Alabama in Huntsville.

Wang, Gang, Associate Professor, Mechanical and Aerospace Engineering, 2010, PhD, University of Maryland.

Waring, Stephen, Professor, History, 1988, PhD, University of Iowa.

Watson, Joseph, Assistant Professor, Theatre, 2018, PhD, Louisiana State University.

Weber, Anna, Senior Lecturer, English, 2012, MFA, Purdue.

Weber, Ryan, Associate Professor, English, 2011, PhD, Purdue.

Weger, Kristin, Assistant Professor, Psychology, 2017, PhD, Otto-Friedrich-University.

Weimer, Jeffrey, Associate Professor, Chemistry, 1990, PhD, Massachusetts Institute of Technology.

Weimer, Jeffrey, Associate Professor, Chemical and Materials Engineering, 1990, PhD, Massachusetts Institute of Technology.

Weisskopf, Mary Ellen, Assistant Professor, Computer Science, 1983, PhD, University of Alabama in Huntsville.

Wells, Earl, Professor, Electrical and Computer Engineering, 1992, PhD, University of Alabama.

Whitehead, Paul N., Assistant Professor, Kinesiology, 2017, PhD, University of Pittsburgh.

Wilkerson, William, Dean and Professor, Philosophy, 1997, PhD, Purdue.

Word-Allbritton, Andrea, Clinical Assistant Professor, Education, 2002, EdD, University of Alabama, Tuscaloosa.

Wren, Brent, Associate Provost and Professor, Marketing, 1994, PhD, University of Memphis.

Wu, Dongsheng, Professor, Math, 2006, PhD, Michigan State University.

Wu, Tingting, Associate Professor, Civil and Environmental Engineering, 2014, PhD, University of Florida.

X

Xing, Xuejing, Professor, Finance, 2007, PhD, University of Missouri-Columbia.

Xu, Gabe, Associate Professor, Mechanical and Aerospace Engineering, 2012, PhD, Georgia Tech.

Y

Yoo, Seong-Moo, Associate Professor, Electrical and Computer Engineering, 2001, PhD, Texas University.

Z

Zank, Gary, Trustee and Distinguished Professor, Space Science, 2008, PhD, University of Kwazulu Natal.

Zhang, Guangsheng, Assistant Professor, Mechanical and Aerospace Engineering, 2017, PhD, Xi'an Jiaotong University.

Zhang, Guo-Hui, Associate Professor, Math, 1993, PhD, Southern Illinois University.

Zhang, Huaming, Associate Professor, Computer Science, 2005, PhD, State University of New York at Buffalo.

Zhao, Shuang, Assistant Professor, Political Science, 2015, PhD, Indiana University, Bloomington.

Zhao, Shuang, Assistant Professor, Atmospheric Science, 2015, PhD, Indiana University, Bloomington.

Zhu, Feng, Associate Professor, Computer Science, 2005, PhD, Michigan State University.

Zhu, Qingyun, Assistant Professor, Management, 2019, PhD, Worcester Polytechnic Institute.

Financial Information

In the following section you will find information pertaining to financial aspects of attending UAH including how you will be billed, how to pay your bill, estimated cost of tuition and other fees, and information regarding financial aid options. The cost of attendance for students at The University of

Alabama in Huntsville will vary by their course of study, personal needs, and place of residence. Please note that all fees, charges, and costs detailed in this catalog are subject to change without notice. Financial obligations must be satisfied by the established deadlines. For additional information or questions please contact the Bursar's Office (www.uah.edu/bursar (<http://www.uah.edu/bursar/>)).

Billing and Payment Procedure

Tuition, fees and all associated charges are to be paid in full by the first official day of the semester (click here (p. 1160) to find first official day of semester). Acceptable forms of payment are:

- Cash
- Personal Checks
- Money Orders
- Cashier's Checks
- Traveler's Checks
- Electronic Checks
- Credit Cards/Debit Cards (VISA, MasterCard, American Express, or Discover - 2.75% service fee applies)

Payments may be made online through the student account, in person at the Bursar's Office (SSB 123), or by phone at 256.824.6226. Students who do not pay their bill in full by the first day of the semester are assessed a \$50.00 late fee. Students who do not pay their bill in full by the end of the second week of classes may be dropped from class rolls and their enrollment canceled. The University assumes no responsibility for students who attend classes without official enrollment. For summer sessions, please check dates in the Academic Calendar (p. 1160) and on the UAH website (<http://www.uah.edu/registrar/calendars/>).

Mail payments to:

The University of Alabama in Huntsville
Bursar's Office
Student Services Building, Room 123
Huntsville, AL 35899-5050

Installment Plans

Installment plans are available to students fall and spring semesters for the management of that semester's costs. UAH partners with Flywire Payment Solutions to offer student installment plan accounts. For more information, or to set up an installment plan, click here. (<https://www.uah.edu/bursar/installment-plans/>)

Balances

Past due balances are a debt owed the State of Alabama and appropriate action will be taken to collect all balances. Holds will be placed on all student accounts that have past due balances. This hold prevents students from receiving grades and transcripts and from registering for another semester at UAH. To the extent permitted by the laws of the State of Alabama, any costs to collect a past due account, to include collection agency charges and attorney fees, will be charged back to the student who shall be liable for payment of those charges.

Other Charges

Other Charges	
Credit by examination or validation	\$10.00/semester hour
Replacement of I.D. card	\$25.00
Transcript	\$4.00
Graduation Application fee (non refundable)	\$50.00
Duplicate Diploma	\$40.00
Vehicle registration	\$120.00
Summer only vehicle registration	\$40.00
College of Nursing	
Nursing Badge	\$5.00
Liability Insurance (per year)	variable
College of Nursing Pin (graduation)	\$50.00-\$150.00
Annual health examinations	variable

Refunds

Students may drop a class through the second week of classes (fall and spring) and receive a 100% tuition refund. Please check the UAH website (<http://www.uah.edu/registrar/calendars/>) for summer dates. A student desiring to drop one or more classes may do so on the UAH online registration site or by submitting a drop request form to the Records and Registration Office, SSB 120. The date of the drop request is the date the written request is received at the Records and Registration Office.

Financial Aid

Students who apply for financial aid are responsible for completing the necessary paperwork far enough in advance to assure aid is received in a timely manner. For further information, please check with the Office of Financial Aid, Student Services Building, Suite 124.

Undergraduate Student Aid

UAH has several programs to assist students in financing their college education. Comprehensive, updated information on all financial aid offered through the Office of Financial Aid is available online at www.uah.edu/financialaid (<http://www.uah.edu/financialaid/>). It includes detailed information about types of aid, eligibility guidelines, application procedures, criteria for awards, disbursement methods and regulations, and institutional policy followed in administration of aid. Additional information and necessary forms are available online and in the Office of Financial Aid.

Students of academic promise who can demonstrate financial need are encouraged to apply for assistance. Realistic financial planning is an essential part of college preparation. UAH helps qualified students find employment, scholarships, and loans as resources permit.

Students should make financial plans well in advance of entering the University. There are two important priority dates for student aid—December 1 for scholarships and April 1 for federal aid (apply online at <https://fafsa.ed.gov/>). The priority dates are the dates by which completed scholarship applications are certain to be included in the first round of review and by which the Free Application for Federal Student Aid (FAFSA) can be processed in a timely manner. A new FAFSA application must be submitted each year aid is requested.

Types of Financial Aid

Scholarships

(See the Financial Aid (<http://www.uah.edu/admissions/undergraduate/financial-aid/scholarships/>) website (<http://www.uah.edu/admissions/undergraduate/financial-aid/scholarships/>) for Scholarship listings)

Loans

UAH participates in the William D. Ford Federal Direct Loan program. Student loan funds are made available directly from the U.S. Department of Education. Although it is sometimes necessary to borrow money to finance an education, caution is advised. Generally, a student should not rely primarily on loans and is advised not to borrow more than what is needed to meet expenses. Additional information regarding eligibility amounts, loan limits, application procedures and suggested application timelines may be found online at www.uah.edu/financialaid (<http://www.uah.edu/financialaid/>). This and other valuable information regarding the financial aid process is available in the Office of Financial Aid.

Grants

The Federal Pell Grant Program assists eligible students by providing help in meeting the cost of postsecondary education. To be eligible, a student must meet the following criteria:

1. demonstrate financial need (for most programs);
2. be a U.S. citizen or an eligible noncitizen;
3. have a valid Social Security number (with the exception of students from the Republic of the Marshall Islands, Federated States of Micronesia, or the Republic of Palau);
4. be registered with Selective Service, (<https://studentaid.ed.gov/eligibility/basic-criteria/#selective-service>) if you're a male (you must register between the ages of 18 and 25);
5. be enrolled or accepted for enrollment as a regular student in an eligible degree or certificate program;
6. be enrolled at least half-time to be eligible for Direct Loan Program funds;
7. maintain satisfactory academic progress in college or career school;
8. sign statements on the *Free Application for Federal Student Aid* (FAFSA[®]) stating that
 - you are not in default on a federal student loan and do not owe money on a federal student grant and
 - you will use federal student aid only for educational purposes; and
9. show you're qualified to obtain a college or career school education by
 - having a high school diploma or a recognized equivalent such as a General Educational Development (GED) certificate or
 - completing a high school education in a homeschool setting approved under state law.

A Federal Supplemental Educational Opportunity Grant provides aid to undergraduate students who would not otherwise be financially able to attend college. A student must be accepted for enrollment and be eligible for the Federal Pell Grant Program. Grants may be renewed for the four years of undergraduate study, subject to the availability of funds, unless a major change in the family's financial condition causes the student to be ineligible. Grants are awarded in compliance with eligibility based on federal guidelines.

The Alabama Student Assistance Program is a state/federal aid program designed to provide Alabama residents financial assistance for undergraduate postsecondary education. Grants are awarded for one year. The grants are renewable, but new applications must be made each year. All awards are determined by student eligibility requirements, available funds, and student need. Students should contact the Office of Financial Aid for information regarding eligibility, application, selection, and awards procedures.

Federal Work-Study Program

The Federal Work-Study Program provides employment for students who need financial assistance. A participating student works part-time on campus or in a non-profit agency while attending the University. In determining eligibility, preference will be given to students with the greatest financial need.

Return of Federal Financial Aid

Federally funded financial aid (Pell, SEOG, Direct Loans) awarded to a student who withdraws from all classes after registration but before the end of the refund period, or who earns no passing grades for a specific term, must be repaid to the respective program source. When withdrawal or reduction of class load occurs after the end of the refund period, all tuition charges will be paid from the awarded aid and any remaining aid must be repaid to the respective aid source. Specific regulations governing this policy may be found online at www.uah.edu/financialaid. (<http://www.uah.edu/financialaid/>)

Housing Semester Rates

Central Campus Residence Hall (CCH)

Available for 1st Year Students

Private Bedroom in 4-person suite	\$3,260
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Frank Franz Hall (FFH)

Honors First Year Student Housing

Private bedroom in 4-person suite	\$3,350
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North Campus Residence Hall (NCH)

1st Year Student Overflow, Early Fall Sports Athletes, and Upperclassmen with Charger Excellence Scholarships

Private bedroom in 4-person suite	\$3,475
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Studio Suite (one-bedroom suite)	\$3,715
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Charger Village (CGV)

Available for 2nd Year Students

Private Bedroom in 4-person suite	\$3,515
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Private Bedroom in 2-person suite	\$3,625
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Studio Suite (One-bedroom suite)	\$3,790
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Southeast Campus Housing (SCH)

Available for Sophomores, non 1st Year Charger Excellence Scholarships, Upperclassmen, and Graduate Students

Private Bedroom in 3-bedroom suite (Graduate Students and Student Families - 12 month contract)	\$2,810
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One Bedroom Unfurnished	\$8,280*
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One Bedroom Furnished	\$8,900**
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Fraternity and Sorority Housing (FSH)

Available for 2nd Year and Upperclassmen

Private Bedroom in 10-bedroom house	\$3,280
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Off Campus Apartments

Available for 2nd Year (non-scholarship) and Upperclassmen (non-scholarship)

Private Bedroom in an Apartment*	\$3,625
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*Ashford Terrace, Emerald Ridge, Highland Point, or Waterford Square

¹ Payable \$2,760 Fall semester, \$2,760 Spring semester, \$2,760 Summer semester

² Payable \$2,967 Fall semester, \$2,967 Spring semester, \$2,967 Summer semester

Note: All Housing rates include basic utilities, Internet access, and basic cable television for each suite and bedroom.

Meal Plan Rates

2018 - 2019 Meal Plan Options

*These meal plan options and prices are per semester beginning August 2018 and January 2019.

Option # 1 - \$1625

21 Meals per week + \$200 Charger Bucks per Semester

This option meets the First-Year Residents' Requirement.

Option #1 provides 21 meals per week. 21 meals allow you to eat each and every meal served in the Charger Cafe, Gardenview Cafe, or in Sandella's throughout the week!

If, on occasion, you wish to dine elsewhere, this plan includes \$200 in Charger Bucks that can be used for purchases at Chick-fil-A, Papa John's, Sandella's, Charger Brew, Dunkin' Donuts, World of Wings, Burrito Bowl, Blue's Tech Hall, Mein Bowl, the C-Store, or the Gardenview Cafe.

Option # 2 - \$1625

14 Meals per week + \$300 Charger Bucks per Semester

This option meets the First-Year Residents' Requirement.

Option #2 provides 14 meals per week. As our most popular meal plan, 14 meals evens out to 2 meals a day to be used in the Charger Cafe, Gardenview Cafe, or Sandella's, perfect for hungry residents on the go!

Of course, #2 provides more Charger Bucks - giving students more flexibility and spending power when it comes to our resident and retail dining options: Chick-fil-A, Papa John's, Sandella's, Charger Brew, Dunkin' Donuts, World of Wings, Burrito Bowl, Blue's Tech Hall, Mein Bowl, the C-Store, or the Gardenview Cafe!

This is the default option for the meal plan requirement for all freshmen students living in on-campus housing should students not request a change by the end of the 2nd week of classes each semester.

Option # 3 - \$1625

10 Meals per week + \$500 Charger Bucks per Semester

This option meets the First-Year Residents' Requirement.

Option #3 provides 10 meals per week. Planning to eat at more retail locations? Need a take-out option for lunch? This is the plan for you!

Option #3 still gives students a meal per day in the Charger Cafe, Gardenview Cafe, or in Sandella's, as well as \$500 in Charger Bucks to spend at Chick-fil-A, Papa John's, Sandella's, Charger Brew, Dunkin' Donuts, World of Wings, Burrito Bowl, Blue's Tech Hall, Mein Bowl, the C-Store, and the Gardenview Cafe!

Option # 4 - \$1625

95 Meals per Semester + \$700 Charger Bucks per Semester

This option meets the First-Year Residents' Requirement.

Option #4 provides 95 pre-paid meals per semester in the Charger Cafe, Gardenview Cafe, or in Sandella's. These meals reset at the end of each semester.

With the most Charger Bucks of any plan, this option provides the student with maximum flexibility and spending power at Chick-fil-A, Papa John's, Sandella's, Charger Brew, Dunkin' Donuts, World of Wings, Burrito Bowl, Blue's Tech Hall, Mein Bowl, the C-Store, and the Gardenview Cafe!

Option # 5 - \$555 Dining Dollars per semester

This option meets the Upperclassmen Resident's Requirement.

Option #5 provides \$555 in Dining Dollars to be used at Chick-fil-A, Papa John's, Sandella's, Charger Brew, the Charger Cafe, Dunkin' Donuts, World of Wings, Burrito Bowl, Blue's Tech Hall, Mein Bowl, the C-Store, and the Gardenvue Cafe. Unlike Charger Bucks, Dining Dollar Funds roll over from the fall to spring semester and expire at the end of each spring semester.

This is the default option for the meal plan requirement for Upperclassmen living in on-campus housing in North Campus or Charger Village Residence should a student not request a change or decide to choose a meal plan of greater value by the end of the 2nd week of classes each semester.

Option # 6 - \$325 Dining Dollars per semester

This option meets the off-campus students', SCH, and FRSO Residents' Requirement.

Option #6 provides \$325 in Dining Dollars that can be used at any on-campus dining location including Chick-fil-A, Papa John's, Sandella's, Charger Brew, the Charger Cafe, Dunkin' Donuts, World of Wings, Burrito Bowl, Blue's Tech Hall, Mein Bowl, the C-Store, and the Gardenvue Cafe. Dining Dollar Funds roll over from fall to spring semester and expire at the end of the academic year.

This is the default option for the meal plan requirement for students living in on-campus housing in Southeast Campus or Greek Housing should students not request a change by the end of the 2nd week of classes each semester.

This is the default option for the meal plan requirement for full-time students not living on-campus should students not request a change or decided to choose a meal plan of greater value by the end of the 2nd week of classes each semester.

Option # 7 - \$570

5 Meals per week + \$175 Charger Bucks per Semester

This option meets the Upperclassmen Resident's Requirement, the off-campus students', SCH, and FRSO Residents' Requirement.

Option #7 provides 5 meals per week in the Charger Cafe plus \$175 worth of Charger Bucks to be used at any on-campus dining location including: Chick-fil-A, Papa John's, Sandella's, Charger Brew, Dunkin' Donuts, World of Wings, Burrito Bowl, Blue's Tech Hall, Mein Bowl, the C-Store, and the Gardenvue Cafe. Meals and Charger Bucks reset at the end of each semester.

Option # 8 - \$570

70 Meals per Semester + \$150 Charger Bucks / Semester

This option meets the Upperclassmen Resident's Requirement, the off-campus students', SCH, and FRSO Residents' Requirement.

Option #8 provides 70 meals in the Charger Cafe plus \$150 worth of Charger Bucks to use in any of on-campus dining locations including: Chick-fil-A, Papa John's, Sandella's, Charger Brew, Dunkin' Donuts, World of Wings, Burrito Bowl, Blue's Tech Hall, Mein Bowl, the C-Store and the Gardenvue Cafe. Meals and Charger Bucks reset at the end of each semester. Get the most bang for your buck with this plan!

Tuition and Fees

The University reserves the right to change its tuition, fees, charges, rules and regulations at the beginning of any semester and without prior notice. Generally, the Board of Trustees of the University of Alabama System considers proposals for changes in fees at the June meeting. These fees do not apply to any short term, off-campus, or noncredit offering. For additional information on these courses, see section on College of Professional and Continuing Studies. Current fees are available on the web at www.uah.edu (<http://www.uah.edu>).

Undergraduate Hours	Resident	Non-Resident
1	510.00	1188.00
2	906.00	2087.00
3	1301.00	2984.00
4	1697.00	3881.00
5	2094.00	4780.00
6	2490.00	5677.00

7	2885.00	6574.00
8	3281.00	7473.00
9	3677.00	8370.00
10	4074.00	9267.00
11	4469.00	10166.00
12-18	4865.00	11063.00
19	5302.00	12121.00
20	5739.00	13179.00

Each additional semester hour is \$437.00 for in-state students and \$1058.00 for out-of-state students.

The University reserves the right to change its fees, charges, rules and regulations at the beginning of any semester and without prior notice.

Facilities Fee

\$12 per hour

**The above tuition and fee rates apply to audited courses.

2019-20 Campus Course and Other Instructional Fees

College of Arts, Humanities, and Social Sciences - \$23 per hour

AMS, ARH, ARS, CL, CM, EH, EHL, GS, GY, HY, MU, MUA, MUE, MUJ, MUX, PHL, PSC, PY, SOC, TH, WLC, WGS

ARS - additional \$25 fee per hour

TH - additional \$15 fee per hour

MU - Studio Fee of \$125 per hour

MU 100 - additional \$10 fee per hour

College of Business - \$23 per hour

ACC, BLS, ECN, FIN, IS, MGT, MKT, MSC

College of Education - \$23 per hour

ECH, ED, EDC, HPE, KIN

HPE courses have additional fees per course as follows:

1 credit hour course - \$150

2 credit hour course - \$175

3 credit hour course - \$200

College of Education Additional Fees per Course

ED 301	\$100.00
ED 493	\$400.00
ED 497	\$400.00
ED 499	\$400.00
ED 501	\$100.00
ED 698	\$400.00
ED 699	\$400.00
KIN 490	\$100.00
KIN 491	\$100.00

College of Engineering- \$45 per hour

CBS, CE, CHE, CPE, EE, EM, ENG, ISE, MAE, MTS, OPE, OSE

Honors College

Student Service Fee - \$175 per semester

Office of International Services

International Fee (Fall and Spring Semesters) - \$150 per semester

International Fee (Summer Semester) - \$25 each 5-week term

International Fee (Summer Semester) - \$50 each 10-week term

J Visa Processing Fee - \$100 per request

College of Nursing - \$45 per hour

NUR

HESI Exam Fee for 408-20 - \$153

HESI Exam Fee for 408-2 - \$153

HESI Exam Fee for 408-3 - \$153

College of Professional and Continuing Studies - \$23 per hour

PRO

College of Science - \$36 per hour

AST, ATS, BSE, BYS, CH, CS, ESS, MA, MS (*Summer only*), MOD, MTS, OPT, PH, SPA, ST

Academic Transcript Fee

\$10 per request

Listener's License

First Course, if taken in the Fall - \$290

First Course, if taken in the Spring - \$245

First Course, if taken in the Summer - \$200

First Course fees include a parking permit

Each Additional Course \$150

Credit by Departmental Exam

\$10 per hour

2019-20 Other Fees**Parking Permit**

Fall Semester Purchase - \$140 (Student permit valid through 08/02/20; Faculty permit valid through 08/31/20)

Spring Semester Purchase - \$95 (Student permit valid through 08/02/20; Faculty permit valid through 08/31/20)

Summer Term Purchase - \$50 (Student permit valid through 08/02/20; Faculty permit valid through 08/31/20)

Meal Plans

Required Meal Plans (<https://www.uah.edu/chargercard/meal-plans/>) (<https://www.uah.edu/chargercard/meal-plans/requirements/>)

Charger ID Cards

New Students - \$10

Replacement Card - \$25

2019-20 Intensive Language and Culture Program Rate Tuition

ILC - \$250 per hour

College fee of \$21 per hour

2019-20 Distance Learner Rate Tuition

Students enrolled in online courses only during a semester/term are charged the distance learner rate. Students who are enrolled in on-campus/blended courses during a semester/term or are taking online courses while also taking on-campus courses during a semester/term are charged the campus rate, including the Facilities Fee, associated Campus Course Fees and Other Instructional Fees.

Undergraduate Courses

Degree Programs, Certificate Programs, and Non-Degree Seeking Students - \$402 per credit hour

Graduate Courses

College of Arts, Humanities, and Social Sciences - \$426

College of Business - \$524

College of Education - \$426

College of Engineering - \$617

College of Nursing - \$426

College of Science - \$617

Non-degree Seeking Student - \$617

Alabama PACT Program 2019-20

The Alabama PACT Program will pay at the following rates:

Hours	Resident
1	\$464.40
2	824.85
3	1185.30
4	1545.75
5	1906.21
6	2266.66
7	2267.10
8	2987.55
9	3348.00
10	3708.45
11	4068.92
12	4429.36
13	4638.60
14	4847.85
15	5057.11
16	5266.36
17	5396.96
18	5684.87
19	5894.11
20	6103.35
21	6312.61
22	6521.86
23	6731.10
24	6486.32
25	6940.36
26	7358.86
27	7568.11
28	7777.36
29	7986.82
30	8195.87

Policies and Procedures

The University of Alabama in Huntsville has various policies and procedures that guide our faculty, staff, and students. This section of the catalog provides detailed information on these policies, with which you should be familiar. Failure to read and comply with the policies listed here will not exempt a student from being held accountable to them. Additional policies are listed in the Student Handbook (<http://www.uah.edu/student-support/student-conduct/handbook> (<http://www.uah.edu/student-support/student-conduct/handbook/>)). Please note that the policies identified in this catalog do not represent an entire repository of university policies, as colleges and departments may implement policies that are not listed here. In addition, policies may be amended throughout the year.

Academic Achievement

Honor Scholar

An undergraduate student in good standing earning 12 or more hours in a semester with a GPA of 3.50-4.00 is distinguished by being identified as an honor scholar. A GPA of 4.00 is noted with an asterisk '*'.

Scholar

An undergraduate student in good standing earning 12 or more hours in a semester with a GPA of 3.00-3.49 will be designated on the list of scholars.

Graduation with Honors

Graduation with honors at the baccalaureate level requires a minimum of 60 semester hours at UAH. Honors will be determined by the GPA for the last 60 semester hours of coursework taken at UAH or the overall GPA for all coursework taken at UAH, whichever is higher. The academic terms containing the last 60 semester hours of coursework taken at UAH will be identified and the GPA of all UAH courses taken during those terms to satisfy graduation requirements will be computed and the honors will be determined as follows:

- If the GPA computed as above is 3.90 or above, the student graduates summa cum laude.
- If the GPA computed as above is 3.70 or above (but below 3.90), the student graduates magna cum laude.
- If the GPA computed as above is 3.40 or above (but below 3.70), the student graduates cum laude.

Honors Convocation

The University faculty recognizes and honors those students who have attained academic excellence at a convocation held in the spring of each year. At the Honors Convocation, students who have been inducted into the honor societies, who have been named to the dean's list in each college, and who have attained excellence in academic programs are recognized.

Academic Warning, Probation, and Dismissal/Suspension

In order to be in good academic standing, students must maintain a GPA above the Academic Action Threshold (AAT), which varies according to classification. For freshmen and sophomore students, the AAT is 1.9; for juniors and above, the AAT is 2.0. A student whose semester GPA at UAH falls below the applicable AAT will be placed on academic warning, probation, or dismissal.

Academic Warning

Students are subject to academic warning if they are in good standing and earn less than the applicable AAT for the semester; or if they earn the applicable AAT or greater for the semester but the UAH cumulative is less than the applicable AAT.

Probation

Students are subject to academic probation if they are on academic warning and the current semester GPA is less than the applicable AAT and the UAH cumulative is less than the applicable AAT.

Dismissal/Suspension

Students are subject to academic dismissal if they are on academic probation and the current semester GPA is less than the applicable AAT and the UAH cumulative is less than the applicable AAT.

A regularly admitted student dismissed for the first time is automatically eligible to re-enter after being out of school one term. A student admitted in any special category and dismissed for the first time must petition the Admissions Committee for permission to re-enter after an absence of at least one term. A student dismissed for the second time is considered suspended and disqualified for readmission. After a period of one year, such student may petition for re-admission. Individual colleges may have additional requirements specific to their programs. Refer to college sections.

Conditional/Probational to Regular Status

Students admitted conditionally or on probation will be evaluated for regular student status after completion of at least 15 semester hours at UAH. If the student at that time has earned a 2.00 on all UAH coursework, the Conditional/Probational classification will be changed to regular student status. The deadlines to submit a petition for readmission to the Registrar's Office (SSB 120) are July 1 for Fall, November 15 for Spring, and April 1 for Summer readmission.

Academic Appeals Process

Academic appeals will originate in written form by the student and will be processed through the Chair of the student's major department, the Dean of the College, and the Office of the Provost and Executive Vice President for Academic Affairs, in that order. Students classified as 'special' will be routed through the most appropriate academic dean. Students should contact their major advisor for assistance. The decision of the Provost is final.

Transcripts

There are two ways to request an official UAH transcript.

1. Fill out the transcript request form (<http://www.uah.edu/images/admissions/Registrar/Charger%20Central/Forms/offtran071116.pdf>). The completed form and payment information can be sent via fax to 256.824.7780, scanned and emailed to registrar@uah.edu, mailed to our office, or dropped off in-person.
2. You can also request electronic or paper official transcripts through the National Student Clearinghouse (https://www.studentclearinghouse.org/secure_area/Transcript/login.asp?FICEcode=00105500/).
 - o In order to send PDF transcripts, you must request them through the link above.

Please note: effective August 1, 2016, a 3% convenience fee will be added to all credit/debit card payments. However, if you use the National Student Clearinghouse (https://www.studentclearinghouse.org/secure_area/Transcript/login.asp?FICEcode=00105500/) to request transcripts, you will *not* be charged the convenience fee.

Course Numbering System

Range Year	Student Normally Takes Courses
001-099	Refresher (noncredit)
100-199	Freshman
200-299	Sophomore
300-399	Junior (upper-level)
400-499	Senior (upper-level)
500-599	Graduate
600-699	Graduate
700-799	Graduate, Ph.D. level

Academic Responsibility

Students at the University of Alabama in Huntsville have the following academic responsibilities:

1. To enroll in only those courses for which the stated prerequisite(s) (if there are any) has/have been satisfactorily completed. Failure to comply with this procedure may result in administrative withdrawal.
2. To attend all meetings of each class in which they are enrolled. Instructors will announce at the beginning of the semester if they consider attendance in computing final grades.
3. To observe all regulations of their college and select courses according to the requirements of that college.
4. To consult their advisors on all matters pertaining to their academic careers, including changes in their programs.
5. To answer promptly all written notices from advisors, faculty, deans and other University officers.
6. To maintain the integrity of the classroom by practicing academic honesty. Students should refer to the student handbook for details regarding academic dishonesty.
7. To file an 'Application for Degree' in the Office of Student Records by the published deadline.
8. To be personally responsible for fulfilling all requirements for graduation and observing all regulations at UAH.

Academic Honesty

Plagiarism and other forms of cheating are subject to penalties as outlined in the Student Handbook (<http://www.uah.edu/dos/student-conduct/handbook/>).

Application for Graduation

Candidates for graduation must file their application at least one semester prior to the time requirements are expected to be completed. Deadlines are announced each semester and application forms may be obtained at <http://www.uah.edu/registrar/commencement/apply-to-graduate> (<http://www.uah.edu/registrar/commencement/apply-to-graduate/>). Early application will assist the student by confirming requirements remaining to be completed. Requirements must be completed and certified prior to the published deadline. Diplomas are issued at the end of each semester or during commencement ceremonies.

Total Degree Requirements

1. Minimum Degree Requirements

- o Bachelor of Arts, Bachelor of Fine Arts, Bachelor of Science in Business Administration, Bachelor of Science in Economics and Computational Analysis, and the Bachelor of Arts or Bachelor of Science in Professional Studies have a minimum of 120 semester hours.

- o Bachelor of Arts in Education or Bachelor of Science in Education have a minimum of 123 semester hours.
 - o Bachelor of Science in Nursing has a minimum of 126 semester hours.
 - o Bachelor of Science has a minimum of 128 semester hours.
 - o The Bachelor of Science in Aerospace Engineering, Bachelor of Science in Chemical Engineering, Bachelor of Science in Civil Engineering, Bachelor of Science in Computer Engineering, Bachelor of Science in Electrical Engineering, Bachelor of Science in Industrial and Systems Engineering, and the Bachelor of Science in Mechanical Engineering have a minimum of 128 semester hours.
 - o Bachelor of Science in Optical Engineering requires 129 semester hours. (No students will be admitted after fall 2018).
2. A minimum of 25% of the total requirements and 12 of the last 18 semester hours must be completed at UAH.
 3. Unless otherwise specified by the department involved, a minimum of 12 semester hours of upper-level courses numbered 300 or above must be completed at UAH in a student's program (6 semester hours in the major and 6 semester hours in the minor or cognate studies).
 4. A minimum of 30% of the total degree requirements must be taken in courses numbered 300 or above (39 semester hours for a 128 semester hour requirement).
 5. The maximum amount of correspondence or credit by examination allowed towards a bachelor's degree is 50% of the degree requirements.
 6. An overall average of C is required for all courses taken at UAH; and in all courses in the major discipline taken at UAH; and in all courses in the minor discipline taken at UAH or in all courses listed in the cognate studies option taken at UAH.
 7. A maximum of 50% of a degree program may be earned from a junior, community or two-year college. Requests for exceptions must be in writing and approved by the Dean of the College in which the student is enrolled.
 8. Additional requirements for each degree are described in the appropriate sections of this catalog.

Time Limit

The degree requirements for graduation are normally those specified in the catalog in effect when a student first registers as a degree-seeking student at UAH. At any time during the student's enrollment that requirements for graduation are changed, a student may elect to graduate under the new requirements. If the student does not complete requirements for graduation within seven years from the date of entry or seven years from the date of the catalog chosen, the student must then change to the catalog in effect and meet the requirements as specified. If a student breaks enrollment for a period of at least 24 months, the student must then change to the catalog in effect at the time of re-enrollment and meet the requirements as specified. The student's advisor and college dean must approve any exceptions to this policy with the proper notation filed in the student's program of study in the Registrar's Office. At any point at which a change in catalog becomes necessary, a new program of study must be completed and proper notation filed in the Registrar's Office.

Confidentiality of Student Records

The Family Educational Rights and Privacy Act of 1974 (FERPA) is a federal law that protects the confidentiality of student education records. To implement FERPA, the University has formulated and adopted a written institutional policy governing the handling of these records.

The term 'education records (http://www.uah.edu/registrar/ferpa/#educational_record)' under FERPA includes generally any record, whether in a printed, handwritten, audio, video, or computer media format, maintained by the University and containing information related to a student in his/her role as a student (<http://www.uah.edu/registrar/ferpa/#student>). Certain records are, however, excluded by FERPA from this broad definition, such as those made by instructional, supervisory, and administrative personnel and kept in their sole possession, those made by campus police, and those made by a physician or other professional medical personnel in connection with treatment of the student.

Under FERPA and University policy, a student has a right of access to his/her education records and may inspect and review the information contained in them. To exercise this right, the student should present a request to the University office where the record is located, and a response will be made no later than 45 days later. In certain cases, a copy of the record may be provided, with a copying fee, as an alternative to actual inspection. Some records are not within this right of review, such as financial information from the student's parents and confidential letters or statements of recommendation where the student has waived the right of access.

A student who believes his/her education records contain information that is inaccurate, misleading, or in violation of his/her privacy rights may bring the matter to the attention of the appropriate records official. If by informal discussion with this official the student does not obtain the corrective action desired, the student will then be entitled to a hearing at which he/she may challenge the objectionable item. Additional information about hearing procedures will be given to the student at that time. The decision of the hearing official or panel shall be final. If the decision is adverse to the student, he/she may insert in the education record an explanatory statement about the disputed item.

A student's privacy interest in the education record is further protected by the rule against unauthorized disclosure. Generally, the University may not, without the student's consent, release the education record or personally identifiable information (http://www.uah.edu/registrar/ferpa/#personally_identifiable_information) in it to other individuals or entities.

Disclosure in certain circumstances, however, is specifically excepted by FERPA from the foregoing rule. These circumstances include disclosure to certain parties—University personnel who have a legitimate educational interest in the information, officials of institutions where the student is seeking to enroll, parties to which the student is applying for financial aid, the parent of a dependent student, etc.; disclosure to comply with a judicial order or lawfully issued subpoena; or disclosure in connection with a health or safety emergency. Under the first exception, 'University personnel (http://www.uah.edu/registrar/ferpa/#university_official)' includes any UAH employee, and a 'legitimate educational interest (http://www.uah.edu/registrar/ferpa/#legitimate_educational_interest)' means that the employee has a need for access to the record to perform appropriate tasks clearly within the area of responsibility of the employee, to perform a task related to the education or discipline of the student, or to provide a benefit or service relating to the student. Personally identifiable information will be transmitted by the University under these exceptions only upon the condition that the recipient not permit any other party to have access to it without the student's consent.

The University may also release what is called 'directory information (http://www.uah.edu/registrar/ferpa/#directory_information)' without obtaining the student's consent. Directory information is limited to the following: the student's name, address (local and permanent), telephone number, e-mail address, date and place of birth, enrollment status (full-time or part time), major field of study, participation in officially recognized activities and sports, dates of attendance, degrees and awards received, the previous educational institution most recently attended, and a photograph of the student. However, a student may prevent the release of even this information, if he/she wishes, by completing a form provided for this purpose in the Office of Student Records.

Any student who believes that his/her rights under FERPA have been violated by the University may notify and request assistance from the Provost and Executive Vice President for Academic Affairs. The student may also file a complaint with the Family Policy Compliance Office, U.S. Department of Education, 400 Maryland Avenue, SW, Washington, DC 20202-5920.

Course Repeat Policy

Students should be aware that repeated or forgiven courses and their assigned grades will remain on the transcript, and employers or graduate schools may choose to use those grades and recalculate a student's GPA. Repeats and forgiven courses may not be looked upon favorably by some employers and by professional or graduate schools.

Students shall be allowed to repeat no more than three (3) courses with grade replacement, and to forgive no more than three (3) courses. Definitions of 'course repeat' and 'course forgiveness' and specific policies and procedures for each are described below.

COURSE REPETITION

Students repeat a course when they retake a course they have already taken. They may repeat the course to improve their grade or to obtain a better understanding of the course material. For undergraduates, the original grade remains on the transcript but is not calculated into the cumulative GPA. Undergraduates may have three repeats in which the new grade is used to calculate the cumulative GPA. Graduate students are allowed only one repeat in which the new grade is used to calculate the cumulative GPA. For any additional courses repeated, beyond three for undergraduate students and beyond one for graduate students, both the original and the repeated grades appear on the transcript and both are calculated into the cumulative GPA. Repeated courses may count toward the requirements of students' majors. (Example: an undergraduate student fails Calculus A, but repeats it because s/he needs this course for his/he major. Upon the second attempt, the student earns a passing grade and continues with the course of study).

Students may repeat a course in order to achieve a passing grade or an improved understanding.

- Students may not replace a grade with a W.
- Students may not repeat a course for which they have higher-level credit. For example, a student cannot repeat Pre-Calculus Trigonometry after s/he has credit for Calculus.
- For the first three courses repeated, the original grade will not be calculated into the student's cumulative grade point average. Each course repeat counts against the maximum of three course repeats that can replace the previous grade. For example, a student may use all three repeats in a single course or in three separate courses or any combination of separate courses and multiple repeats of single courses.
- The transcript will show both the original grades and the course repeat grades, but only the grade points and semester hours earned in the repeated courses or final repeated course when multiple repeats are used for one course count toward graduation and are averaged into the student's GPA.
- After three course repeats, all other courses repeated at UAH will result in both the original grade and the course repeat grade being calculated into the student's GPA.
- This course repeat policy will be automatically applied unless the student files for an exemption when registering. The Course Repeat form can be downloaded from the Office of the Registrar (<https://www.uah.edu/registrar/forms/general/>). They are also available in person in the Student Services Building, Room 120. Call 256.824.7777 or email registrar@uah.edu if you have any questions.

COURSE FORGIVENESS

Students have a course forgiven when the grade from that course no longer figures into their cumulative GPA, although it remains on their transcript. Forgiven courses may not count toward the requirements of a student's major. (Example: a student fails Calculus A, but has it forgiven upon request of the student because s/he changes to a major in a different college that does not require Calculus A. The grade from this course is no longer included in the student's cumulative GPA, although the course and the original grade still appear on the transcript as forgiven).

Only undergraduates may apply for course forgiveness.

- Students may forgive any three courses, provided that they are not required for their major.
- Any forgiven courses and the assigned grades remain on the transcript, but the grades are not calculated into the student's cumulative grade point average.
- Forgiveness cannot be used for classes in which an F was earned for academic dishonesty.
- Forgiveness is retroactive but must be done before graduation.
- Forgiveness does not apply to pass/fail courses.
- Students cannot transfer an equivalent course from another institution after a course is forgiven.
- Forgiveness cannot be unforgiven. (The grade for a forgiven course cannot be restored once forgiveness for that course has been approved.)
- Students apply for grade forgiveness by downloading the Course Forgiveness form from the Office of the Registrar (<https://www.uah.edu/registrar/forms/general/>). Forms are also available in person in the Student Services Building, Room 120. Call 256.824.7777 or email registrar@uah.edu if you have any questions.

Double Major/Dual Degree/Second Bachelor's Degree

A student may choose to have a double major and earn one degree. The following policy applies to those students who wish to earn two degrees simultaneously or sequentially to a first degree. As early as possible, a student should meet with an assigned faculty advisor to indicate on the Program of Study form the intent to pursue a second degree. The Program of Study form must specify the requirements for each degree and contain the approval of the appropriate chairs and dean(s).

Double Major

With approval of the two appropriate departments, a student who wishes to concentrate in two disciplines may pursue a program of study that leads to a B.A. or B.S. degree with a double major. If a minor is required for a major, then the minor requirement is waived for students with double majors. General education requirements and all requirements stipulated for each of the two majors must be completed. The total requirements of some programs may exceed 128 semester hours.

Dual Degree

If a student elects to earn a second degree simultaneously with a first degree (e.g., B.A. and B.S.), the student must:

1. satisfy all applicable requirements for each degree,
2. earn at least a C average in all UAH coursework,
3. complete minimum degree requirements of the combined degree program, and
4. complete majors and/or minors appropriate to the degrees (a major for one degree may count as a minor for the other degree).

Second Bachelor's Degree

If a student elects to earn a second degree at UAH after having earned a first degree at UAH or another institution (e.g., B.A. after earning a B.S.B.A.), the student must:

1. satisfy all applicable requirements for each degree (Charger Foundations requirements are satisfied through the first degree),
2. earn at least an average grade of C in all UAH coursework,
3. complete a minimum of 25% of the total degree requirements at UAH for the second degree, and
4. complete majors and/or minors appropriate to the degrees (a major for one degree may count as a minor for the other degree).

A specific course required for both the first and second degree does not have to be repeated; however, only courses completed after the first degree will be applied to the minimum number of semester hours required for the second degree.

Graduation with honors recognition for the second bachelor's degree requires a minimum of 60 semester hours of coursework taken at UAH above the requirements for the first bachelor's degree. Honors will be determined by the grade-point average for the last 60 semester hours of coursework taken

at UAH above the requirements for the first bachelor's degree or all coursework taken at UAH above the coursework for the first baccalaureate degree, whichever is higher. Honors calculation for the second bachelor's degree follows the same procedures as graduation honors for the first baccalaureate degree.

Registration

Dates, times, procedures and eligibility conditions for registration are published on the UAH website. Registrations for Fall and Spring Semesters begin several weeks before the start of the new semester and continue through the fifth day of classes. All financial obligations to the University must be cleared before a student may register for courses. Students should consult with their academic advisor prior to registration. Non-degree students have a lower registration priority.

Concurrent registration for multiple sections of a course is not allowed.

A student who schedules courses during registration makes a financial commitment to the University. Course adjustments, drops and withdrawals must be officially transacted in writing on a Registration/Schedule Adjustment form and recorded by the Office of the Registrar by the published deadlines. Adjustments in fees, if any, will be made by the Office of the Bursar. The University assumes no responsibility for students who attend classes without proper registration.

The Semester System

The academic year is divided into two semesters and one summer session. The fall semester begins in late August and ends in December. The spring semester begins in January and ends in May. The summer term consists of 10 weeks with two 5-week mini-sessions. The summer session begins in June and ends in August. (See Academic Calendar (p. 1160).)

In addition, the University offers a Maymester term that begins after the Spring term and before the Summer term. Maymester is a 3 week term with the same contact time as a regular semester course. Maymester credit courses are intense and require significant effort on the part the instructor and the student. Departments carefully select courses that are suitable for this fast pace, and students registering for Maymester courses should be good academic standing. Students may only register for one course during Maymester and Maymesters are considered part of the Summer academic term. The policies for registration, payment, grading, etc. are the same as for other summer courses.

A semester hour is an academic unit of credit awarded for the completion of educational activities. The amount of credit awarded depends on the expected amount of time required to complete in-class and out-of-class work during a semester for a course that is passed. For example, each semester hour awarded for a lecture course at UAH requires at least one hour of classroom or direct faculty instruction and a minimum of two hours out of class student work each week for approximately fifteen weeks for one semester. At least three hours of work per week is required for each semester hour awarded for practica, internships, activity courses, laboratory experiences, and distance learning courses, although there will be variations in the amount and type of instruction and the minimum amounts of outside student work to accommodate differences among academic disciplines and the natures of particular subject matters and courses. The institution reserves the right to make semester hour assignments that exceed the minimum time requirements stated. Time expectations for work outside of class are minimums and may be higher depending on the nature and level of the course as well as the ability, commitment, and learning style of the student.

In the Department of Art, an undergraduate studio semester hour at UAH consists of at least 1.66 hours of in class instruction with a minimum expectation of at least 1.33 hours of work outside of class each week. For a three semester hour studio art course this would equate to at least five (5) hours in class and at least four (4) hours outside of class per week during a 15-week semester. Time expectations for work inside and outside of class are minimums and may be higher depending on the nature and level of the course, and for outside work, [also] on the ability, commitment, and learning style of the student.

Student Course Loads

The typical full-time undergraduate course load is 15-18 semester hours each semester. Students should take between 30 and 33 semester hours annually in order to graduate in four years. The minimum full-time load for an undergraduate student is 12 semester hours a semester. A part-time undergraduate student is one who is enrolled in less than 12 semester hours. Permission of the student's dean is necessary to enroll in 21 semester hours or more, including concurrent enrollment at other institutions and online courses. A student enrolling for a minimum load each semester should not expect to graduate in four years unless he or she enrolls in summer terms in addition to the regular academic year.

Prerequisite, Prerequisite with Concurrency, Co-requisite

Some courses offered at UAH require students to complete a prerequisite or prerequisites prior to registering for a course, to register for a prerequisite with concurrency, and to register for a co-requisite course. The definitions for these categories are as follows:

Prerequisite – a course must be taken before a target course, i.e., successful completion of EH 101 before registering for EH 102.

Prerequisite with Concurrency – a course must be taken before or at the same time as a target course, i.e., CH 101 and CH 105; PH 111 and PH 114; CE 271 and MA 201. A 'W' or 'F' grade in one course does not require that a student re-register for both courses. Prerequisite with concurrency courses do not have to be completed at the same time. A student may withdraw from a target course or a concurrent course and continue enrollment in the other

course and vice versa. **Note: A student may be asked to withdraw from a required course if in the judgment of the instructor/chair/advisor the student does not have the requisite knowledge to successfully complete the course (i.e., CE 271 and MA 201).**

Co-requisite – a course must be taken simultaneously with a target course, i.e., BYS 119 and BYS 119L; PH 102 and PH 102L; CPE 211 and CPE 211L; CE 370 and CE 370L; MAE 311 and MAE 311L; NUR 660 and NUR 660L, and etc. Co-requisite courses must be completed at the same time. A student may withdraw from a target course; however, the student must also withdraw from the co-requisite course and vice versa.

Student Classification

An undergraduate is classified as indicated in the following table when a student has completed the number of semester hours shown.

Semester	Hours Earned
Freshman	0-30
Sophomore	31-60
Junior	61-90
Senior	91 and up

Schedule Adjustments

After the beginning of an academic term, students seeking to change their course schedules must follow the Schedule Adjustment Process. Schedule adjustments fall into seven categories: Drop/Add, Late Addition, Credit/Audit, Withdrawal, Late Withdrawal, Retroactive Withdrawal, and Medical Withdrawal. The following definitions and procedures will govern the Schedule Adjustment Process.

Drop/Add

After classes have begun, students should consult with their academic advisor and other university officials for advice and approval before making any schedule changes. Students are advised to check the impact of dropping courses on things like financial aid, athletics eligibility, visa status, etc.

Through the sixth day of classes for a ten-week or fifteen-week semester, fourth day of a seven-week semester, or third day of a six-week or shorter semester, students may Add a course through the web-registration process, by meeting with their advisor, or by submitting a Registration/Schedule Adjustment form to the Office of the Registrar.

Through the sixth day of classes for a ten- or fifteen-week semester, fourth day of a seven-week semester, third day of a six week or shorter semester, students may Drop any or all courses from their schedule and receive a refund of tuition and fees associated with the dropped courses.

Late Addition

In rare circumstances a student may have a legitimate and substantial need to register, add a class or change a class section after the deadline (i.e., Last Day to Add a Class). In these instances the student must complete the Registration/Schedule Adjustment form, with recommendations (approval/non-approval) from the instructor and the chair of the department that offers the course. The Office of the Registrar will process the request once approvals are obtained.

New international students who want to register after the deadline must obtain approval from the International Student Advisor, and in the case of graduate students, the Graduate Dean. Approvals for late registration for new international students will include the respective academic units.

Credit to Audit

A student is permitted to change a course from credit to audit through the fourth week of a fifteen-week semester, the third week of a seven- or ten-week semester, and the second week of a five-week or shorter semester. The instructor is not required to grade any written assignments that may be submitted by an auditing student. A student who elects to audit a course may not at any point after electing to audit, change to "for-credit", i.e., graded status. Any student failing to follow established procedure for change to audit will continue to be enrolled in the class for credit and may receive a failing grade in that course.

Withdrawal

After the Drop/Add period a student may Withdraw from any course and receive a grade of W. The deadline for Withdrawal is the end of the tenth week of a fifteen-semester, end of the seventh-week of a ten-week session, the end of the fifth week of a seven-week session, the end of the third week of a five-week semester, or the end of the second week of a semester shorter than five weeks.

Withdrawal is accomplished by either 1) executing a withdrawal on the registration website or 2) by submitting a Registration/Schedule Adjustment form to the Office of the Registrar. No signatures or approvals are required for a Withdrawal, but students should consult with appropriate officials to determine the impact that withdrawing from a course may have on financial aid, athletics eligibility, visa status, etc.

Class non-attendance does not constitute withdrawal nor does notification to the instructor. Any student failing to follow the established procedure for withdrawal will continue to be enrolled in the class and may receive a failing grade in that course.

Late Withdrawal

After the Withdrawal period, a student may request a Late Withdrawal from a course under the most extenuating circumstances. Avoidance of an undesirable grade does not justify withdrawal.

Students requesting a Late Withdrawal must submit the Late Withdrawal Form, along a written explanation of the extenuating circumstances and any appropriate documentation, to the Office of the Provost. Students may mail their request and supporting documentation to Provost@UAH.edu or deliver it to SSB 303. If the Office of the Provost believes sufficient evidence exists to warrant a Late Withdrawal, the withdrawal request is forwarded to the Dean of the college in which the student is enrolled (minus personal documentation) for consideration. If approved, the Office of the Registrar will process the request when approvals are obtained and received by the Registrar.

Class non-attendance does not constitute withdrawal nor does notification to the instructor. Any student failing to follow the established procedure for withdrawal will continue to be enrolled in the class and may receive a failing grade in that course.

Retroactive Withdrawal

Undergraduate students may at times experience extraordinary problems during an academic semester. Within two years of having completed such a semester, a student may petition the Office of the Provost to withdraw retroactively from ALL classes taken during that semester. A retroactive withdrawal is granted only under exceptional circumstances, such as extraordinary medical or personal problems and is only granted prior to graduation. The petition must use the Retroactive Withdrawal form and include clear and documented evidence whenever possible. The Office of the Provost verifies the documentation and considers the petition. If the request is granted, the grades for ALL courses taken during the semester in question will be changed to W's. Petitions for Retroactive Withdrawals are considered after final grades are posted. Students should be aware that retroactive withdrawals may have an impact on their ability to receive or retain financial aid and timely completion of their degree.

Medical Withdrawal

Students may at times experience medical hardships that prevent them from attending class and necessitate a withdrawal. Decisions on whether to award a Drop, Withdrawal, Refund, etc. must include sufficient documentation to justify the request. In such cases the student should contact the Dean of Students office for assistance.

Recording of Withdrawals

If the withdrawal process is completed during the first two weeks of the semester, the withdrawing student's name does not appear on the final rolls of the class from which the student withdrew, and that course does not appear on the student's permanent record. If the withdrawal process is completed after the first two weeks, then the withdrawing student's name will be on the final roll of the class from which the student withdrew, and that course will be recorded on the student's permanent record with a final grade of W.

Counseling

Students need to be aware that many potential employers, as well as graduate and professional schools, view an excessive number of W's on a transcript as a flag that the student cannot be counted on to complete demanding projects. Advisors should be informed of this fact and students should be encouraged to discuss with their advisors any plans to withdraw from a course, especially after the first two weeks of the semester.

Grading System

The University of Alabama in Huntsville's grading system includes grades of A, B, C, D, F, I, X, W, S, U, P, AU, and N. Instructors have the option of augmenting the course grades of A, B, C, and D with symbols '+' and '-' signifying, respectively, high and low achievement within the assigned grade. These augmented letter grades become part of the student's permanent record and appear on transcripts, but augmentation of a letter grade does not affect its value for the purposes of the GPA computation.

A	Superior achievement. Four quality points given per semester hour.
AU	Audit. Course attendance as a listener. No credit given, no quality points assigned, no attendance requirement.
B	Above average achievement. Three quality points given per semester hour.
C	Average Achievement. Two quality points given per semester hour.
D	Passing work. One quality point given per semester hour.
F	Failing work. No credit given; no quality points assigned.
I	Incomplete. Assigned by the instructor when a student, due to circumstances beyond his or her control, has not satisfied some requirement of the course. The deadline for a student to remedy a grade of I is the last day of class of the next semester enrolled or one calendar year from the date of the grade whichever occurs first. If the grade of I is on a student's record at the time of graduation, it is treated as an F.

N	No grade. Assigned by the Office of the Registrar when the instructor does not report a grade.
P	Passing work. Assigned in some courses. See Pass-Fail Option.
S	Satisfactory work. Applicable to noncredit courses and to some specified credit courses, and will not be counted in the GPA.
U	Unsatisfactory work. Applicable to noncredit courses and to some specified credit courses.
W	Withdrawal. (See Withdrawal Policy.)
X	Excused absence from examination. Assigned by the instructor when a student completes all course requirements except the final examination. The final grade becomes an F unless the examination is completed by the time of the announced deferred examination date at the beginning of the semester of next regular enrollment of the student. (See Examinations and UAH calendar). Time schedule permits a student to take only one examination on this date. If a student receives more than one grade of X, he or she should make arrangements directly with other instructors for additional make-up examinations.

Course Numbering System

Range Year	Student Normally Takes Courses
001-099	Refresher (noncredit)
100-199	Freshman
200-299	Sophomore
300-399	Junior (upper-level)
400-499	Senior (upper-level)
500-599	Graduate
600-699	Graduate
700-799	Graduate, Ph.D. level

Change of Grade

When it is believed that a grading error may have occurred, a student is permitted a maximum of one semester from the date a grade is assigned to request a change of course grade. Grades submitted to the Office of the Registrar can normally be changed only by submission by the instructor on a Change of Grade form containing a written explanation of the error. The Change of Grade form must be approved by the department chair and received in the Office of the Registrar no later than two semesters from the date the original grade was assigned.

Academic Appeals

An academic appeal may be filed by a student regarding an action taken by University personnel, including instructional personnel, administrators, or staff members at the University, that affects the student's academic standing. Examples of academic appeals include, but are not limited to, allegations of unfairness in grading, alleged violation of a written or oral agreement with a student (e.g., course requirements for graduation), and alleged inconsistent applications of existing policies. Appeals related to course grades must be filed within 30 days of the end of the semester/term in which the grade was earned. Students wishing to file an appeal must follow the Academic Appeals policy, found at https://www.uah.edu/images/administrative/policies/02.01.12-AA_Academic_Appeals_Policy.pdf

Pass-Fail Option

A student wishing to exercise a P-F option must apply to the Office of Registrar (SSB 120) when registering or before the end of the third week of classes. Any undergraduate student not on academic probation may take courses on a P-F basis. **P-F policies vary from college to college; consult your advisor before selecting this option.**

A student is limited to 12 semester hours of credit on a P-F basis over the course of the degree. Courses listed on the Program of Study (major, minor, cognate, track, cluster, specialization, option and concentration) may not be taken P-F. Required courses in English composition and mathematics, as well as the rest of the Charger Foundations, (p. 34) may not be taken P-F. Departments may limit the P-F to courses outside the department or college.

A grade of P may be changed to a regular grade only if the student changes his or her program to an area in which a regular grade is required. The change must be initiated at the dean's office and must go through the normal grade change procedures. Once a P grade has been changed to a regular grade, the regular grade must remain. Under the P-F system, a grade of P will not be counted in a student's grade-point average; a grade of F will be counted in a student's grade-point average.

Even though a student chooses to take courses on the P-F basis, instructor's grade sheets will reflect the regular grade and the student may be informed of the regular grade upon request.

Examinations

During each semester, one or more announced examinations of class period length may be held. At the end of each semester, a final examination period is scheduled for each course. Absences from a scheduled final examination without previous arrangement with the course instructor (except in extenuating circumstances) will be classified unexcused and a failing grade in the course will be assigned.

Any student whose final examination schedule is such that the student is scheduled to take three examinations during a single day shall have the right to have the middle examination rescheduled. The date and time of the rescheduled examination shall be by mutual agreement between the student and the affected faculty member and must be agreed upon prior to the final week of the semester. It is the student's responsibility to notify the instructor of this type of conflict, and it is the instructor's responsibility to verify that the conflict actually exists. If a student is scheduled to take four examinations during a single day, then the same procedure shall apply except that the student shall now have the right to have both the second and fourth examinations rescheduled.

Student Grade Report

At the completion of each semester, a report of final grades is available for viewing using [myuah.uah.edu](https://my.uah.edu) (<https://my.uah.edu/>).

Grade Point Average

The grade point average (GPA) is computed by dividing the total number of quality points earned at UAH by the total number of semester hours attempted at UAH (transfer grades are not included). Courses in which a grade of NC, W, P, S, X or AU is assigned are not included.

Change of College

Students who are pursuing a program of study in one college at UAH and desire to change to a program in another college may petition to do so by making application at the Office of the Registrar. Academic advisement before changing programs may help students avoid losing credits. Application of previously earned credits toward the new program will be determined after the transfer has been approved.

Student Athletes

Student athletes must declare a major and follow an academic plan by the beginning of the third academic year or fifth academic semester.

Support Services

The University of Alabama in Huntsville provides a wide range of support services designed to help students succeed throughout their college career and after. Our Student Success Center is staffed with tutors and academic coaches who offer assistance in a variety of subjects, while the Student Health Center keeps our students performing at their best. We even have Career Services to help them plan for life after graduation. Information on the services we offer to enhance the college experience can be found in this section of the catalog.

Academic Support Services

Student Success Center (SSC)

M. Louis Salmon Library First Floor
www.uah.edu/ssc/ (<http://www.uah.edu/ssc/>)
ssc@uah.edu
256-824-2478

The Student Success Center (SSC) provides academic support programs that empower individuals to realize their potential as self-directed learners and professionals. The SSC is located in M. Louis Salmon Library. To learn more about any of our programs, visit the SSC website (<http://www.uah.edu/ssc/>) or call 256-824-2478.

Tutoring Programs

The Tutoring Programs consist of Academic Coaching, Content Tutoring, and Writing Tutoring. The goal of the Tutoring Programs is to work with UAH students not only on content, but also on study and learning strategies so that students can become independent learners. The programs provide academic assistance to students in-person and online through one-on-one and small group sessions with up to three classmates.

Academic Coaching helps students improve their performance in and out of class by offering sessions on study, learning, and self-management strategies. During a session, coaches and students work together to create a personalized action plan.

Content Tutoring provides academic assistance for students in a variety of subjects. Tutors work with students on course content and developing study and learning strategies during a session.

Writing Tutoring helps students become more confident and successful writers. Writing tutors use peer consultations at any point in the writing process to encourage writers to identify and develop their own writing skills.

To make an appointment or learn more about our programs, visit the Tutoring Programs website (<https://www.uah.edu/ssc/tutoring/>) or call 256-824-2478.

Peer Assisted Study Sessions (PASS)

The Peer Assisted Study Sessions (PASS) Program provides academic support for students enrolled in designated classes that are considered historically difficult. PASS leaders are UAH students who have successfully completed the course. They attend class lectures with currently enrolled students and facilitate group study sessions two to three times per week outside of class. PASS sessions provide an active learning environment that focus on both course content and learning strategies. To find out more about the program, or to view the current PASS schedule, students can visit the PASS website (<http://www.uah.edu/ssc/pass-program/>) or call 256-824-2478.

College Academic Support Centers

College of Business

The Office of Academic Assistance is located in the Business Building, room 102. Advisement and tutoring arrangements may be scheduled by phone at 256.824.6787 or by email at undergradbiz@uah.edu.

College of Engineering

The College of Engineering Student Affairs Office is located in the Engineering Building, room 157. The office offers comprehensive advising services and coordinates tutoring when requested. Phone 256.824.6877 for information.

College of Arts, Humanities, and Social Sciences

The Academic Advisors for the College of Arts, Humanities, and Social Sciences are Mr. Joshua Riddle and Ms. Jana Savanapridi, are located in the Conference Training Center (CTC) 113. CAHS students who have not filed a Program of Study must meet with Mr. Riddle or Ms. Savanapridi for schedule planning before registering. Call for an appointment at 256.824.2867 (jnr0004@uah.edu or jms0014@uah.edu). The College maintains two libraries: A Sociology Library in CTC 203 and a Women's and Gender Studies Resource Center library in CTC 111.

College of Nursing

Student advisement is conducted in the College of Nursing, Suite 227 by Ms. Laura Mann, Director of Admissions and Advisement or by Ms. Janiece Smith, Academic Advisor. Students who are not registered nurses pursuing a Bachelor of Science in Nursing (BSN) should visit the office for advisement about pre-requisite courses and for answers about admission requirements. Appointments with Ms. Mann can be set up by calling the Office of Undergraduate Nursing Programs at 256-824-6742 or by online scheduling at <https://www.uah.edu/nursing/degree-programs/bsn> (<https://www.uah.edu/nursing/degree-programs/bsn/>). Students who are registered nurses completing degree requirements for a BSN can contact Ms. Janiece Smith, CON Academic Advisor by calling 256-824-6742 or by email at jas0031@uah.edu.

College of Science

The College of Science Academic Advisors, Ms. Morgan Lewis and Ms. Jennifer Bradley, are located in the Materials Science Building room C206 and may be reached at scienceadvising@uah.edu or 256.824.2505. Science advising is provided for College of Science undergraduate students in conjunction with departmental advising. Each department in the College of Science provides its own student services, including tutoring and specialized support centers that support major and non-major courses in biology, chemistry, computer science, mathematics, and physics. Information can be obtained in the departmental offices.

Mathematics Tutoring Center

The Mathematics Tutoring Center provides tutoring in MA 107, MA 110, MA 113, MA 115, MA 120, MA 171, and MA 172. The tutoring center is conveniently located in the Shelby Center for Science and Technology where most of the mathematics courses are taught, and is staffed by graduate assistants. The hours of the tutoring center vary from semester to semester. For more information, please call the Mathematical Sciences Department at 256.824.6470, or visit our web site at www.math.uah.edu. (<http://www.math.uah.edu>)

Mathematics Computer Laboratory

The Mathematics Computer Laboratory has approximately 20 computers equipped with a variety of mathematical software packages including Maple, MATLAB, and various tutorial programs. Located on the lower level of the Shelby Center in Room 006, the Mathematics Computer Lab is open only to students enrolled in math courses, and a student ID is required in the Lab. It is open approximately 35 hours per week and is staffed by undergraduate student assistants. For more information, please call the Mathematical Sciences Department at 256.824.6470, or visit our website at www.math.uah.edu (<http://www.math.uah.edu>).

Calculus Workshop

UAH's calculus workshop provides academic assistance to students at any level of calculus. No fee is charged and no grade is given. The workshop encourages students to work in groups on problems presented by graduate teaching assistants. Workshop participants get away from standard homework problems and see how math is used in the real world. This promotes teamwork, a sense of belonging to a community of math peers, and developing friendships which extend beyond the workshop.

Physics Success Center

The Physics Success Center exists to provide a central location (Optics Building 200) from which students in the physical sciences can seek guidance from experienced tutoring personnel free of charge. The center is supported by Physics Department faculty and provides supplementary class materials as well as on-going tutoring.

UAH Police Department

The UAH Police Department works diligently to promote the security of our campus community through a variety of services and programs, which are conducive to the support of the University's learning environment.

More information on UAH security policies and procedures can be found in the University's Annual Security Report (https://www.uah.edu/images/administrative/police/safety/annual_security_report.pdf).

Security Tips

Get to know these valuable tips (<https://www.uah.edu/police/programs/safety-tips/>) that will help ensure your security on, and off, the UAH campus.

Reporting Crime

It is the policy of the university to strongly encourage students, employees, and visitors to UAH to promptly contact the university police, or if they wish, the Huntsville Police Department, about any criminal activities, accidents, or medical emergencies occurring on campus. Reporting a crime does not mean an individual must take legal action – it may, however, help law enforcement stop further incidents as well as help them keep the community informed about criminal activity.

To make a report in person, an individual should go to the UAH Police Department, which is located in the Intermodal Facility, 501 John Wright Drive (Parking Garage). To make a report by phone, call 256-824-6596 and describe the situation to the communications operator. In emergency situations, including fires and medical emergencies, call 911 or UAHPD at 256-824-6911. All 911 calls made from campus phones go directly to the UAH Police Department; all cell phone 911 calls are routed to UAHPD through the Madison County 911 center.

Campus Security Authorities

A person may also report a crime to certain individuals who have been designated as a Campus Security Authority (CSA). These individuals include, but are not limited to, the Director of Housing and senior Housing Office staff members, Residence Directors, the Dean of Students, the Director of Student Conduct, the Director of Student Activities, the Athletic Director or any coach, staff in the Student Health Center, the Vice President of Diversity, or other UAH officials with significant responsibility for student and campus activities. Upon request, the CSA may assist the reporting individual in contacting the University Police about an incident.

In some cases, the reporting person may wish to remain anonymous or a victim may not want to involve the police. The CSA will record the information on a special form that will be forwarded to the Chief of Police. The Chief will evaluate the information and determine if other actions required under Federal law may have to be taken. The reporting person will likely not be contacted. All such incident reports will help the University take steps to make the campus safer. They will be used, in particular, to determine whether there is a pattern of crime involving a particular location, offender, or method; to provide the basis for alerting the campus community about crimes posing a danger to students or employees; and to compile the crime statistics included in this annual report.

KNOW WHAT TO DO: Emergency Preparedness at UAH

As an on-going effort, UAH has developed an Emergency Management Plan. Part of the plan is to inform our community of how to respond in the event of an emergency. Knowing what to do in an emergency situation will help keep the UAH community safe and secure. Each department/unit should also have an up-to-date Building Emergency Action Plan that includes information on assembly areas, shelter locations, hazardous materials storage, and building-specific emergency contacts. We encourage you to familiarize yourself with the Emergency Action Guidebook (http://www.uah.edu/images/administrative/facilities/oep/emergency_guidebook.pdf) and the building-specific emergency action plan(s) for each building you regularly visit.

Information Technology Services

Campus Technologies

The Office of Information Technology (<http://oit.uah.edu>) (OIT) offers technological expertise and service to UAH faculty, students, and staff. OIT maintains many online resources such as Banner, UAH's enterprise resource program. Banner components, such as those used by the Bursar's and the Registrar's office, are integral to the success of UAH. Other online resources maintained by OIT include:

- A portal to access most UAH online resources - myUAH (<http://my.uah.edu>)
- G Suite for Education (<http://google.uah.edu/>) - Google Mail, Calendar, Drive, and more
- A self-service password reset site, <http://reset.uah.edu>
- The OIT User Services portal (<http://oitportal.uah.edu>) where you can change your known password, import your course schedule onto your Google calendar, and more

Enhanced Learning

The Enhanced Teaching and Learning Group (ETL) includes Online Learning (<https://www.uah.edu/online-learning/>), Academic Technologies, and the Collaborative Learning Center. The Online Learning team offers instructional design, online course development training, and more. The Academic Technologies team supports the following and more:

- Canvas (<http://canvas.uah.edu>), UAH's online learning management system
- Panopto, UAH's Lecture Capture solution
- TurningPoint/Clickers (from Turning Technologies), an engagement and assessment solution for real-time student participation during classes
- Classroom Technology, including audio-visual equipment
- Video Conferencing Services
- Qualtrics, UAH's online survey solution
- Respondus LockDown Browser and Respondus Monitor

Technical Support

The OIT Help Desk is available for remote support 24/7/365 at 256-824-3333. Between 9 and 5 on weekdays that the university is open, the Help Desk is available via email at helpdesk@uah.edu or at the Salmon Library.

Classroom Technology Support is available 7:30 am - 7:30 pm Monday through Friday at (256) 513-7492. Support for Canvas and related technologies is available 24/7 by calling 1-844-219-5802 (students) or 1-833-519-8478 (faculty). Support via chat is available from within Canvas (click 'Help' > 'Chat with Canvas Support').

With so many online resources, it is important for each student to know his or her Charger ID and password (<https://www.uah.edu/oit/services/charger-id-and-password/>). OIT offers account management support.

Networks and Telecommunications

Wireless network access is available for all students via the eduroam wireless network. Campus residents may take advantage of wired network access and telecommunications access from OIT.

Desktop Software

OIT makes a number of software programs available at no cost for faculty, staff, and students via Chargerware at <http://chargerware.uah.edu> (<http://chargerware.uah.edu/>).

Students have access to state-of-the-art computer labs in each college as well as open labs in the Salmon library. The computers in these labs offer software products not distributed to students via Chargerware.

Campus Printing

Students, as well as visitors and guests, have access to the printing kiosks located around campus. Click here for more information. (https://uah.edusupportcenter.com/sims/helpcenter/common/layout/SelfhelpArticleView.seam?inst_name=uahhd&/#38;article_id=2137-1529043)

Student Facilities and Services

University Housing

The University of Alabama in Huntsville (UAH) offers a variety of housing facilities to meet the needs of its diverse student population. Please visit www.uah.edu/housing (<http://www.uah.edu/housing/>) for the most current information for first and second year options, requirements, policies, and residence hall amenities/services. All first-year freshmen students who apply for University housing will be assigned to either Central Campus Residence Hall (CCH), Frank Franz Hall (FFH), or North Campus residence Hall (NCH). First and second year students that reside outside of 30 miles from campus will be required to reside in University Housing. Sophomores and second year residents may apply to Charger Village (CGV), Southeast Campus Housing (SCH), and the Off Campus Apartments (OCA). Students who are of at least junior status or 21 years of age may apply to Southeast Campus Housing (SCH), or Off Campus Apartments (OCA). Upperclassmen assignments are based on availability of space. CCH, FFH, CGV and NCH all have private rooms designed for students who are physically challenged.

All Housing and Residence Life suites have basic cable television connection and a dedicated telephone line, except for the suites in Charger Village where there is one dedicated phone line in each common room. Each bedroom has a computer hookup that provides access to UAH's mainframe and the Internet. Housing and Residence Life offers wireless service throughout all of its facilities.

All residence halls are convenient to the Salmon Library, the University Fitness Center, Charger Union, and all classroom facilities. Each resident has a carpeted, private bedroom in an air-conditioned suite and most share a bath with only one other suitemate. Every bedroom has a loftable extra-long twin bed, a wardrobe or closet, a chest of drawers, a desk and chair. Suites are furnished with a sofa, accent tables, and lounge chairs. CCH has a mini kitchen with a small refrigerator, microwave and sink. FFH, NCH, and CGV have a mini kitchen with an apartment-size refrigerator, microwave and sink. Laundry facilities, a recreation/meeting room, study lounges, and mail service are available in each residence hall. Access to all halls except SCH is by an electronic smart card.

Southeast Campus Housing (SCH) consists of a cluster of nine three-story buildings located on John Wright Drive near the University Fitness Center and most engineering and science classrooms. Private bedrooms in three-bedroom suites are available in Southeast Campus Housing. In addition, one-bedroom unfurnished private apartments are available for graduate students or students with spouses and/or children. Several of the one-bedroom apartments are accessible to disabled students. A sandpit volleyball court in the center of the Southeast complex and intramural fields surrounding the area provide recreational spaces for residents.

All housing facilities have a full time, live-in Resident Director and at least one student Resident Assistant (RA) on each floor. Southeast Campus is staffed with a Resident Director and a team of RA's. RA's develop activities and programs, provide assistance to student residents, serve as liaisons to other University departments and help create a residential community that contributes to effective student learning, personal and social growth, and individual responsibility.

Any admitted student to UAH is eligible for an assignment in University Housing. Housing and Residence Life applications are available on line at <http://www.uah.edu/housing/prospective-residents/apply> (<http://www.uah.edu/housing/prospective-residents/apply/>). Room assignments are contingent upon confirmation of admission. Priority for assignment is based upon academic class standing (first year student, graduate student, etc.), the date of receipt of the application, commitment fee, and availability of housing.

All single students sign an academic year room contract (Fall semester-early May). Housing charges are due when tuition is due each academic semester. Summer housing for single students is available in Frank Franz Hall, Southeast Campus Housing, or the Off Campus Apartments, under a separate contract. The room contract for family and graduate student apartments is for twelve months (Fall semester-early August) and rent installments are due at the beginning of each semester.

Current rates and additional information are all available from the:

Housing Office
601 John Wright Drive
256.824.6108

or on line at <http://www.uah.edu/housing> (<http://www.uah.edu/housing/>). Individual and group tours of UAH Housing and Residence Life may be arranged by appointment through the Admissions Office.

University Food Service

Through the delivery of an exceptional food program, the UAH community is provided with options, quality, and convenience. Finding your favorite foods on campus is a snap. We are proud to offer a dining program, complete with signature brands and menu selections that entail just about every item you can imagine. Please visit www.uah.edu/dining (<http://www.uah.edu/dining/>) for available dining locations, menus, meal plan hours, and meal plan options.

The Charger Cafe is an 'All You Care To Eat' dining area located in the Conference Training Center (CTC). The menu program is known as Ultimate Dining and features rotating formats of food presentation: Classics, Pizzarette, The Grille, Innovation Station, Soup'n Salad, Made to Order Deli Station, Vegetarian Selections, Gluten Free Bar, Desserts and Beverages. A spacious dining room with an adjacent patio is available for all guests.

In addition to the Charger Cafe, the CTC also houses 'We Proudly Brew Starbucks Coffee' and Sandella's Flat Bread Cafe. A second Starbucks Coffee location offers a coffee shop atmosphere and menu in the Salmon Library. This is the ideal place for meetings, grab-and-go lunches, or afternoon coffee breaks. Freshly brewed gourmet coffees, teas, fresh baked gourmet muffins and cookies, salads, and sandwiches provide a variety of choices for all to enjoy.

Charger Village (CGV) houses Chick-fil-A, Papa John's Pizza, Burrito Bowl, and a convenience store (The C-Store) featuring Boars Head Deli. A nice dining area and patio are available to meet with friends for a meal or to enjoy the view while studying.

Charger Union (CGU) is the home to Dunkin' Donuts, Mein Bowl, and World of Wings. There are plenty of places in and around the building to enjoy a cup of coffee or meet friends to indulge in the best wings on campus.

Technology Hall is the home to Blue's Tech Hall mini convenience store featuring Simply-To-Go quick food options such as sandwiches, salads, fresh fruit and more! The store also offers assorted candy bars, energy drinks, or bottles soda's or water.

The Gardenview Cafe located in the Bevill Conference Center and Hotel is a full service All You Care To Eat dining facility available for students, faculty/staff, and the Huntsville community..

UAH Dining Services also provides catering services campus wide for any student or campus groups. Visit www.uah.edu/bevill-center/catering (<https://www.uah.edu/bevill-center/catering/>) to view our menu options as well as limited time offers for special events.

The Charger Union

The Charger Union (CGU) serves as the heart of the UAH community. It provides a comfortable, safe, and welcoming environment for student life and engagement. The Charger Union supports the personal and professional development of students, offering formal and informal spaces to attend programs and access to high quality services that enhance the UAH educational mission.

The Charger Union offers meeting rooms, dinning (World of Wings and Dunkin Donuts) and snack facilities, lounges, two game rooms (one traditional game room with pool tables and ping pong, and an e-gaming lounge with the latest e-gaming systems and large monitors), an information desk, student organization spaces, a theater, and the University Bookstore. Also located in the CGU are the offices of the Dean of Students, the Student Government Association, Association for Campus Entertainment, the Charger Times, Student Life, Student Engagement & Transitions, and Charger Union Administrative offices.

M. Louis Salmon Library

333 Salmon Library
Telephone: 256.824.6540
Email: library@email.uah.edu
Director: David Moore

The M. Louis Salmon Library supports the information, instructional, and research needs of faculty, staff, students, and the surrounding community. It is housed in a 105,000 square feet facility which includes an InfoArcade, five general-purpose laboratories, and a 75-seat lecture hall. It also houses the Faculty Resource Center (FRC) for the University. Over 250 workstations are supported in the facility. There is also a coffee shop on the ground floor with a large area for collaborative study, complete with comfortable seating and white boards.

The Library supports the academic and research programs of the University. It has a collection of over 350,000 print volumes, a selective collection of over 500,000 United States government publications, and over 600,000 materials in microform, and manuscript collections. In addition to books and microform materials, the Library offers a broad selection of books, journals, newspapers and other serials in electronic form. Approximately 67,000 online paid periodical titles, over 65,000 electronic books and over 350 databases can be accessed both on and off campus via the Library website at <http://lib.uah.edu> (<http://www.lib.uah.edu>) In addition, the University Archives/Special Collections offer a number of unique collections, including the papers of former Congressman Robert Jones, the personal Library of Willy Ley, the architectural research collection of Harvie P. Jones, and several space-related collections involving such projects as the Saturn V rocket, Skylab and Apollo-Soyuz.

For students in science and engineering and technology, research at UAH is supported by the Redstone Scientific Information Center (RSIC), located five miles from campus. RSIC was developed to support the wide-ranging research interests of NASA and the United States Army Missile Command and is one of the finest technical libraries in the Southeast. UAH subscribes to numerous full-text and bibliographical databases each of which supports specific colleges, including Arts, Humanities, and Social Sciences; Business; Education; Engineering; Nursing; Professional and Continuing Studies; and Science.

UAH subscribes to numerous full-text databases each of which supports specific colleges including: Arts, Humanities, and Social Sciences; Business; Education; Engineering; Nursing; Professional and Continuing Studies; and Science. The Library is privileged to provide access to many major online resources including the entire Elsevier collection through Science Direct and Scopus, Springer, CINAHL, the IEEE collection through IEEEExplore, ABI/Inform, Bloomberg Terminals, Academic Search Complete, and JSTOR (Journal Storage). The Library is also a member of several consortia that provide access to research materials not owned by libraries in north Alabama. Its membership in the Online Computer Library Center (OCLC) and the Network of Alabama Academic Libraries (NAAL) facilitates rapid document delivery/interlibrary loan service to faculty and students without charge.

Reference services are provided by reference librarians who are able to assist students in finding information in-person, by email, phone, text message, chat, or Twitter. Group Library instruction sessions are provided to teach students how to locate, manage, and evaluate the information they need for class projects and papers. Other Library services include wireless access, federated searching across databases (EBSCO Discovery Service OneSearch), instant linking to the article level in most databases (LinkSource), Turnitin.com training (plagiarism), group study rooms, PC and Mac computers, a scanner workstation, a digital audio/video area, and special computer accommodations for users with disabilities. Printing is available in the InfoArcade and labs.

Loan Periods

Undergraduates may borrow materials for four weeks; graduate students for 90 days. Overdue fines accrue at the rate of twenty-five cents per day. All fines must be paid before registration for the following semester.

Contact Information

For additional information about the Library, inquire at the User Services Desk, 256.824.6530, the Reference Desk, 256.824.6529, Interlibrary Loan, 256.824.6124, Twitter @uahEref, SMS Text to 256.824.2368, Email at erefq@uah.edu. Library home page is: <http://www.lib.uah.edu>.

Student Identification Cards

As your official student identification, the Charger Card gives you access to campus facilities and services and allows you to make purchases at participating locations.

Your Charger Card may be used for access to or purchases in:

- Food Service Venues
- Barnes and Noble's On-Campus Bookstore
- University Fitness Center
- Residence Halls
- Salmon Library
- Student Health Services
- Campus Entertainment and Athletic Events
- Computer Labs and Printers
- Copy and Laundry Machines

The Charger Card offers four (4) types of accounts:

- Meal plans
- Charger Bucks
- Dining Dollars
- Flex

Deposits by cash, check or credit card are accepted in UAH's Cashier's Office.

Meeting Spaces

Meeting Rooms

The Charger Union has meeting rooms designed for multipurpose functions. The rooms can accommodate meetings of a variety of sizes. The Center has a large number of tables, chairs, portable stages and audiovisual equipment, and can assist in designing set-up to make any conference or meeting a success.

Lounges

Spacious lounges, designed as a place to relax and meet friends, are equipped with comfortable furniture, tables and chairs for small group meetings, and plenty of places to charge your favorite electronic devices.

Student Support Services

Dean of Students

Student Affairs at UAH creates opportunities for students to engage in a diverse community of learners characterized by a supportive campus environment that encourages individual growth and development. This mission is accomplished through comprehensive programs and services focused on student learning and success. Through the Dean of Students office, the interpretation and administration of the Code of Student Conduct takes place.

The Code of Student Conduct protects students' rights and assists students in their awareness of their obligations and responsibilities in being part of the University community.

Counseling Center

The Counseling Center, under the direction of the Dean of Students, at UAH provides specialized professional services designed to assist students in their academic, personal, and social development. Many students encounter personal difficulties that affect the course of their collegiate experience. The Counseling Center provides short-term therapy to help students cope with stress and/or learn new skills. Counseling services are available to all students currently enrolled in 3 or more credits at UAH. The staff is committed to meeting the needs of individuals from diverse backgrounds. Services are confidential and in accordance with the ethical guidelines of the American Psychological Association. Information from counseling sessions does not go on a student's academic record and is not released to any other individuals (on campus or off) without the student's written permission—except in rare situations as mandated by law. Students come in for a variety of concerns such as relationships, self-esteem, time management, anxiety, family concerns, depression, stress management, and many other concerns. See our webpage at <http://www.uah.edu/counseling/> for more information. To schedule an appointment, contact the Counseling Center at 256.824.6203 or come by Executive Plaza Bldg 200, Suite 208.

Disability Support Services

Disability Support Services (DSS) is committed to ensuring access to educational opportunity for all qualified students with disabilities. Any student who has a documented condition that substantially limits his or her learning activities can request coordination of appropriate academic support services. DSS collaborates with students, faculty, and staff to ensure appropriate services are provided to students registered with our office.

Students must self-identify to be eligible for accommodations and other disability services on campus. However, the student can choose whether or not to register for services. Disability support services are provided in accordance with federal law. To be eligible for services, students must provide documentation of disability from an appropriate practitioner. See our webpage at www.UAH.edu/counseling/disability (<http://www.uah.edu/counseling/disability/>) or contact DSS for more information. To schedule an appointment contact our office at 256.824.1997 or come by Wilson Hall 317.

Office of International Services

The Office of International Services (OIS) prepares students, faculty and staff for success in today's globally interconnected world through international study, research, teaching, service, and experience and through opportunities for intercultural engagement that foster strengthened awareness and understanding among people of different cultures. The purpose of OIS is to promote campus and community internationalization and to provide central administrative support for a wide-ranging network of international initiatives. Through the Office of International Student & Scholar Services, the Intensive Language & Culture Program, and the Office of International Programs, the OIS coordinates programs and services that extend the university to our local and global communities. The OIS is located in the Student Services Building, Room 218; phone 256.824.6055.

Undergraduate Minority Mentoring Program

The Office of Undergraduate Minority Student Mentoring at UAH fosters student success through personal mentoring and leadership development for underrepresented students which will increase opportunities for student engagement across the campus community. The peer mentoring relationship is designed to foster a network of support for first year students of African-American and Hispanic descent at UAH. Mentors serve as peer support personnel for these freshmen (Mentees) and share program goals and responsibilities aimed at ensuring the retention of these particular student groups. This office is located in Charger Union 201; phone 256.824.2775.

Multicultural Affairs

The Office of Multicultural Affairs (OMA), a division of the Office of the President and Vice President for Diversity, assists the University in providing an atmosphere that is welcoming, supportive and rewarding for students from diverse cultural backgrounds. Students are encouraged to achieve and aided in attaining academic excellence while learning to be competitive with their peers. OMA endeavors to foster an understanding and a respect for cultural diversity throughout the UAH community. Programs are designed for minority as well as non-minority students in order to promote a sense of community and acceptance of multiculturalism and racial appreciation on the UAH campus. Students may contact the Office of Multicultural Affairs in Conference Training Center, Room 104, or telephone 256.824.6822 (oma@uah.edu).

Student Health Services

The services of the Student Health Center are available to students enrolled for the current semester. Services available include treatment of illnesses and injuries, preventive health care, lab testing, immunizations and health counseling. There is a nominal fee for an office visit with additional minimum charges for laboratory testing, immunizations, and medications. The Student Health Center is located in Wilson Hall 325. The center is open Monday through Friday 8:15 a.m. – 5:00 p.m. For more information call 256.824.6775 or visit our website <http://uah.edu/shc> (<http://www.uah.edu/shc/>).

Tuberculosis Screening and Immunization Requirements

Immunization Requirements

The University of Alabama in Huntsville requires all students born after 1956 to have had 2 doses of measles (rubeola) vaccine. One dose must have been a Measles, Mumps, Rubella (MMR) vaccine. Students ages 30 and older may submit evidence of one dose of MMR if the dose was received after 1980. A copy of a lab report showing proof of immunity to measles (rubeola), mumps, and rubella may be submitted in lieu of the vaccine.

A meningitis vaccination within the past 5 years is required for all first time freshman and all students living in on-campus residence halls.

Tuberculosis Screening

Domestic students are required to complete a Tuberculosis Screening form. Tuberculosis testing may be required for domestic students based upon the information provided on the screening form.

International students are required to have a Tuberculosis test. The test must be administered in the United States within 12 months of the student's most recent arrival to campus. TB screening tests are administered upon your arrival to campus at the Student Health Center.

Documentation Requirements

All new students admitted to The University of Alabama in Huntsville must provide a completed Tuberculosis Screening and Immunization Requirements form which is signed by a physician or authorized individual. The physician's license number or clinic stamp must also be recorded on the form for verification purposes. The form and instructions for completion can be found at the Student Health Center website at www.uah.edu/shc (<http://www.uah.edu/shc/>). Forms, along with any necessary attachments, should be submitted to:

The University of Alabama in Huntsville
Student Health Center
Wilson Hall 325
301 Sparkman Drive
Huntsville, AL 35899
256.824.6775
256.824.6722 (Fax)
shc@uah.edu

Please note: The requirements noted above are for new students being admitted to The University of Alabama in Huntsville. Individual colleges, e.g. College of Nursing, may have additional immunization requirements.

Veterans Affairs

The Office of Veteran Student Services works to develop and implement a variety of programs to provide student support services focused on the special needs of today's military veterans, service members, dependents, and survivors. The office, located on the second floor of the Charger Union in the Dean of Students suite (Room 223), offers a comprehensive educational benefits counseling program to help students maximize VA educational benefits. A variety of programs are offered to facilitate the transition to school and to help support our students by advocating for the needs of our veterans, service members, dependents, and survivors. The office offers Veteran Work Study positions for eligible students.

For questions about tuition and fees for Veterans, please consult the UAH Tuition Fee Guidelines (<http://catalog.uah.edu/undergrad/admissions/residency/>) page.

For students receiving VA education benefits, any complaint against the university should be routed through the VA GI Bill Feedback System by going to the following link: <http://www.benefits.va.gov/GIBILL/Feedback.asp>. The VA will then follow up through the appropriate channels to investigate the complaint and resolve it satisfactorily.

Graduate

The Graduate catalog provides basic information about the more than 80+ masters, doctoral and certificate programs available at The University of Alabama in Huntsville. In addition to course offerings, it provides valuable information such as suggested and required degree plans and information about tuition, financial aid, and support services.

While we encourage you to follow the pathways outlined in this catalog, it is also recommended that you consult with your academic advisor to ensure that you are taking advantage of courses and university resources that will help you reach your educational and career goals by graduating on time. Please contact your department to learn who can assist you with your academic advising.

As a supplement to the Graduate Catalog, the Graduate School Handbook (<https://www.uah.edu/graduate/resources/graduate-handbook/>) contains most of the policies and procedures of the Graduate School. Students should become familiar with the material pertaining to their degree programs and, together with their faculty advisors, make certain that the chosen program of study complies with all policies.

For questions regarding the content of this catalog please contact the Graduate School at 256.824.6002, DeanGrad@uah.edu, or our office in the Student Services Building, Room 222.

Academic Information

The Graduate School at The University of Alabama in Huntsville provides the following academic information in the graduate catalog to bring awareness regarding our academic programs that pertain to our academic degrees or support the growth of our students during their degree.

- Collaborative Programs (p. 829)
- Cooperative Education and Career Development Program (p. 830)
- Intensive Language and Culture (p. 830)
- Joint Undergraduate Master's Program (JUMP) (p. 832)
- Online Learning (p. 832)
- Study Abroad (p. 833)

Collaborative Programs

Between Auburn University and the University of Alabama System (UA, UAB, UAH)

In some designated programs, a student enrolled in either Auburn University or any campus of the University of Alabama System may register as a transient student at the other institution with the approval of both graduate deans, or their representatives, and the department or school in which the student wishes to take the courses. The amount of coursework that may be taken by a student under such an arrangement will be determined by the supervisory committee, with appropriate approvals at the other university. A student earning a master's degree at either institution must complete a majority of the required coursework at the institution granting the degree. For a course to be applicable for credit beyond the hours presently transferable toward a master's degree or beyond the master's, the course must be approved in advance by the student's major department and the graduate dean. The deans of the graduate schools will serve as liaison officers in arranging programs for which the additional hours may be transferred.

Between UAH and Alabama A&M University

A visiting student policy has been established between Alabama A&M University and UAH. Under this arrangement, a graduate student at one institution may request permission to attend a course at the other. Conditions governing the granting of permission include the following:

1. The student is in good graduate standing.
2. The course desired is unavailable to the student at the home institution.
3. A visiting student is limited to one graduate course a semester at the host institution except where the second course is a laboratory required to accompany the first course.
4. A visiting student must have prerequisites for the course.
5. The number of courses taken under this plan cannot exceed those allowed in the policy on transferred credit.
6. The student's request requires the approval of the advisor, department chair, and graduate dean.
7. Permission of the host institution is dependent upon the availability of space for the visitor after its own students are accommodated.

Interested students should contact the Office of the Registrar for appropriate forms.

Between UAH and The University of Alabama at Birmingham (UAB)

A collaborative program in engineering exists between UAH and UAB for the pursuit of doctoral degrees. A student at UAB may earn the doctoral degree at UAH with a major in electrical engineering, or mechanical engineering; while a UAH student may pursue the master's or the doctoral degree with a major in biomedical engineering at UAB. An interested student must first be admitted at the principal institution, i.e. the one offering the degree, but may take courses and satisfy the residency requirements at either campus. All degree requirements must be satisfied at the principal institution. More details are available through the participating departments.

Cooperative Education and Career Development Program

Student Services Building, Room 205
256.824.6741
chargerjobs@uah.edu
www.uah.edu/career-services/ (<http://www.uah.edu/career-services/>)

Career Center

Career Services

Career Services assists students in all phases of career planning and preparation including resume writing and critique, interview preparation, developing networking skills, career assessments and career coaching through one-on-one appointments as well as workshops and information sessions. Our services provide students with the knowledge and resources to make informed career choices and personal skills to reach their objectives.

Career Services coordinates on and off-campus recruiting opportunities and hosts two comprehensive career fairs each fall and spring semester for students in all majors. Career Fair allows our students the opportunity to speak with multiple employers in one location about cooperative education (co-op), internships and degreed positions. Attendees are required to dress professionally and bring copies of their resumes for distribution.

Cooperative Education and Internships

Cooperative Education and Internships provide a unique, structured educational experience that allows students to gain practical, professional work experience while completing degree requirements. Through the integration of classroom theory and professional practices, students increase their understanding of the world of work.

The Cooperative Education program offers alternating and parallel options. Students working on an alternating schedule rotate semesters of full-time study with semesters of full-time work in their majors. Some students may complete continuous parallel (part-time work) assignments concurrently with a reduced class load. Cooperative Education work experiences are progressive in responsibilities, monitored by the University, and directly related to the students' academic and career goals. Students participating in Cooperative Education are required to register their Cooperative Education through the Career Center.

Internships are one semester degree-related employment opportunities where students work one-on-one with professionals to gain practical experience in their field. Several academic programs on campus offer credit for internships; students should check with their academic advisor to learn about any credit-bearing internship opportunities within their program of study.

Charger Path

Charger Path is UAH's exclusive comprehensive career management system and all newly enrolled students receive an account during their first week of classes. In this system, students update their profiles, upload their resumes and apply for positions including co-ops, internships, and professional degree opportunities. Through Charger Path, students receive career announcements, view upcoming workshops and information sessions, have access to on-campus recruiting schedules and make appointments with the Career Center.

Intensive Language and Culture

Mission

The Intensive Language and Culture Program (ILC) is an academically-oriented language and culture program that prepares students for engagement in the classroom, on the campus, and across the community. In the ILC, nonnative speakers of English can develop language skills for study in an English-medium university such as UAH. With a rigorous curriculum and strict attendance requirements, the program supports students as they progress in their acquisition of academic/professional English.

Overview

The ILC includes 18-20 hours of classroom instruction per week. Students develop their skills in both oral and written academic English. Instruction adheres to principles of communicative language teaching.

Students are instructed in the four component skills of listening, speaking, reading, and writing. Additional work in pragmatics, grammar and pronunciation supports progress in both accuracy and fluency, with special attention paid to interaction in a U.S. university context.

The Intensive Language and Culture Program (ILC) serves the needs of non-native speakers of English at UAH. Students in Levels 010-040 (High Beginning - High Intermediate) prepare for study at English-medium universities, such as UAH. Students in Level 050 (Advanced) polish their language skills and transition into undergraduate, graduate, or non-degree programs at UAH.

Additional Information

ILC Program information is also available on the program website (<http://www.uah.edu/ilcp/>). If you are interested in applying to the ILC or receiving additional information, please email the director of the ILC at ilc@uah.edu.

Business Administration Building, Room 126
256.824.2370
ilc@uah.edu
<http://www.uah.edu/ilcp/> (<http://www.uah.edu/ilcp/>)

To be considered for admission to the ILC program, you must complete the following four steps:

1. Submit your TOEFL or IELTS scores

You must achieve the following minimum score to be considered for admission:

- TOEFL (iBT): Overall of at least 50 with no sub-score below 12

OR

- IELTS: Overall of at least 4.0 with no sub-score below 3.5

If you do not have a TOEFL or an IELTS score, you may request a pre-assessment to be considered for admission to the ILC. You will then be formally assessed upon arrival at UAH and, if admitted, placed in the appropriate classes in the ILC program.

2. Submit your transcripts

Whether applying for the ILC or a degree program, nonnative speakers of English must submit certified, translated copies of their high school and/or college transcripts.

3. Submit any supporting financial documentation (if applicable)

International students who are on student visas (F1 status) must also complete and submit the UAH Affidavit of Financial Support (https://www.uah.edu/images/colleges/graduate-studies/forms/ilc_affidavit_of_financial_support_2019-2020.pdf).

4. Submit a completed application

To apply online, follow these steps:

- Go to UAH's **Charger Status** page and create an account
- Once your account is created, complete your application
 - Select the Intensive English Program Application

ILC 010 - INT LANG & CULT I
Semester Hours: 4-20

Course designed to improve nonnative speaker's ability in their overall language proficiency at the high beginning level.

ILC 020 - INT LANG & CULT II
Semester Hours: 4-20

Course designed to improve nonnative speaker's ability in their overall language proficiency at the low intermediate level.

ILC 030 - INT LANG & CULT III
Semester Hours: 4-20

Course designed to improve nonnative speaker's ability in their overall language proficiency at the intermediate level.

ILC 040 - INT LANG & CULT IV
Semester Hours: 4-20

Course designed to improve nonnative speaker's ability in their overall language proficiency at the high intermediate level.

ILC 050 - INT LANG & CULT V
Semester Hours: 4-20

Course designed to improve nonnative speaker's ability in their overall language proficiency at the advanced level.

ILC 090 - ILC: SPECIAL TOPICS
Semester Hours: 1-3

JUMP

UAH's Joint Undergraduate Master's Program (JUMP) allows undergraduate students to study at the graduate level. By taking graduate courses in your senior year, you could reduce the time taken to get a graduate (M.S. or M.A.) degree.

Benefits for you:

1. No entrance exam!
2. Double count undergrad classes for grad degree!
3. Pay undergrad tuition for grad classes taken as a JUMP student!
4. No application fee!

How to JUMP!

- Apply any time before your last semester.
- Meet with your college JUMP advisor and submit application.

Official Rules for JUMP!

- For admission to JUMP, student must meet overall GPA requirements¹ of the college. GPA includes all transfer coursework.
- Only courses taken at UAH and listed on JUMP application are eligible.
- Student must receive a B minimum in each JUMP course for it to count towards graduate degree.
- Student must maintain minimum overall GPA throughout JUMP program until graduation.
- All coursework must be completed within six years of taking first JUMP class.
- Students are considered undergraduate students until all requirements for undergraduate degree are met.
- Students cannot hold a GTA, GRA, or graduate scholarship or fellowship until undergraduate degree is completed.
- If a change is made to initial JUMP application both a JUMP change form and a change to student's undergraduate Program of Study (POS) must be submitted for approval.
- If student's GPA upon graduation is less than the required minimum, the student does not receive admission to the graduate degree program automatically. Student must apply to the graduate school with admission test score and graduate application. Courses will be counted as if the student had been a non-degree seeking graduate student.
- Students must begin their graduate program within one year of their undergraduate graduation.
- Students must n (deangrad@uah.edu?subject=JUMP!%20Notification)otify the Graduate School (deangrad@uah.edu?subject=JUMP!%20Notification) when submitting an application for undergraduate graduation.

More information available at <http://uah.edu/jump> (<http://uah.edu/jump/>)

¹ Minimum GPA requirements by college or program

Online Learning

The University of Alabama in Huntsville offers a number of academically challenging online and hybrid-online programs. Please review a listing of available programs here: <http://www.uah.edu/online-learning> (<http://www.uah.edu/online-learning/>)

State Authorization

The state of Alabama is a member of the SARA compact. The State Authorization Reciprocity Agreement is an agreement among member states, districts and territories that establishes comparable national standards for interstate offering of postsecondary online education courses and programs. It is intended to make it easier for students to take online courses offered by postsecondary institutions based in another state. For more information, including a current list of states in the SARA compact, please visit <http://www.nc-sara.org/>. The University of Alabama in Huntsville is an approved SARA institution.

For further information regarding SARA requirements on the UAH campus please see <http://www.uah.edu/academic-affairs/offices/oira/state-authorizations> (<http://www.uah.edu/academic-affairs/offices/oira/state-authorizations/>)

Topics include: Timeline for approval, International Residents, Territories and Provinces, Military Bases, Additional Resources, Professional Licensure, & Grievance Procedures

Study Abroad

The Office of Study Abroad within the Office of International Services serves as the coordinating office for study abroad opportunities at UAH.

Faculty-Led Courses

Each year, UAH offers a number of faculty-led study abroad courses typically ranging from two to four weeks in length and conferring three to six academic credit hours in the course(s) offered.

Summer, Semester and Academic-Year Programs

UAH works with international partners and education abroad organizations to offer students summer, semester, or academic-year study abroad programs at sites in Africa, Asia, Australia, and Europe. You can participate in these programs and earn academic credit toward your degree at UAH. Programs are with affiliate partners or exchange agreement partners.

Internship, Research, and Service Abroad Opportunities

Students may consult with the Office of Study Abroad about interning, researching, and completing service projects abroad. Please note that many of these opportunities have specific application procedures and may be competitive in the selection process.

To learn more about specific countries and programs, please visit our Study Abroad programs page (<https://www.uah.edu/study-abroad/programs/>) for more information or by emailing studyabroad@uah.edu.

The Office of Study Abroad is located in the Student Services Building, Room 218M.

Admissions

Graduate Admissions

The University of Alabama in Huntsville welcomes inquiries and applications from interested persons who wish to further their education. Faculty members and academic advisors for the various graduate programs are available to confer with interested individuals to discuss their enrollment plans and opportunities at UAH. Students are encouraged to reach out directly to those departments by telephone or email. To find your program contact information, please visit the college department webpage of your interest. General admissions application questions can be emailed to GradSchool@uah.edu. Further admission information is available on our graduate admissions page (<https://www.uah.edu/admissions/graduate/>).

Prospective students should apply well in advance of the application deadline to ensure adequate time to receive all required documents and for a departmental decision. The application, deadline information, and information on how to apply can be found on the graduate application website (<https://www.uah.edu/admissions/graduate/apply-for-admission/>).

The graduate student body is composed of traditional, full-time college students and non-traditional students who are pursuing their graduate degree while balancing their educational pursuits with work, family, and various activities.

Application Procedure

Applying

An applicant for a master's, doctoral or certificate program must submit a completed graduate application form and a nonrefundable application fee which can be completed on our graduate application webpage (<https://www.uah.edu/admissions/graduate/apply-for-admission/>).

New applicants to The University of Alabama in Huntsville will be directed to complete The Common Application, a third party application portal that will assist UAH in collecting your required documents.

Please note you will be directed to one of the following applications:

Engineering students will use 'EngineeringCAS';

Business students will use 'BusinessCAS';

Science, Nursing, Education and Arts, Humanities and Social Sciences will use 'GradCAS';

Alumni will be directed to use 'Banner' to complete their graduate application.

Within The Common Application, you will be requested to provide transcripts, test scores, and a resume. Depending on the program you select, you may also be requested to provide additional documents, such as recommendation letters, a personal statement, and/or proof of a professional license. Each document that is requested will be noted in the application and will have a corresponding upload feature. Alumni may be requested to provide the same information but will email their domestic or international admissions officer directly when requested to do so.

Please see our Graduate Admissions Requirements (<https://catalog.uah.edu/grad/admissions/graduate-admission-requirements/>) for additional information.

Concurrent Degrees

An applicant for an additional graduate program (including a different degree in the same discipline, e.g. adding a master's program to a Ph.D. program, or adding a certificate) who has been previously admitted to the Graduate School must submit a new application form to the Graduate School for the new program. The student must inform the chairs of both departments/programs that he/she is pursuing two degree programs concurrently. Current students can contact their admissions officer for a paper application to add the additional program and to avoid paying a second application fee.

Students who fail to enroll in classes within one year of their date of admission must submit a new application.

Conditional Admission

The Graduate School may conditionally admit applicants who do not satisfy all of the requirements for unconditional admission, but who do show reasonable potential for doing graduate work. Conditional admission requires the approval of both the Graduate Dean and the chair of the department in which the applicant plans to pursue an advanced degree.

If a conditionally admitted student has an overall grade average of B (3.0) or better for all graduate work attempted up to and including the semester in which the student completes 12 semester hours of graduate work at UAH, then the student assumes the status of an unconditionally admitted student. Otherwise, the student is dismissed from the Graduate School. Under exceptional cases, a student may be readmitted upon a justified recommendation of the faculty in the student's major department and approval of the Graduate Dean.

Graduate Admission Requirements

For admission to the Graduate School, applicants must hold a bachelor's degree, or equivalent, from an approved institution. The following minimum requirements are acceptable to the graduate school; individual colleges and/or departments may require higher grade point averages and test scores or additional or more specific requirements. See college/departmental sections for specific admissions information.

Unconditional Admission

To qualify for unconditional admission, applicants must satisfy the following minimum criteria:*

1. Have a minimum grade-point average of B (3.0) on the undergraduate record, and
2. Have a minimum total score of 300 on the Graduate Record Examination (GRE) and a minimum score of 3.0 on the analytical writing portion. For the English, Nursing, and Public Affairs programs, applicants must have a minimum total score of 410 on the MAT. For business, applicants must have a minimum total score of 500 on the GMAT.

*Individual programs may have higher GPA and score requirements for unconditional admission.

Test Score Waiver

A request for a waiver in lieu of GRE/GMAT/MAT test scores may be granted upon the recommendation of the department or program chair if at least one of the following conditions holds and other departmental requirements are met:*

1. the applicant is the holder of a graduate degree from an accredited institution;
2. the applicant presents evidence of having taken the GRE/MAT over five years ago and hence cannot obtain official scores;
3. the applicant graduated from an accredited college or university five or more years ago and has not subsequently been enrolled since that time, and has a record of consistent professional and/or academic achievement as documented on a submitted resume;
4. FE exam may be accepted for some engineering degrees. If available, a candidate must show proof of passing the exam.

*Not all departments participate in test score waivers even if the above is met.

International applicants should also visit the International Student catalog page (<https://catalog.uah.edu/grad/admissions/additional-admission-requirements-international-students/>) to review additional requirements.

In response to COVID-19, admission test scores for the GRE, GMAT, and MAT have been waived for Summer 2020, Fall 2020, and Spring 2021 if the applicant meets the alternate requirements. Please visit our graduate admission page to review the alternate requirements available (<https://www.uah.edu/admissions/graduate/apply-for-admission/#CovidInfo>).

Graduate Assistantships

Graduate assistantships are offered to encourage graduate work, to promote teaching, and to promote research. Graduate assistants have a graduate degree as their primary goal, and the assistantships are part of their graduate education. Assistantships are available through various departments of instruction, under the auspices of the Graduate School. Any student qualified for admission to the Graduate School is eligible to apply for a graduate assistantship.

A student eligible for an assistantship may be appointed as a Graduate Teaching Assistant (GTA), Graduate Research Assistant (GRA), or Graduate Administrative Assistant (GAA). Full assistantships usually require 20 hours per week service to the University, but may require more or fewer hours per week in exceptional cases. All full-time graduate assistants must be registered for a minimum of 9 semester hours (6 semester hours in the summer term) during any semester in which an appointment is held. Exceptions require permission of the Graduate Dean. Normally, all courses for which the student is registered shall be graduate credit courses. Exceptions must be approved by the Department Chair and Graduate Dean.

All assistantship appointments are subject to the continuing availability of funds. Appointments are made by the department only when resources to support them are assured, but students are cautioned that a variety of circumstances could cause positions to be terminated prior to the end of the appointment period. All assistantships are awarded contingent upon satisfactory progress toward a graduate degree. Assistantship support may continue through one additional semester after the semester in which degree requirements are completed.

Benefits

Tuition

A graduate assistant who holds a full assistantship (20 hours per week) appointment will receive tuition and fees for 9 to 12 hours per semester (6 hours in the summer term). Tuition and fees for students who hold less than a full assistantship appointment are prorated accordingly.

Stipend

Assistantship stipends vary in amount by type, program, and student academic progress. Students receive an offer letter indicating the amount of the stipend. Further information may be obtained in the department or in the Graduate School.

Graduate Teaching Assistantships

As the title implies, Graduate Teaching Assistants (GTAs) share the faculty's responsibility for teaching. The purpose of this assistantship is twofold: one is to support the departmental teaching program, and the other is to aid the student's professional development. The teaching assistant may have duties assigned as a classroom instructor, laboratory instructor, tutor, grader or other activities related to the educational mission of the department. Only students in good academic standing are eligible for and may be awarded a teaching assistantship. The GTA's teaching load will necessarily vary from one department to another, and the load should be proportional to the normal full-time teaching load carried by other faculty members in the department.

If a student holding an assistantship withdraws from courses during the semester such that his/her course load is below the minimum required hours, that student can be required to reimburse the University for tuition and health insurance prorated on the remaining course load. Students holding an assistantship that do not continue to make satisfactory progress toward their degree may have their assistantship revoked.

Mandatory GTA training for all new GTAs is available within Canvas prior to the beginning of classes each semester and must be completed within two weeks of the semester start date. Ongoing GTAs need to complete the course only once, but if the student's assistantship lapses, the student will need to complete the modules again.

GTAs must have completed at least 18 semester hours of graduate coursework in their discipline to qualify as the instructor of record in any class.

Graduate Research Assistantships

A Graduate Research Assistant (GRA) performs research under the supervision of a faculty member. At times, a research project to which the research assistant is appointed may eventually lead to a thesis or dissertation topic; however, a research supervisor cannot guarantee that a particular project will provide suitable material for a thesis or dissertation. All assistantship appointments are subject to the continuing availability of funds. Appointments are made only when resources to support them are assured, but a financial emergency in the University could cause positions, including those of graduate assistants, to be terminated prior to the end of the appointment period. Assistantship support normally will not continue past the end of the semester in which the assistant expects to complete degree requirements. Some contracts or grants may specify U.S. citizenship as a prerequisite for appointment.

Graduate Administrative Assistants

A GAA performs administrative duties under the supervision of a faculty/staff member. As a condition of an administrative assistantship appointment, a 20-hour per week graduate assistant must be registered for at least 9 semester hours of graduate credit courses during any semester (Fall or Spring), and for at least 6 hours during the Summer term. Minimum course loads for appointments of lesser work-hours per week are prorated accordingly. A

student with a graduate administrative assistantship may be permitted to enroll in appropriate, relevant, undergraduate courses only with the approval of the supervisor, the department/program chair, and the Graduate Dean. GAA opportunities are limited and not as common as the GTAs or GRAs.

Further Information

If a student holding an assistantship withdraws from courses during the semester such that his/her course load is below the minimum required hours, that student can be required to reimburse the university for tuition prorated on the remaining course load. Students holding an assistantship that will not continue to make satisfactory progress toward their degree may have their assistantship revoked.

International Students

English proficiency is a prerequisite for classroom or laboratory instruction for any non-native English speakers wishing to obtain an assistantship. Please visit the International Student section of the catalog (<https://catalog.uah.edu/grad/admissions/additional-admission-requirements-international-students/>) for more information regarding language requirements.

Graduate Fellowships

Several fellowship award programs exist, which can provide graduate student stipends, tuition allowances, and funds for other purposes (e.g., equipment purchase). Examples of such fellowships are the NASA Graduate Student Research Program (GSRP), National Science Foundation Fellowships, Space Grant Fellowships, and The National GEM Consortium Fellowship Program. Announcements of these fellowships are typically made annually via brochures, departmental announcements, sponsored websites, and email distribution. Interested students are encouraged to be proactive in requesting fellowship information from departmental offices or The Graduate School.

In addition, the Graduate Student Fellowship Scholarship Matrix (<https://www.uah.edu/admissions/graduate/financial-aid/scholarships/>) is awarded to newly admitted first-time, full-time students who have demonstrated superior academic achievement in their undergraduate education. For automatic consideration, applicants must submit an application for admission, official transcripts, and standardized test scores to UAH. Individuals who do not provide test scores will not be considered regardless of program admission requirements or extenuating circumstances by which the applicant receives a test score waiver. Online students are ineligible for consideration.

Endowed fellowships/scholarships for graduate students exist in several departments. Please contact your department to inquire or contact financial aid to ask specifically for graduate-level awards.

International Students

Additional Admission Requirements for International Students

Language Proficiency for Admission

All applicants whose native language is other than English must demonstrate the linguistic proficiency necessary to function in degree programs at UAH.

Unconditional admission to degree programs:*

1. In order to be considered for admission to degree programs with no additional English language training required, applicants must meet the following minimums on the Test of English as a Foreign Language (TOEFL) or International English Language Testing System (IELTS):
TOEFL: all sub-scores greater than or equal to 18 OR
IELTS: all sub-scores greater than or equal to 6.0
2. Students with two or more sub-scores below these minimum qualifications must enroll in the UAH Intensive Language and Culture (ILC) Program before they can enroll in graduate course work.

*College and/or departments may require a higher minimum language score for admission.

Language proficiency is only one factor in admission decisions. To confirm the full admission requirements for specific degree programs, please refer to the application for your particular degree. Students who have earned a bachelor's or higher degree from an accredited U.S. institution will be exempted from the TOEFL or IELTS requirements above. Students with degrees from non-U.S. institutions that have English as their primary language of instruction (e.g. United Kingdom, Canada, Australia, etc.) may petition the Graduate School for an exemption from the English Language Placement Test (ELPT).

Intensive Language and Culture Program

If a student does not meet the above language requirements, he/she may be admitted to our Intensive Language and Culture Program.

Admission to the ILC Program:

1. Applicants who do not currently meet the requirements for admission to a degree program at the university are encouraged to apply for admission to the UAH Intensive Language and Culture (ILC) Program. Successful completion of the UAH ILC Program meets the language proficiency standard for admission to degree programs at the university.

2. To be considered for admission to the UAH ILC Program, applicants must have the following minimums on the TOEFL or IELTS.*

TOEFL: Overall of at least 50 with no sub-score below 12 OR

IELTS: Overall of at least 4.0 with no sub-score below 3.5.

*NOTE: If an applicant does not have a TOEFL or an IELTS score, he/she may request a pre-assessment and be considered for admission to the ILC. He/she will then be formally assessed upon arrival at UAH and will be placed in appropriate classes in the ILC program. For information about English language courses visit <http://www.uah.edu/ilcp> (<http://www.uah.edu/ilcp/>).

Nonnative English-speaking Graduate Teaching Assistants

To be considered for positions as teaching assistants or graduate assistants, students must have the following minimums on the TOEFL or IELTS.

TOEFL: no sub-score below 22 OR

IELTS: no sub-score below 6.5

Submission of Additional Documents

Documents need for your application will be indicated within the application and will vary depending on the program selected. Please submit your documents directly within the application portal. In some cases, unofficial transcripts may be used for pre-admission, but if the student is later approved for admission, official documents must be received before the student is admitted. You will be notified if official transcripts are required and a physical courier address will be given. Once admitted an international student will also need to submit an Affidavit of Financial Support before an I-20 can be issued.

Please review our catalog admissions page (p. 833) for additional information regarding required documents.

Priority admittance will be given to international students who have applied and submitted all required documents by:

Spring: October 1

Summer: February 1

Fall: June 1

In response to COVID-19, admission language test scores have been updated for Summer 2020, Fall 2020, and Spring 2021. Please visit our international admissions page to review the alternate requirements available (<https://www.uah.edu/admissions/graduate/apply-for-admission/international-students/>).

Non-Degree Admission

Students who are interested in earning graduate credit but who are not applicants for a graduate degree program at UAH may be admitted as non-degree graduate students. Admission in this category requires proof of a bachelor's degree from an accredited institution and department and/or college approval.

- **This category is not available to students with non-immigrant visa status.**
- **Non-degree students are not eligible for federal financial aid.**

All courses taken while in non-degree status require the approval of the instructor. Students must maintain the same grade point average requirements expected of conditionally admitted graduate students. Graduate courses numbered 500 and above may be taken while in this category provided that all prerequisites have been met.

Individuals admitted as graduate non-degree students may decide to make formal application to a graduate degree or certificate program. If admitted, credit earned as a non-degree graduate student may be applied toward a graduate degree or certificate program subject to the following conditions and limitations:

- All grades earned in 500-level courses or above during non-degree status and applied to a graduate degree or certificate program must have been B or higher;
- No more than twelve (12) graduate semester hours for courses taken as a non-degree student may be applied to a degree program.
- Courses used to satisfy degree or certificate requirements are subject to approval by the major department and grades for those courses become part of the student's graduate program GPA.

To apply to as a non-degree student, please visit our Non-Degree Application page. (<https://www.uah.edu/admissions/graduate/apply-for-admission/non-degree-students/>)

Provisional Admission

A student (other than an individual with non-immigrant visa status) whose application to the Graduate School is not complete or is pending approval, may, with a departmental recommendation, be admitted to UAH on a provisional basis. Students admitted in this category may register for graduate-

level courses for one semester with approval from the department(s), provided that all prerequisites for those courses have been met. Students may be admitted provisionally for one semester only unless specified otherwise by the Graduate Dean. Within that period they must complete their application materials in time to be considered for regular admission prior to the start of the next semester, usually by the 10th week of the semester. Students who do not complete the application process within the allowed period, or are subsequently not admitted to the graduate program, will not be allowed to take additional graduate classes as a degree-seeking student.

Once a student gains regular admission to the Graduate School, all policies regarding conditional or unconditional admission become effective in the provisionally admitted semester. Graduate credit for courses at the 500-level or above taken as a provisional student may, with the approval of the degree department, be applied toward a graduate degree program only if the grades earned in such courses were B or higher.

- **Students admitted provisionally are not eligible for federal financial aid.**
- **This category is not available to students with non-immigrant visa status.**

Seniors Taking Graduate Courses

UAH seniors may take up to 9 semester hours of courses (500 or 600 level) for graduate credit while completing requirements for the baccalaureate if they meet the following qualifications:

1. An approved degree application is on file;
2. Overall GPA, or GPA for the last 40 semester hours, is at least 3.5;
3. Fewer than 13 semester hours remaining for degree completion;
4. A total course load of no more than 12 semester hours a semester;
5. Permission of the instructor.

Students initiate the request process by filling out the Request for Approval of Graduate Credit by UAH Senior, (Form 16), which is available on the Graduate School website or in the Graduate School and which requires the approval of the department chair and graduate dean. Graduate tuition and fee rates apply to courses taken in this category. A student may not use courses taken for graduate credit as part of the baccalaureate degree under this option. Please note, this is not the same as the Joint Undergraduate Master's Program (JUMP).

JUMP

Seniors may wish to enroll in JUMP, which allows undergraduate students to double count their undergraduate courses for their graduate (MS) degree. For more information, please visit: <http://www.uah.edu/jump> (<http://www.uah.edu/jump/>)

Tuition Scholarships

A limited number of tuition scholarships may be awarded to students without assistantship appointments who have unconditional admission status and are in good academic standing. Such scholarships may be awarded for up to 9 graduate semester hours per semester (6 semester hours in the summer term). Students receiving tuition scholarships are bound by the same rules as graduate assistants with respect to course withdrawal, contingency of the award on satisfactory performance toward the graduate degree, general eligibility, and special department requirements.

The departmental faculty select the proposed awardees from qualified applicants. An appointment letter, similar to a graduate assistantship letter but without assigned duties, is prepared by the department chair and sent through the college dean to the graduate dean for approval at least one month prior to the start of the semester in which the scholarship is proposed.

Additional scholarships may be available. Please visit our financial aid website to learn more: <http://www.uah.edu/admissions/graduate/financial-aid> (<http://www.uah.edu/admissions/graduate/financial-aid/>)

Colleges and Departments

- College of Arts, Humanities, and Social Sciences (p. 841)
 - English (p. 843)
 - English, MA - Alternative Fifth Year Program for Class A Certification in English (p. 844)
 - English, MA - Capstone Option (p. 845)
 - English, MA - Thesis Option (p. 846)
 - English, MA with Technical Communication Certificate (p. 846)
 - English, MA with TESOL Certificate (p. 847)
 - Technical Communication Certificate (p. 847)
 - TESOL Certificate (p. 848)
 - User Experience Certificate (p. 849)
 - History, MA (p. 849)

- Comparative Cultures and Conflicts Certificate (p. 850)
- Political Science - Public Affairs and Policy, MA (p. 851)
- Professional Communication, MA (p. 852)
- Psychology, MA (p. 854)
- Psychology, MA - Industrial/Organizational Psychology Specialization (p. 855)
- College of Business (p. 856)
 - Accountancy, MAcc (p. 858)
 - Graduate Certificate - Cybersecurity Studies (<http://catalog.uah.edu/grad/colleges-departments/business/graduate-certificate-cybersecurity-studies/>)
 - Graduate Certificate, Business Analytics (<http://catalog.uah.edu/grad/colleges-departments/business/graduate-certificate-business-analytics/>)
 - Graduate Certificate, Enterprise Resource Planning (<http://catalog.uah.edu/grad/colleges-departments/business/graduate-certificate-enterprise-resource-planning/>)
 - Graduate Certificate, Federal Contracting and Procurement Management (<http://catalog.uah.edu/grad/colleges-departments/business/graduate-certificate-federal-contracting-procurement-management/>)
 - Graduate Certificate, Human Resource Management (<http://catalog.uah.edu/grad/colleges-departments/business/graduate-certificate-hrm/>)
 - Graduate Certificate, Supply Chain Management (<http://catalog.uah.edu/grad/colleges-departments/business/graduate-certificate-supply-chain-management/>)
 - Graduate Certificate, Technology and Innovation Management (<http://catalog.uah.edu/grad/colleges-departments/business/graduate-certificate-technology-innovation-management/>)
 - Information Systems, MS-IS (p. 861)
 - Management - Human Resource Management, MS (p. 865)
 - Management Science - Business Analytics, MS (p. 866)
 - Master of Business Administration, MBA (p. 860)
 - Supply Chain and Logistics Management, MS (p. 864)
- College of Education (p. 867)
 - Autism Spectrum Disorders (Collaborative K-6 or 6-12) (<http://catalog.uah.edu/grad/colleges-departments/education/autism/>)
 - Autism Spectrum Disorders Certificate (<http://catalog.uah.edu/grad/colleges-departments/education/autism-certificate/>)
 - Elementary Education - Differentiated Instruction (Elementary K-6) (<http://catalog.uah.edu/grad/colleges-departments/education/elementary-education/>)
 - English Speakers of Other Languages (P-12) (<http://catalog.uah.edu/grad/colleges-departments/education/english-other/>)
 - Master of Arts in Teaching - Elementary Education (<http://catalog.uah.edu/grad/colleges-departments/education/mat-elementary/>)
 - Master of Science in Applied Behavior Analysis (<http://catalog.uah.edu/grad/colleges-departments/education/aba/>)
 - Reading Specialist (P-12) (<http://catalog.uah.edu/grad/colleges-departments/education/reading/>)
 - Secondary Education - Differentiated Instruction (6-12) (<http://catalog.uah.edu/grad/colleges-departments/education/secondary/>)
 - Teaching, MA - Biology (<http://catalog.uah.edu/grad/colleges-departments/education/biology/>)
 - Teaching, MA - Chemistry (<http://catalog.uah.edu/grad/colleges-departments/education/chemistry/>)
 - Teaching, MA - English Language Arts (<http://catalog.uah.edu/grad/colleges-departments/education/english-language-arts/>)
 - Teaching, MA - English Speakers of Other Languages (<http://catalog.uah.edu/grad/colleges-departments/education/esol/>)
 - Teaching, MA - History (<http://catalog.uah.edu/grad/colleges-departments/education/history/>)
 - Teaching, MA - Mathematics (<http://catalog.uah.edu/grad/colleges-departments/education/mathematics/>)
 - Teaching, MA - Music Education - Choral (P-12) (<http://catalog.uah.edu/grad/colleges-departments/education/mat-music-education-choral/>)
 - Teaching, MA - Music Education - Instrumental (P-12) (<http://catalog.uah.edu/grad/colleges-departments/education/mat-music-education-instrumental/>)
 - Teaching, MA - Physical Education (P-12) (<http://catalog.uah.edu/grad/colleges-departments/education/mat-physical-education/>)
 - Teaching, MA - Physics (<http://catalog.uah.edu/grad/colleges-departments/education/physics/>)
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College of Arts, Humanities, and Social Sciences

Morton Hall 116

Telephone: 256.824.6200

Email: dean-ahs@uah.edu

Degree

Master of Arts

Dean: Dr. Sean Lane, Ph.D.

Mission

The College of Arts, Humanities, and Social Sciences is committed to excellence in teaching, research, and service in the following disciplines:

- fine arts,
- humanities,
- the social and behavioral sciences, and
- teacher education.

For its own majors, as for those in the professional schools, the College strives to provide superior liberal arts education characterized by close interaction between teachers and learners. Its goals are to impart to each student

- a spirit of intellectual curiosity,
- critical thinking skills,
- abilities in writing and oral communication,
- aesthetic awareness and creativity,
- familiarity with human history and behavior,
- a knowledge of languages and cultures, and
- an understanding of the bases of ethical behavior and the duties of citizenship.

Believing in the centrality of liberal learning to the mission of a university, the College is committed to maintaining a diverse community of teacher-scholars of the highest quality and to providing an environment that encourages personal and professional growth. It considers teaching and research mutually enriching activities and strives to make its knowledge and expertise available to professional programs on campus and to the educational needs of society. Through its graduates and programs, the College contributes to the cultural, intellectual, and economic growth of the state and nation.

Accreditation

UAH is accredited by the *Southern Association of Colleges and Schools Commission on Colleges (SACSCOC)* to award bachelor's, master's, and doctoral degrees. Contact the Commission on Colleges at 1866 Southern Lane, Decatur, Georgia 30033-4097 or call 404.679.4500 for questions about the accreditation of UAH. The College of Arts, Humanities, and Social Sciences thus offers baccalaureate and master's programs under the auspices of that accrediting body. In addition, The University of Alabama in Huntsville is an accredited institutional member of the National Association of Schools of Art and Design and the National Association of Schools of Music. Teacher education programs are approved by the Alabama State Board of Education, according to standards of the National Association of the State Directors of Teacher Education and Certification (NASDTEC), for the issuance of appropriate professional certificates for service in public schools, and the Department of Education at The University of Alabama in Huntsville is accredited by the National Council for Accreditation of Teacher Education (NCATE).

Facilities

The College of Arts, Humanities, and Social Sciences utilizes the facilities and resources of the entire university. However, the College is housed primarily in two buildings, namely Morton Hall and Roberts Hall. Critical to study of the liberal arts is the Salmon Library, located in close proximity to both Morton and Roberts Halls. Supporting facilities include the instructional computer laboratories on the second floor of Salmon Library, art galleries in several buildings, and Union Grove Gallery and Meeting Hall, an historic church moved to campus in 1974 and currently used as an art gallery and a meeting place for students and faculty.

The Humanities Center

The Humanities Center was established in 1991 with the aid of an award from the National Endowment for the Humanities (NEH). The NEH award was a challenge grant that was subsequently matched by funds from other sources, including public, corporate, and private giving, to create the three endowments that support the Center's activities in five areas:

1. hiring of eminent and visiting scholars,
2. library enhancement grants,
3. public programming grants,
4. faculty travel, and
5. faculty research.

The Humanities Center is located on the first floor of Morton Hall.

Degrees and Programs

Graduate study in the College of Arts, Humanities, and Social Sciences brings together faculty and advanced students to share the excitement of creative learning. All degree candidates plan a Program of Study with faculty members who share the student's intellectual interests. Students design, in consultation with a faculty advisor, a graduate program fitted to their particular interests and needs.

The College of Arts, Humanities, and Social Sciences offers programs of study leading to the Master of Arts degree in

- English,
- History,
- Professional Communication,
- Psychology, and
- Public Affairs.

Class A teacher certification is available with degree programs in English and History, as well as the disciplines of Biology, Chemistry, Mathematics and Physics (offered within the College of Science).

Teacher certification may be achieved through either traditional (including the Strengthened Subject Matter Option or the Technology Option) or non-traditional 'fifth year' approaches. Those students who have earned graduate degrees in appropriate disciplines may be eligible for certification only programs.

Discipline Graduate Programs

Discipline	Degree	Focus
English	M.A.	Literature, Teacher Preparation, Teaching English to Speakers of Other Languages, Technical Communication
History	M.A.	American History, European History, Teacher Preparation
Professional Communication	M.A.	Preparation to work in communication intensive fields; Basic understanding of communication processes
Public Affairs	M.A.	Public Policy, Public Administration
Psychology	M.A.	Experimental; A specialization in Industrial/Organizational Psychology is available

Teacher Preparation Graduate Programs

Discipline	Degree	Focus	Teacher Certification	Traditional	Strengthened Subject Matter Option	Traditional w/ Technology	Nontraditional Fifth Year	Certification Only ¹
English	M.A.	English Language Arts	6-12	Yes	Yes	Yes	Yes	Yes
History	M.A.		6-12	Yes	Yes	Yes	Yes	Yes
Biology ²	M.S.		6-12	Yes	Yes	Yes	Yes	Yes
Chemistry ²	M.S.		6-12	Yes	Yes	Yes	Yes	Yes
Mathematics ²	M.A.		6-12	Yes	Yes	Yes	Yes	Yes
Physics ²	M.S.		6-12	Yes	Yes	Yes	Yes	Yes

¹ For those who have already earned appropriate graduate degrees, but who seek teacher certification.

² Offered within the College of Science.

Master's Programs in Arts, Humanities, and Social Sciences

- English, MA (p. 843)
- History, MA (p. 849)
- Political Science - Public Affairs, MA (p. 851)
- Professional Communication, MA (p. 852)
- Psychology, MA (p. 854)
- Psychology, MA - Industrial/Organizational Psychology Specialization (p. 855)

Certificates in Arts, Humanities, and Social Sciences

English Graduate Certificates

- Technical Communication Certificate (p. 847)
- TESOL Certificate (p. 848)
- User Experience Certificate (p. 849)

History Graduate Certificates

- Comparative Cultures and Conflicts Certificate (<https://catalog.uah.edu/grad/colleges-departments/arts-humanities-social-sciences/history-ma/comparative-cultures-conflicts/>)

Political Science Graduate Certificates

- International Security Policy (ISP) Certificate (p. 851)

English

Students wishing to pursue graduate work in English have a number of choices. The English MA Program includes both a thesis (<https://catalog.uah.edu/grad/colleges-departments/arts-humanities-social-sciences/english-ma/thesis/>) and a non-thesis (<https://catalog.uah.edu/grad/colleges-departments/arts-humanities-social-sciences/english-ma/capstone/>) option. Additionally, we offer several certificates that prepare graduates to pursue professional opportunities in technical writing (<http://catalog.uah.edu/grad/colleges-departments/arts-humanities-social-sciences/english-ma/tech-writing/>) or user experience (<https://catalog.uah.edu/grad/colleges-departments/arts-humanities-social-sciences/english-ma/ux-cert/>), and teaching (either in English (<https://catalog.uah.edu/grad/colleges-departments/arts-humanities-social-sciences/english-ma/english-ma-alternative-fifth-year-program-class-a-certification-english/>) or English as a Second Language (<http://catalog.uah.edu/grad/colleges-departments/arts-humanities-social-sciences/english-ma/tesol/>)). Students are encouraged to consult with the Director of Graduate Studies (ehgrad@uah.edu) to select the program that best meets their needs.

Specific requirements for each program are available under the Programs tab on this page.

Master of Arts in English:

- English, MA Thesis Option (p. 846)
- English, MA Capstone Project (p. 845)
- English, MA with Technical Communication Certificate (p. 846)

- English, MA Alternative Fifth Year Program for Class A Certification (p. 844)
- English, MA with TESOL Certificate (p. 847)
- JUMP Program (p. 18)

Graduate Certificates:

- Technical Communication Certificate (p. 847)
- TESOL Certificate (p. 848)
- User Experience Certificate (p. 849)

English, MA - Alternative Fifth Year Program for Class A Certification in English

This program is for people who have earned a bachelor's degree, and have now decided that they want to teach English in Alabama's public schools. At the end of this program, you will have both an M.A. in English and a recommendation for a Class A teaching certificate. You will also have sufficient coursework in English to teach Advanced Placement courses or lower-division English courses at the university level. If you have an undergraduate degree in English or Language Arts, you will probably not need to take additional coursework before being admitted to the program. Otherwise, you need to have undergraduate credits in speech, theatre, and/or journalism (at least two out of the three). You can take the relevant coursework during your first semesters as an M.A. student prior to applying for the Education certification. The M.A. program itself consists of 24 credit hours in English, of which 18 hours must be in literature; 24 hours of graduate Education courses; a 1-hour practicum in Education; and a 3- to 6-hour internship. You will need to complete a capstone project for this program, as the course requirements do not leave room for a thesis. We usually advise you to take the English component first, because in the event that you change your mind and decide against becoming certified, the English courses, unlike those in Education, will still lead toward an M. A. degree. The program generally requires 5 semesters to complete prior to the semester-long internship. Expect to work closely with both the Education College and the Director of English Graduate Studies (ehgrad@uah.edu) to be sure you are meeting all state-level requirements for teacher certification, as such requirements are subject to change.

You will also need to meet the additional requirements listed below.

Basic Requirements:

- 24 hours of coursework (or 8 courses). At least one-third of the hours you take toward your degree should be at the 600 level.
- At least 18 hours in your program should be courses in literature.
- You must complete all work toward your degree within 10 years of the first course you take. Courses taken between 6 and 10 years prior to your degree program completion date must be re-validated by departmental exams negotiated with the specific faculty member who has responsibility for that course; any graduate course more than 10 years old may not be used.
- Up to 9 hours of graduate work in English may be transferred from other institutions with the approval of the Director of Graduate Studies. At least 9 hours in English courses numbered 500 or above must be completed here at UAH (exclusive of thesis hours).
- To be a full-time student, you will need to take a course load of 9 hours per semester. While you are permitted to take up to 13 semester hours per term, you should consult with the Director of English Graduate Studies (ehgrad@uah.edu) about doing so.
- You must maintain a 3.0 GPA in all courses taken at the graduate level. If in any semester your cumulative GPA falls below that 3.0 level, you will be placed on probation.

Additional English courses required:

Code	Title	Semester Hours
600 level Literature Elective		3
600 level Literature Elective		3
600 level Literature Elective		3
600 level Literature Elective		3
500 or 600 Literature Elective		3
500 or 600 Literature Elective		3
EH 500 or EH 601	COMPOSITION STUDIES TCHRS ACTION RESCH WRITING STUDIES	3
EHL 505 or EHL 507	SURVEY OF GENERAL LINGUISTICS ADV ENGLISH GRAMMAR STUDIES	3

Required Education courses:

Code	Title	Semester Hours
ED 520	COMPUTER BASED INSTRUCT'L TECH	3
ED 521	SECNDRY ELA INSTR WRIT TO READ	3
ED 530	APPLIED MULTICULTURALISM	3
ED 593	ED EXCEPT CHILD & YOUTH	3
ED 604	CONTRIBUTION PSY TO EDUC	3
ED 607	EDU LEADER AS EVALUATOR	3
ED 608	EXPAND RDG ABIL CONT AREA INST	3
ED 609	CLASSROOM & BEHAVIOR MGMT	3
ED 698	HIGH SCHOOL INTERNSHIP	6
Total Semester Hours		30

In addition to the requirements for any applicant to our programs, the Department of Education has additional requirements. Because such requirements do shift regularly (and are outside UAH's control), students are advised to confirm with the Education Department that they meet the current requirements. However, at this time, students admitted to any of the programs that include teacher certification must have a cumulative G.P.A. of at least 2.5.

English, MA - Capstone Option

Basic Requirements:

- 33 hours of coursework (11 courses). At least one-third of the hours you take toward your degree should be at the 600 level.
- At least 18 hours in your program should be courses in literature.
- You must complete all work toward your degree within 10 years of the first course you take. Courses taken between 6 and 10 years prior to your degree program completion date must be re-validated by departmental exams negotiated with the specific faculty member who has responsibility for that course; any graduate course more than 10 years old may not be used.
- Up to 9 hours of graduate work in English may be transferred from other institutions with the approval of the Director of Graduate Studies. At least 9 hours in English courses numbered 500 or above must be completed here at UAH (exclusive of thesis hours).
- To be a full-time student, you will need to take a course load of 9 hours per semester. While you are permitted to take up to 13 semester hours per term, you should consult with the Director of English Graduate Studies (ehgrad@uah.edu) about doing so.
- You must maintain a 3.0 GPA in all courses taken at the graduate level. If in any semester your cumulative GPA falls below that 3.0 level, you will be placed on probation.

Capstone Requirements:

The Capstone project should be completed in the final semester you anticipate being enrolled in the MA program. The Capstone project typically consists of the expansion of a paper or major project originally completed for one of your MA courses. The project is typically framed toward a professional goal (academic conference presentation or academic journal publication, work application portfolio, creative writing publication, etc.). Graduate students will choose a Capstone director and develop goals for the project and a completion plan. Students should follow department deadlines for the Capstone project:

1. Selection of supervisor: December 1 (for Spring graduation); May 1 (for Fall graduation)
2. Submission of Non-Thesis Capstone Proposal: January 20 (for Spring graduation); August 20 (for Fall graduation). The proposal will be subject to revision at this point, but should be finalized as an acceptable plan NO LATER THAN two weeks after initial submission (to allow time for the work to be completed).
3. Submission of completed Non-Thesis Capstone Project: March 20 (for Spring graduation); October 20 (for Fall graduation)

The Capstone project is culminated with an interview about the project's process by the chair of the Capstone and a second, appointed department faculty member. See the Graduate School information page for final Capstone (non-thesis) project deadlines (<https://www.uah.edu/graduate/resources/dates-deadlines/>). For more information contact the Director of English Graduate Studies (ehgrad@uah.edu). **Please be advised** that since most faculty members are on nine-month contracts and thus not employed by the university during the summer, it is usually not possible to schedule thesis defenses between mid-May and mid-August.

English, MA - Thesis Option

Basic Requirements:

- 24 hours of coursework (or 8 courses). At least one-third of the hours you take toward your degree should be at the 600 level.
- At least 18 hours in your program should be courses in literature.
- You must complete all work toward your degree within 10 years of the first course you take. Courses taken between 6 and 10 years prior to your degree program completion date must be re-validated by departmental exams negotiated with the specific faculty member who has responsibility for that course; any graduate course more than 10 years old may not be used.
- Up to 9 hours of graduate work in English may be transferred from other institutions with the approval of the Director of Graduate Studies. At least 9 hours in English courses numbered 500 or above must be completed here at UAH (exclusive of thesis hours).
- To be a full-time student, you will need to take a course load of 9 hours per semester. While you are permitted to take up to 13 semester hours per term, you should consult with the Director of English Graduate Studies (ehgrad@uah.edu) about doing so.
- You must maintain a 3.0 GPA in all courses taken at the graduate level. If in any semester your cumulative GPA falls below that 3.0 level, you will be placed on probation.

Thesis Requirements:

This program leads to an M.A. in English, and includes the thesis option. You take 24 hours of coursework (8 courses) in English, plus a minimum of six hours of thesis credit (2 courses), once you have selected a thesis advisor and a topic. If you are not finished with the thesis at the end of those 6 hours, you may take additional thesis hours, subject to the rules about time-to-completion of the degree. You must register for thesis hours in the semester you complete and defend the thesis, and in any other semester or term where you anticipate requiring your advisor's assistance. For more on the thesis, contact the Director of English Graduate Studies (ehgrad@uah.edu).

English, MA with Technical Communication Certificate

Technical Communication Certificate Requirements:

This program leads to an M.A. in English with a Graduate Certificate in Technical Communication. In addition to the basic requirements listed below, this program requires coursework in technical writing and editing as well as coursework in a technical or allied field. Those courses will be determined in consultation with the Director of Technical Writing (rw0019@uah.edu). The program requires 12 courses (36 hours) for completion, six of which (18 hours) will be in literature. You will need to complete either a Capstone Project or a Thesis. The other course requirements are as follows:

Code	Title	Semester Hours
EH 501	THRY & PRACTICE TECHNICAL COMM	3
EH 603	EDITING FOR PUBLICATION	3
EH Technical Writing Elective, 600 level		3
EH Technical Writing Elective		3
Allied Field Course		3
Allied Field Course		3
Literature Electives		18
Total Semester Hours		36

Basic Requirements:

- 24 hours of coursework (or 8 courses). At least one-third of the hours you take toward your degree should be at the 600 level.
- At least 18 hours in your program should be courses in literature.
- You must complete all work toward your degree within 10 years of the first course you take. Courses taken between 6 and 10 years prior to your degree program completion date must be re-validated by departmental exams negotiated with the specific faculty member who has responsibility for that course; any graduate course more than 10 years old may not be used.
- Up to 9 hours of graduate work in English may be transferred from other institutions with the approval of the Director of Graduate Studies. At least 9 hours in English courses numbered 500 or above must be completed here at UAH (exclusive of thesis hours).
- To be a full-time student, you will need to take a course load of 9 hours per semester. While you are permitted to take up to 13 semester hours per term, you should consult with the Director of English Graduate Studies (ehgrad@uah.edu) about doing so.

- You must maintain a 3.0 GPA in all courses taken at the graduate level. If in any semester your cumulative GPA falls below that 3.0 level, you will be placed on probation.

English, MA with TESOL Certificate

TESOL Certificate Requirements:

This program leads to an M.A. in English with a certificate in Teaching English as a Second Language (TESOL). In addition to the basic requirements for the M.A. listed below, this program requires additional coursework in TESOL. The program offers tracks that prepare students for one of two opportunities: A) instruction at post-secondary/adult levels, or B) technical communication in corporate/non-profit settings. Either program might prepare a student to pursue doctoral work in applied linguistics or other areas of English Studies. Specific decisions should be reached in consultation with the Director of English Graduate Studies (ehgrad@uah.edu). The program requires 12 courses (36 hours) for completion, 6 of which (18 hours) will be in literature. You will need to complete either a Capstone Project or a Thesis. The other course requirements are as follows:

Code	Title	Semester Hours
EHL 505	SURVEY OF GENERAL LINGUISTICS	3
EHL 507	ADV ENGLISH GRAMMAR STUDIES	3
ED 640	DIFD STRGTY RES & TEACH ELL	3
EHL 610	AP EH LI VI:PRACTICUM TESOL	3
Choose one option below		6
Option A: Instruction		
EH 500	COMPOSITION STUDIES TCHRS	
EH 601	ACTION RESCH WRITING STUDIES	
Option B: Technical Communication		
EH 501	THRY & PRACTICE TECHNICAL COMM	
EH 603	EDITING FOR PUBLICATION	
Literature Electives		18
Total Semester Hours		36

Basic Requirements:

- 24 hours of coursework (or 8 courses). At least one-third of the hours you take toward your degree should be at the 600 level.
- At least 18 hours in your program should be courses in literature.
- You must complete all work toward your degree within 10 years of the first course you take. Courses taken between 6 and 10 years prior to your degree program completion date must be re-validated by departmental exams negotiated with the specific faculty member who has responsibility for that course; any graduate course more than 10 years old may not be used.
- Up to 9 hours of graduate work in English may be transferred from other institutions with the approval of the Director of Graduate Studies. At least 9 hours in English courses numbered 500 or above must be completed here at UAH (exclusive of thesis hours).
- To be a full-time student, you will need to take a course load of 9 hours per semester. While you are permitted to take up to 13 semester hours per term, you should consult with the Director of English Graduate Studies (ehgrad@uah.edu) about doing so.
- You must maintain a 3.0 GPA in all courses taken at the graduate level. If in any semester your cumulative GPA falls below that 3.0 level, you will be placed on probation.

Technical Communication Certificate

The English Department offers an 18-credit-hour Graduate Certificate in Technical Communication. This Certificate prepares students for careers in technical communication, technical editing, graphic design, proposal writing, and user experience. In preparation for future employment, certificate students get exposure to real-world documents and writing opportunities, both in class and through optional internships. The program routinely offers special studies courses in topics including Proposal Writing, Document Design, and Writing about Science and Technology. Students also use current technical communication software, such as Adobe and MadCap products.

The Graduate Certificate requires four graduate English courses in technical writing or editing, including EH 501 and EH 603 as well as two English Electives (including EH 542, EH 552, EH 554, EH 601, EH 602, EH 649, and EH 662). In addition, students take two related graduate courses outside of English in an allied field (<http://www.uah.edu/la/departments/english/graduate-program/74-main/liberal-arts/english/7080-graduate-certificate-in->

technical-writing-allied/) selected in consultation with the Director of Business and Technical Writing (rw0019@uah.edu). Graduate Certificate in Technical Communication students enroll in the following Program of Study (POS):

Code	Title	Semester Hours
EH 501	THRY & PRACTICE TECHNICAL COMM	3
EH 603	EDITING FOR PUBLICATION	3
EH Technical Writing Elective		3
EH Technical Writing Elective 600 level		3
Allied Field Course		3
Allied Field Course		3
Total Semester Hours		18

Students who wish to earn the Graduate Certificate in Technical Communication must be admitted to the Graduate School (<https://www.uah.edu/admissions/graduate/>), but may pursue the certificate independent of a master's degree program. These courses may also count toward a master's degree in English if the student meets admission requirements for the M.A.

No more than six credit hours taken at another institution may be applied to the certificate, and certificate courses taken at UAH must include EH 501 and EH 603.

For further information about UAH programs in technical communication, contact Dr. Ryan Weber, Director of Business and Technical Writing, at rw0019@uah.edu.

TESOL Certificate

This fully online program leads to an 18-hour graduate certificate in Teaching English as a Second Language (TESOL) and prepares you to work worldwide. The program prepares you for multiple opportunities, whether you hope to work with children or adults, teach online or on-ground, or deliver training in corporate and non-profit settings globally.

Program Snapshot

- Format: Online
- Credit hours: 18 (can be combined with additional hours to complete the M.A. in Communication Arts or the M.A. in English)
- Time to degree: 12 - 18 months
- Start dates: Spring, Summer, Fall
- Application deadlines: May 15 (Summer), July 15 (Fall), December 1 (Spring)

Program Overview

- Two core courses (505 and 507) ground you in the components, structures, and analysis of language, including a deep dive into form and meaning across human languages.
- Two core courses (610 and 640) prepare you to design and deliver instruction across a range of settings, with real-world teaching opportunities included!
- Two allied field courses, often chosen from Communication Arts, Curriculum and Instruction, or English, allow you to tailor the program to your unique goals.

Course List

Code	Title	Semester Hours
EHL 505	SURVEY OF GENERAL LINGUISTICS	3
EHL 507	ADV ENGLISH GRAMMAR STUDIES	3
ED 640	DIFD STRGTY RES & TEACH ELL	3
EHL 610	AP EH LI VI:PRACTICUM TESOL	3
Allied Field Course		3
Allied Field Course		3
Total Semester Hours		18

Getting Started

- Contact the Director of TESOL (andrea.word@uah.edu). Subject Line: TESOL Certificate Program
- Prepare your application for admission to the program. Follow this link to the admissions website (<https://www.uah.edu/admissions/graduate/apply-for-admission/>).
- Upon admission, register for course(s) outlined in your Program of Study.

User Experience Certificate

The University of Alabama in Huntsville offers an interdisciplinary 18-hour Graduate Certificate in User Experience, hosted by the College of Arts, Humanities, and Social Sciences. This certificate prepares students for careers in user experience (UX), which involves understanding users and designing better technologies, products, and services to meet users' needs. UX professionals conduct research, design prototypes, test products, and organize information, all to ensure that users' needs are met. This certificate provides students both foundational knowledge in UX and the opportunity to take electives in the many different disciplines that contribute to user experience knowledge and practice.

The Graduate Certificate in User Experience requires a total of six courses, including four core courses: CM 542 / EH 542: Usability Studies, CM 552 / EH 552: User-Centered Design, CM 662 / EH 662: Information Architecture, and CM 670: Advanced Communication Methods. Students may take these core courses in any order. Certificate students also take 6 hours of electives in fields such as communication arts, English, psychology, marketing, management, and computer science. Students choose electives in consultation with the Director of the User Experience Programs; in some cases, prerequisites may apply. Students can also complete an internship in UX as part of their certificate. Graduate students in the Graduate Certificate in User Experience enroll in the following program of study (POS):

Code	Title	Semester Hours
Core Courses		
CM 670	ADVANCED COMMUNICATION METHODS	3
EH 542 or CM 542	USABILITY STUDIES USABILITY STUDIES	3
EH 552 or CM 552	USER-CENTERED DESIGN USER-CENTERED DESIGN	3
EH 662 or CM 662	INFORMATION ARCHITECTURE INFORMATION ARCHITECTURE	3
Electives		6
Approved UX Electives		
Total Semester Hours		18

Students who wish to earn the Graduate Certificate in User Experience must be admitted to the Graduate School. No more than six credit hours taken at another institution may be applied to the certificate. For further information about the Graduate Certificate in User Experience, please contact Dr. Ryan Weber, Director of User Experience Programs, at rw0019@uah.edu.

History, MA

In addition to the requirements of UAH's graduate school, the History Department requires the following for the Master of Arts degree:

Plan A: Thesis with Language

1. 30 semester hours total.
2. HY 605 is required.
3. At least nine additional semester hours in courses numbered 600 or above (excluding thesis semester hours at UAH). At least 50 percent of the semester hours for a graduate degree (excluding thesis semester hours) in courses numbered 600 or above.
4. At least twelve additional semester hours in courses numbered 500 or above (excluding thesis semester hours at UAH).
5. Within the 24 non-thesis semester hours, eighteen semester hours of graduate work in history.
 - a. Three semester hours in US history, three semester hours in Europe (ancient/modern), and three semester hours in world (Asia, Latin America, Middle East, or world/comparative) are required.
 - b. Twelve semester hours may be transfer credit approved by the departmental graduate committee.
 - c. Six semester hours of elective graduate courses in a related subject approved by the graduate committee.
6. Master's thesis carrying a minimum of six semester hours credit; In order to write a thesis, the student must have a 3.75 GPA in the first twelve semester hours taken, or permission of the department chair.
7. Reading proficiency in French, German, Latin, Russian, or Spanish.
8. Oral comprehensive examination covering courses and thesis. Students must demonstrate competency in at least two fields of history.

Plan B: Thesis without Language

Same as above, excluding language requirement.

Plan C: Non-Thesis

1. 33 semester hours total.
2. HY 605 is required.
3. Fifteen additional semester hours in courses 600 or above. At least 50 percent of the semester hours for a graduate degree (excluding thesis semester hours) in courses numbered 600 or above.
4. At least fifteen additional semester hours in courses numbered 500 or above (excluding thesis semester hours at UAH).
5. Within thirty-three semester hours total,
 - a. Three semester hours in US history, three semester hours in Europe (ancient/modern), and three semester hours in world (Asia, Latin America, Middle East, or world/comparative) are required.
 - b. Twelve semester hours in history may be transfer credit approved by the departmental graduate committee.
 - c. Six semester hours of elective graduate courses a related subject approved by the graduate committee.
6. Oral and written comprehensive examination covering coursework. Students must demonstrate competency in at least two fields of history.

The requirements for the Master of Arts degree for those students seeking Class A certification are the same as above with the following exceptions:

Class A Teacher Certification in History (non-thesis)

1. 33 semester hours total;
2. Nine semester hours in courses 600 or above in Education;
3. HY 605 is required;
4. Six additional semester hours in courses 600 or above are required. At least 50 percent of the semester hours for a graduate degree (excluding thesis semester hours) in courses numbered 600 or above;
5. At least fifteen additional semester hours in history courses numbered 500 or above (excluding thesis semester hours at UAH);
6. Within twenty-four semester hours in history sub-total,
 - a. Three semester hours in US history, three semester hours in Europe (ancient/modern), and three semester hours in world (Asia, Latin America, Middle East, or world/comparative) are required.
 - b. Twelve semester hours in history may be transfer credit approved by the departmental graduate committee.
 - c. Six semester hours of elective graduate courses a related subject approved by the graduate committee.
7. Oral and written comprehensive examination covering coursework. Students must demonstrate competency in at least two fields of history.
8. The College of Education will coordinate and direct any supplementary requirements.

The History Department does not recommend undertaking an MA thesis in History and teacher certification. If a student wishes to pursue this option, they should consult with the History Department Chair.

Graduate Certificates

- Comparative Cultures and Conflicts (p. 850)

Comparative Cultures and Conflicts Certificate

The Comparative Cultures and Conflicts certificate program offers post-baccalaureate students a program of study that will establish a global context for their careers in the civilian and military sectors. The program will contextualize the cultural, diplomatic, military, and economic variables that influence various societies around the world and explain how these societies interact with the United States and the global community as a whole.

CCC STUDENT LEARNING OUTCOMES

Upon completion of the certificate, students will be able to:

- 1) Analyze contemporary global patterns to show how various regions and cultures develop over time.
- 2) Explain the historical causes and contexts of contemporary conflicts, both within and among states.
- 3) Discuss the historical context of U.S. relations and interactions with the world.
- 4) Compare the ways nations, groups, and individuals experience conflict.

5) Practice historical thinking as central to engaged citizenship and leadership.

6) Communicate historical knowledge and interpretation coherently in writing and in oral presentations.

CCC REQUIREMENTS

Course Requirements: To complete the CCC program, students must complete 15 semester hours selected from the following History classes:

Code	Title	Semester Hours
Courses		
HY 538	MODERN AMERICA	3
HY 539	RECENT AMERICAN HISTORY	3
HY 540	FOREIGN REL U.S. SINCE 1920	3
HY 545	COMPTVE MILITARY PLCY & STRAT	3
HY 572	US MILITARY HISTORY SINCE 1920	3
HY 573	US-LATIN AMERICAN RELATIONS	3
HY 575	SECTARIANISM ISLAMIC WORLD	3
HY 576	BEING YOUNG MODERN MIDDLE EAST	3
HY 585	NAZI GERMANY AND THE HOLOCAUST	3
HY 586	COMMUNISM & LEGACY IN RUS/E-EUR	3
HY 620	STUDIES 20TH CENT AM HY	3
HY 645	READINGS AMERICAN MILITARY HY	3
HY 690	STUDIES IN MODERN EUROPE	3
HY 695	STUDIES IN WORLD HISTORY	3
3 of the 15 semester hours may be from Political Science, selected from the following:		
PSC 540	REGIONAL STUDIES	3
PSC 562	DECISION-MAKING FORGN & SEC POLY	3
PSC 564	AMERICAN FOREIGN POLICY	3
PSC 566	NATIONAL SECURITY STRGY & POLY	3
PSC 570	ISSUES IN SECURITY POLICY	3

Portfolio Requirements: In the final term of study, certificate candidates will prepare a Capstone Portfolio and Presentation for the Comparative Conflicts and Cultures Steering Committee, which consists of the department chair and three additional participating faculty members. The committee will assess the portfolio and presentation. This portfolio will feature three papers or projects prepared for three different classes completed as part of the certificate program, as well as a cover letter which specifically discusses how the papers included within the portfolio address the first five Student Learning Outcomes (see above). It is not expected that each individual paper address all SLOs, but the portfolio as a whole must display the student's mastery of each SLO. Students will complete a Capstone Presentation of approximately 20 minutes in length, which will discuss the papers within the portfolio and the cover letter. Following the Presentation, the Comparative and Cultures Steering Committee will ask the student questions about the student's broader experience within the program.

Political Science - Public Affairs and Policy, MA

The Master of Arts in Public Affairs and Policy requires 33 semester hours of approved graduate work from the following courses.

Code	Title	Semester Hours
Foundation Courses ¹		9
PSC 600	THE AMERICAN POLITY	
PSC 601	THE PUBLIC POLICY PROCESS	
PSC 635	PROGRAM EVALUATION AND METHODS	
Political Science Electives		21
Select 18 semester-hours from the following:		
PSC 520	FEDERALISM & INTERGOV RELATION	
PSC 540	REGIONAL STUDIES	
PSC 551	LAW, COURTS & PUBLIC POLICY	

PSC 562	DECISION-MAKING FORGN & SEC PLY	
PSC 564	AMERICAN FOREIGN POLICY	
PSC 566	NATIONAL SECURITY STRGY & PLY	
PSC 570	ISSUES IN SECURITY POLICY	
PSC 580	SPECIAL TOPICS IN POLITICAL SC	
PSC 610	PUBLIC MANAGEMENT PROFESSIONS	
PSC 611	PUBLIC PERSONNEL ADMINIS	
PSC 612	BUDGETARY PROCESS	
PSC 615	SPEC TOPICS IN PUBLIC AFFAIRS	
PSC 630	PUBL VALUES/PUBL POLICY	
PSC 695	INTERNSHIP IN GOVERNMENT	
PSC 698	DIRECTED READINGS & RESEARCH	
PSC 699	MASTER'S THESIS	
Capstone Course ²		3
PSC 690	CAPSTONE	
Other Options ³		
Total Semester Hours		33

- ¹ Although these courses are required, they are not strictly prerequisites for other courses in the program. However, it is advised that students complete them as early in their program as practical.
- ² The Capstone course is required and should be taken during the last year of the program.
- ³ Students may take or transfer a maximum of nine hours of coursework from outside of the department, including from other universities. Students must consult with the department chair to determine the appropriate coursework from other departments.

The International Security Policy (ISP) Certificate Program provides students with a shorter graduate program experience. The ISP certificate is awarded upon the completion of 12-15 semester hours of graduate courses from the following schedule:

Prerequisites for the Certificate:

- If a student does not have at least three courses in Political Science as an undergraduate (including American Government), prior to taking the required coursework he or she must take PSC 600.

Code	Title	Semester Hours
Required Courses		
PSC 540	REGIONAL STUDIES	3
PSC 562	DECISION-MAKING FORGN & SEC PLY	3
PSC 566	NATIONAL SECURITY STRGY & PLY	3
or PSC 564	AMERICAN FOREIGN POLICY	
Electives (Choose one):		
PSC 564	AMERICAN FOREIGN POLICY	3
PSC 566	NATIONAL SECURITY STRGY & PLY	3
PSC 570	ISSUES IN SECURITY POLICY	3
PSC 601	THE PUBLIC POLICY PROCESS	3

Professional Communication, MA

The Master of Arts in Professional Communication prepares students to work in communication intensive jobs, including social media management, user experience, advertising, public relations, professional writing, human resources, fundraising, event management, training, and consulting, among other things. We accept students with a variety of undergraduate degrees (business, writing, art, computer science) and experience.

Students in the MA in Professional Communication must complete 33 total hours, including the core requirements and either Plan I (non-thesis) or Plan II (thesis). They may select electives freely or follow one of the suggested emphases below. All students must complete 33 hours, including 12 hours of 600-level coursework (excluding CM 699).

Code	Title	Semester Hours
Core (required of all students)		
CM 555	COMMUNICATION AND CULTURE	3
CM 631	ADVANCED COMMUNICATION THEORY	3
CM 633	INTERPERSONAL COMMUNICATION	3
CM 670	ADVANCED COMMUNICATION METHODS	3
CM 675	RHETORICAL CRITICISM	3

Plan I: MA without Thesis

- Choose 18 hours of electives from the list below, which may be freely chosen or may follow one of the suggested emphases identified below.

Plan II: MA with Thesis

- Choose 12 hours of electives from the list below, which may follow one of the suggested emphases identified below
- Six (6) hours of CM 699 Master's Thesis

Code	Title	Semester Hours
Suggested Emphases for Electives		
Social Media		
CM 505	ADVANCED MEDIA WRITING	
CM 535	SOCIAL MEDIA	
CM 540	PUBLIC RELATIONS CAMPAIGNS	
CM 554	NEW MEDIA WRITING & RHETORIC	
User Experience		
CM 552	USER-CENTERED DESIGN	
EH 542	USABILITY STUDIES	
CM 662	INFORMATION ARCHITECTURE	
Advertising/Public Relations		
CM 505	ADVANCED MEDIA WRITING	
CM 520	PUBLIC RELATIONS WRITING	
CM 540	PUBLIC RELATIONS CAMPAIGNS	
CM 544	ADVERTISING	
Professional Writing		
EH 601	ACTION RESCH WRITING STUDIES	
EH 603	EDITING FOR PUBLICATION	
Six hours selected from one of the following areas:		
Technical Writing		
EH 501	THRY & PRACTICE TECHNICAL COMM	
EH 649	SPECIAL TOPICS	
Media Writing		
CM 505	ADVANCED MEDIA WRITING	
EH 554	NEW MEDIA WRITING & RHETORIC	
Communication Studies		
CM 509	CONTEMPORARY RHETORICAL THEORY	
CM 526	BURKEIAN THEORY & CRITICISM	
CM 610	COMMUNICATION PEDAGOGY	
Human Resources Management		
MGT 600	ORGAN THRY, BEHAV & ENVIRONMEN	
MGT 560	EMPLOYEE STAFFING & DEVELOP	
MGT 562	EMPLOYMENT LAW FOR MANAGERS	
MGT 561 or MGT 631	STRATEGIC COMPENSATION MGMT HRM & ORGANIZATIONAL BEHAVIOR	

Teaching English as a Second Language*

EHL 505	SURVEY OF GENERAL LINGUISTICS
EHL 507	ADV ENGLISH GRAMMAR STUDIES
ED 640	DIFD STRGTY RES & TEACH ELL
EHL 610	AP EH LI VI:PRACTICUM TESOL

*to earn your TESOL certificate, contact the TESOL advisor, Dr. Andrea Word-Allbritton (andrea.word@uah.edu)

Other Areas of Emphasis

Students in the MA in Professional Communication program may request to take up to four courses from other graduate programs that cover areas not included here.

Code	Title	Semester Hours
Electives		
CM 505	ADVANCED MEDIA WRITING	3
CM 508	CLASSICAL RHETORICAL THEORY	3
CM 509	CONTEMPORARY RHETORICAL THEORY	3
CM 518	LEGAL ARGUMENT	3
CM 520	PUBLIC RELATIONS WRITING	3
CM 526	BURKEIAN THEORY & CRITICISM	3
CM 530	MASS MEDIA IN AMERICA	3
CM 533	DARK SIDE INTERPERSONAL COMM	3
CM 540	PUBLIC RELATIONS CAMPAIGNS	3
CM 544	ADVERTISING	3
CM 551	ORGANIZATIONAL TRAIN & DEVELOP	3
CM 610	COMMUNICATION PEDAGOGY	3
CM 640	SPECIAL TOPICS	3
CM 670	ADVANCED COMMUNICATION METHODS	3
EH 500	COMPOSITION STUDIES TCHRS	3
EH 501	THRY & PRACTICE TECHNICAL COMM	3
EH 502	PROBS TECHNICAL EDITING	3
EH 512	SP TOPICS IN CREATIVE WRITING	3
EH 554	NEW MEDIA WRITING & RHETORIC	3
EH 601	ACTION RESCH WRITING STUDIES	3
EH 602	PRACTICUM/TECHNICAL COMM	3
EH 603	EDITING FOR PUBLICATION	3
MGT 560	EMPLOYEE STAFFING & DEVELOP	3
MGT 561	STRATEGIC COMPENSATION MGMT	3
MGT 562	EMPLOYMENT LAW FOR MANAGERS	3
MGT 600	ORGAN THRY, BEHAV & ENVIRONMEN	3
MGT 631	HRM & ORGANIZATIONAL BEHAVIOR	3

Psychology, MA

1. The thesis student must complete at least 30 semester hours of graduate work, including a minimum of 6 semester hours of thesis.

Only 6 semester hours may be transfer courses that are approved by the graduate committee of the department.

2. The student's Program of Study must include

Code	Title	Semester Hours
PY 607	PROFESSIONAL DEV IN RES & TCHG	1
PY 608	GRAD PRACT TCHG & CAREER EXPLO	1
PY 610	EXPERIMENTAL DESIGN	3

PY 611	STAT FOR EXPERI METHODS	4
PY 641	CONC READ/RES SPECIALIZ AREA	3
PY 699	MASTER'S THESIS	6
Total Semester Hours		18

3. In addition, the student's Program of Study will include other graduate level courses in psychology selected with the advice of the student's advisor.

If approved by the graduate committee of the department, the student's Program of Study may include up to 6 semester hours of graduate credit from related departments at UAH.

4. The student must pass an oral defense of their thesis.

5. The student must meet requirements for the Master of Arts degree as specified by the Graduate School.

UAH's Joint Undergraduate Master's Program (JUMP) allows undergraduate students to study at the graduate level. By taking graduate courses in your senior year, you could reduce the time taken to get a graduate (M.S. or M.A.) degree.

To be eligible for the Psychology JUMP Program, students must have a grade of B or better in each of the following: PY 101, PY 102, PY 300, PY 304, PY 302, one group A course (PY 316, PY 414, PY 436, PY 480) and one group B course (PY 301, PY 375, PY 415, PY 435). Students interested in the Psychology JUMP Program should pursue the Psychological Science Track rather than the Psychological Services Track. Their current Psychology GPA (including any transfer coursework) must be 3.50 or better and their overall GPA (including transfer coursework) must be 3.25 or better.

Students who meet these criteria and complete the JUMP paperwork may then take up to 12 hours of Psychology graduate course credit, which will count toward both their BA and MA degrees if they make a B or better in these courses. In addition, the student who maintains at least a 3.0 GPA in these graduate courses will be automatically admitted to the MA program without having to take the GRE or formally apply for acceptance.

More information available at <https://www.uah.edu/jump> (<https://www.uah.edu/jump/>)

Psychology, MA - Industrial/Organizational Psychology Specialization

Within our M.A. in Experimental Psychology program, students who are interested in applying psychology in business settings may choose an Industrial/Organizational psychology specialization. The courses in this specialized sequence prepare students for jobs in industry or more extensive study in a Ph.D. program. Graduates with this background are prepared for jobs that require the following skills:

- training
- psychometrics
- job analysis
- personnel selection
- interviewing
- performance appraisal
- empirical research
- statistical analysis
- technical writing

The projected job growth in these areas, nationally, is higher than average.

We welcome both full-time and part-time students. Two of our courses are available through Distance Learning: PY 502 and PY 503. Students will have opportunities to work in faculty research labs in our small, personalized department.

Prerequisites for the M.A. program are a Bachelor's degree in Psychology, including coursework in experimental design and statistics. Prospective students who do not yet have these pre-requisites can take the necessary pre-requisites in our undergraduate curriculum prior to applying to the graduate program; students should contact the Chair of the Psychology Department to discuss this possibility.

Program Requirements

The student's program of study must include the following if the student will complete a thesis:

Code	Title	Semester Hours
Required Courses		
PY 502	INDUSTRIAL & ORGANIZA PSY	3
PY 530	PSYCHOMETRICS	3
PY 607	PROFESSIONAL DEV IN RES & TCHG	1

PY 608	GRAD PRACT TCHG & CAREER EXPLO	1
PY 610	EXPERIMENTAL DESIGN	3
PY 611	STAT FOR EXPERI METHODS	4
PY 641	CONC READ/RES SPECIALIZ AREA	3
PY 699	MASTER'S THESIS	6
Elective Courses		
Select 6 semester hours of the following:		6
PY 503	HUMAN FACTORS PSYCHOLOGY	3
PY 508	TEAMWORK & TEAM RPOCESSES	3
PY 650	SUPERVISED RESEARCH	3-6
PY 675	INTERNSHIP IN APPLD PSYCHOLOGY	1-3
MGT 560	EMPLOYEE STAFFING & DEVELOP	3
MGT 600	ORGAN THRY, BEHAV & ENVIRONMEN	3
MGT 629	LEADERSHIP: THRY & PRACTICE	3
MGT 631	HRM & ORGANIZATIONAL BEHAVIOR	3
ISE 790	ADV STATISTICAL APPLICATIONS	3
Total Semester Hours		30

The student's program of study must include the following if the student will not complete a thesis:

Code	Title	Semester Hours
Required Courses		
PY 502	INDUSTRIAL & ORGANIZA PSY	3
PY 530	PSYCHOMETRICS	3
PY 607	PROFESSIONAL DEV IN RES & TCHG	1
PY 608	GRAD PRACT TCHG & CAREER EXPLO	1
PY 610	EXPERIMENTAL DESIGN	3
PY 611	STAT FOR EXPERI METHODS	4
PY 650	SUPERVISED RESEARCH	6
PY 675	INTERNSHIP IN APPLD PSYCHOLOGY	3
Elective Courses		
Select 9 semester hours of the following:		6
PY 503	HUMAN FACTORS PSYCHOLOGY	3
PY 508	TEAMWORK & TEAM RPOCESSES	3
MGT 560	EMPLOYEE STAFFING & DEVELOP	3
MGT 600	ORGAN THRY, BEHAV & ENVIRONMEN	3
MGT 629	LEADERSHIP: THRY & PRACTICE	3
MGT 631	HRM & ORGANIZATIONAL BEHAVIOR	3
ISE 790	ADV STATISTICAL APPLICATIONS	3
Total Semester Hours		33

College of Business

Dean's Office

Jason.Greene@uah.edu (%20jason.greene@uah.edu)

256.824.4424

BAB 202

Graduate Advising

g (<http://catalog.uah.edu/grad/colleges-departments/business/gradbusiness@uah.edu>)radbusiness@uah.edu (gradbiz@uah.edu)

256.824.6787

BAB 102

Mission

The UAH College of Business serves business and society through the expertise of our alumni, students, and faculty. We provide academically rigorous programs emphasizing the application of theory and skills in scientific, technological, and traditional business environments. We are committed to offering degree programs that build analytical skills, develop an entrepreneurial mindset, and provide opportunities to engage with practice through projects, practica, and internships.

Accreditation

The College of Business is accredited by AACSB International (<https://www.aacsb.edu/>). AACSB provides the highest standard of accreditation offered to business schools worldwide, with fewer than 25% of U.S. business schools and fewer than 5% of worldwide business schools achieving the distinction. To maintain AACSB accreditation, we must have a specific plan and sufficient resources to support high quality undergraduate and graduate programs, a highly qualified faculty who maintain credentials through continuous research or engagement with practice, and a process for assessing that our students are learning what we teach. We report to AACSB annually and undergo a comprehensive review every five years.

Graduate Degrees and Certificates

The College of Business offers seven graduate degrees and seven graduate certificates.

- Master of Accountancy (MAcc) (p. 858)
- Master of Business Administration (MBA) (p. 860)
- M.S. in Cybersecurity (Management Track) (p. 863)
- M.S. in Information Systems (p. 861)
- M.S. in Management-Human Resource Management (p. 865)
- M.S. in Management Science-Business Analytics (p. 866)
- M.S. in Supply Chain & Logistics Management (p. 864)
- Graduate Certificate in Business Analytics (<http://catalog.uah.edu/grad/colleges-departments/business/graduate-certificate-business-analytics/>)
- Graduate Certificate in Cybersecurity Studies (<http://catalog.uah.edu/grad/colleges-departments/business/graduate-certificate-cybersecurity-studies/>)
- Graduate Certificate in Enterprise Resource Planning (<http://catalog.uah.edu/grad/colleges-departments/business/graduate-certificate-enterprise-resource-planning/>)
- Graduate Certificate in Federal Contracting & Procurement Management (<http://catalog.uah.edu/grad/colleges-departments/business/graduate-certificate-federal-contracting-procurement-management/>)
- Graduate Certificate in Human Resource Management (<http://catalog.uah.edu/grad/colleges-departments/business/graduate-certificate-hrm/>)
- Graduate Certificate in Supply Chain Management (<http://catalog.uah.edu/grad/colleges-departments/business/graduate-certificate-supply-chain-management/>)
- Graduate Certificate in Technology & Innovation Management (<http://catalog.uah.edu/grad/colleges-departments/business/graduate-certificate-technology-innovation-management/>)

Admissions Requirements

1. Applications can be found at <https://www.uah.edu/admissions/graduate> (<https://www.uah.edu/admissions/graduate/>).
2. Transcripts: Official transcripts for domestic students and unofficial transcripts for international students are required and will be requested within the application portal. Please use the transcript request form provided in the application to request your transcripts. The correct mailing address will be provided on the form.
3. Complete your Entrance Exam (GMAT/GRE): You will be asked for your test scores within the application portal. The minimum test scores are as follows:

GMAT

Minimum score: 500

<http://www.mba.com/gmat> (<http://www.mba.com/gmat/>)

OR

GRE

Minimum score: 300 verbal and quantitative and a 3.0 on analytical writing

<http://www.taketheGRE.com> (<http://www.takethegre.com/>)

Institutional code: 1854

Note: An applicant can request to have the GMAT/GRE waived if he/she meets any of the following criteria:

- the student has completed a master's degree previously, or
- the student has five years of professional work experience and had a cumulative GPA of 3.0 or higher. (For MSMS-Business Analytics, the requirement is three years of direct analytics experience and a cumulative undergraduate GPA of 3.0 or higher)
- To request the waiver, please upload our GMAT/GRE Waiver Request (http://uah.edu/images/colleges/business-administration/resources/gmat_gre_waiver_request_form.pdf) in the Scores section of our online application (<https://www.uah.edu/admissions/graduate/apply-for-admission/>).

Graduate Assistantships

A limited number of graduate assistantships are available to select full-time students on a competitive basis. Graduate assistantships are awarded at either a 10 or 20 hour per week service to the College, carry a stipend, and have up to 9 semester hours of tuition paid. Assistantship applications are available here (<http://www.uah.edu/admissions/graduate/financial-aid/assistantships/>).

Graduate Teaching Assistantships (GTA) are awarded to students who assist with the College's undergraduate teaching mission as tutors, graders, and coordinators of program activities. Graduate Research Assistantships (GRA) are made available through externally funded grants or contracts. GRAs do research under the supervision of a faculty member or center director. Because GRAs assist with specific research activities, the ability of applicants to assist with these specific activities is considered when awarding assistantships.

Expectations about Degree Progress

Course Load: The typical semester course load for a full-time graduate student is 9 to 12 semester hours. The typical semester course load for a student employed full-time is 3 to 6 semester hours.

Time Limit: Each graduate course is valid for ten years from the semester in which it is taken.

Master's Programs in Business:

- Master of Accountancy (MAcc) (p. 858)
- Master of Business Administration (MBA) (p. 860)
- M.S. in Cybersecurity (Management Track) (p. 863)
- M.S. in Information Systems (p. 861)
- M.S. in Management-Human Resource Management (p. 865)
- M.S. in Management Science-Business Analytics (p. 866)
- M.S. in Supply Chain & Logistics Management (p. 864)

Certificates in Business:

- Graduate Certificate in Business Analytics (<http://catalog.uah.edu/grad/colleges-departments/business/graduate-certificate-business-analytics/>)
- Graduate Certificate in Cybersecurity Studies (<http://catalog.uah.edu/grad/colleges-departments/business/graduate-certificate-cybersecurity-studies/>)
- Graduate Certificate in Enterprise Resource Planning (<http://catalog.uah.edu/grad/colleges-departments/business/graduate-certificate-enterprise-resource-planning/>)
- Graduate Certificate in Federal Contracting & Procurement Management (<http://catalog.uah.edu/grad/colleges-departments/business/graduate-certificate-federal-contracting-procurement-management/>)
- Graduate Certificate in Human Resource Management (<http://catalog.uah.edu/grad/colleges-departments/business/graduate-certificate-hrm/>)
- Graduate Certificate in Supply Chain Management (<http://catalog.uah.edu/grad/colleges-departments/business/graduate-certificate-supply-chain-management/>)
- Graduate Certificate in Technology & Innovation Management (<http://catalog.uah.edu/grad/colleges-departments/business/graduate-certificate-technology-innovation-management/>)

Accountancy, MAcc

For an overview of the program click here (<https://www.uah.edu/business/grad/degrees/macc/>).

Program Prerequisites

Program prerequisites include a bachelor's degree in any field and satisfactory (i.e., "C" or higher) completion of the following courses within business prerequisites and accounting prerequisites.

Code	Title	Semester Hours
Business Prerequisites		
	Written and oral communications	
	Calculus	
	Computer Applications	
	Statistical analysis	
	Legal environment of business	
	Principles of accounting (financial and managerial)	
	Principles of economics	
	Principles of finance	
	Principles of marketing	
	Operations management	
	Organizational theory, behavior, and environment	
Accounting Prerequisites		
ACC 307	ACCOUNTING INFORMATION SYS	
ACC 310	INTERM FINANCIAL ACCT I	
ACC 311	INTERM FINANCIAL ACCT II	
ACC 313	INDIVIDUAL/SMALL BUS INCOME TA	
ACC 414	COST ACCOUNTING	
ACC 431	PRINCIPLES OF AUDITING	

Degree Requirements

The MAcc program consists of 30 semester hours of graduate coursework. The accounting theory class, ACC 680, should be taken toward the end of the student's program, must be taken at UAH, and must be completed with a grade of B or better.

The MAcc curriculum consists of the following courses:

Code	Title	Semester Hours
Required Courses		30
ACC 513	CORPORATE & PARTNERSHIP TAXATN	
ACC 516	ADVANCED COST ACCOUNTING	
ACC 517	ACC FOR STATE/LOCAL GOV/NON-PR	
ACC 532	ADVANCED AUDITING	
ACC 603	FINANCIAL STATEMENT ANALYSIS	
ACC 607	ACCOUNTING ANALYTICS	
ACC 613	TAX RESEARCH	
ACC 680	FINANCIAL ACCOUNTING THEORY	
5xx or 6xx Level ACC Elective ¹		
5xx or 6xx Level Business Elective ²		
Total Semester Hours		30

¹ ACC 600 and ACC 602 may not be used in the MAcc program. BLS 511 counts as ACC Elective.

² Courses numbered 600 cannot be used.

Additional Information

CPA Examination in Alabama

Students planning to sit for the CPA examination in Alabama can find the current requirements at the Alabama State Board of Public Accountancy. (<https://www.asbpa.alabama.gov/>)

Thesis Option

A thesis option requiring 30 semester hours of graduate work, including 6 semester hours of thesis credit. Students interested in this option should contact the Graduate Advisor, BAB 102, 256.824.6732, before completing 12 semester hours of graduate study.

Transfer Credit

Up to 12 semester hours of graduate credit taken at other AACSB-accredited universities may be transferred to meet MAcc degree requirements. Inquiries about the transferability of specific courses should be directed to the Graduate Advisor, who will consult with the faculty to determine whether the content of the class will be accepted for transfer credit.

For more information contact:

Tressa Hillman-Moore

Graduate Advisor
Business Administration Building Room 102
256.824.6732
gradbusiness@uah.edu (gradbiz@uah.edu)

Master of Business Administration, MBA

For an overview of the program click here (<https://www.uah.edu/business/grad/degrees/mba/>).

Program Prerequisites

Program prerequisites include a bachelor's degree in any field and demonstration of competency in statistics.

Degree Requirements

The MBA consists of 36 semester hours of graduate coursework. MGT 698, Strategic Management, is the capstone course and should be taken toward the end of the student's program. A student must earn a grade of B or better in MGT 698.

Code	Title	Semester Hours
Required Courses		36
ACC 600	FOUNDATIONS ACC MANAGERS & ENG ¹	
ACC 602	MANAGERIAL ACCOUNTING	
ECN 600	FOUNDATIONS OF ECONOMICS ¹	
ECN 626	MANAGERIAL ECON & TECH	
FIN 601	FIN DECIS UNDER UNCERTAINTY	
MGT 622	MANAGING HUMAN CAPITAL	
MGT 629	LEADERSHIP: THRY & PRACTICE	
MKT 601	MARKETING STRATEGY & ANALYSIS	
MSC 600	QUANTITATIVE METHODS ¹	
MSC 605	OPERATIONS MANAGEMENT	
MSC 622	ANALYTICS FOR MANAGERS	
or MKT 604	NEW PRODUCT DEVELOPMENT	
or MGT 601	TECH & INNOVATION MGMT	
or IS 601	MANAGEMENT OF INFORMATION TECH	
MGT 698	STRATEGIC MANAGEMENT	
Total Semester Hours		36

¹ MBA students whose previous studies include the undergraduate equivalents of ACC 600, ECN 600, and/or MSC 600 can substitute a 3-credit-hour graduate-level course for each of the latter.

Optional Concentrations

MBA students may take nine semester hours of graduate electives to complete a concentration in one of the following areas:

- Engineering Management
- Federal Contracting and Procurement Management
- Technology and Innovation Management

Those students whose previous studies included the undergraduate equivalents of ACC 600, ECN 600, and/or MSC 600, may substitute graduate courses toward a concentration. Students without the undergraduate equivalents must take up to 9 additional hours to complete a concentration.

Engineering Management

Code	Title	Semester Hours
Required Courses		9
EM 660	ENGR MGMT THEORY	
EM 666	ENGR PROJECT MANAGEMENT	
EM 760	ENGR MGMT STRUCTURES & SYSTEMS	

Federal Contracting and Procurement Management

Code	Title	Semester Hours
Required Courses		9
MGT 501	INTRO TO CONTRACT MANAGEMENT ²	
MGT 502	CONTRACT EVALUATION & AWARD	
MGT 503	CONTRACT PRICING & COST ANALYS	

² BLS 506 may be substituted if a student has a background in acquisitions (e.g., DAU Level I certification)

Technology and Innovation Management

Code	Title	Semester Hours
Required Courses		9
MGT 505	NEW VENTURES STRATEGIES	
MGT 601	TECH & INNOVATION MGMT	
MKT 604	NEW PRODUCT DEVELOPMENT	

Additional Information

Transfer Credit

Up to 12 semester hours of graduate credit taken at other AACSB-accredited universities may be transferred to meet MBA degree requirements. Also, coursework taken through the Defense Acquisition University (DAU) that has been evaluated to be worth graduate level credit can be considered. Inquiries about the transferability of specific courses should be directed to the Graduate Advisor, who will consult with the faculty to determine whether the content of the class will be accepted for transfer credit.

For more information contact:

Tressa Hillman-Moore

Graduate Advisor

Business Administration Building Room 102

256.824.6732

g (<http://catalog.uah.edu/grad/colleges-departments/business/master-of-business-administration-mba/gradbusiness@uah.edu>)radbusiness@uah.edu
(gradbiz@uah.edu)

Information Systems, MS-IS

For an overview of the program click here (<https://www.uah.edu/business/grad/degrees/ms-is/>).

Program Prerequisites

Program prerequisites include a bachelor's degree in any field and demonstration of competency in each of the following areas:

1. **Computer Applications Competency.** Students must demonstrate this competency by passing an on-line computer applications competency exam or by successful completion of the IS 146 or its equivalent. IS 146 or its equivalent will not count towards the requirements of the MS-IS degree.
2. **Computer Programming Competency.** Students must demonstrate this competency by passing an on-line computer programming exam or by successful completion of IS 210 or its equivalent. IS 210 or its equivalent will not count towards the requirements of the MS-IS degree.

Degree Requirements

The MS-IS program consists of 30 semester hours of graduate coursework.

IS 691, Information Systems Strategy and Applications, is the capstone course and should be taken toward the end of the student's program. A student must earn a grade of B or better in IS 691.

Code	Title	Semester Hours
Required Courses		30
IS 512	SYSTEMS ANALYSIS & DESIGN ¹	
IS 550	CYBERSECURITY MANAGEMENT	
IS 560	NETWORKING & IT INFRASTRUCTURE ¹	
IS 571	BUSINESS ANALYTICS & AI ¹	
IS 601	MANAGEMENT OF INFORMATION TECH	
IS 640	DATA MGT AND DATA MINING	
IS 680	ENTERPRISE RESOURCE PLNG SYS	
IS 691	INFORMATION SYS STRATEGY & APP	
5xx or 6xx Level Elective ²		
5xx or 6xx Level Elective		
Total Semester Hours		30

¹ MS-IS students whose previous studies include the undergraduate equivalents of IS 512, IS 560, and/or IS 571 must substitute a 3-credit-hour graduate-level IS course for each of the latter.

² Recommended Elective: IS 522

Additional Information

Thesis Option

A thesis option is available. Students interested in this option should contact both the faculty member who the student wants to serve as the thesis advisor, and the Graduate Advisor in the College of Business, before completing 12 hours of graduate study. If selected, the student will register for the IS 699 Masters Thesis course for 6 credit hours in lieu of 6 credit hours of electives.

Transfer Credit

Up to 12 semester hours of graduate credit taken at other AACSB-accredited universities may be transferred to meet MS-IS degree requirements. Inquiries about the transferability of specific courses should be directed to the Graduate Advisor, who will consult with the faculty to determine whether the content of the class will be accepted for transfer credit.

For more information contact:

Tressa Hillman-Moore

Graduate Advisor

Business Administration Building Room 102

256.824.6732

g (<http://catalog.uah.edu/grad/colleges-departments/business/information-systems-ms-is/gradbusiness@uah.edu>)radbusiness@uah.edu
(gradbiz@uah.edu)

Cybersecurity, MS Interdisciplinary - Management Track

For an overview of the program click here (<https://www.uah.edu/business/grad/degrees/mscbs/>).

Program Prerequisites

Program prerequisites include a bachelor's degree in any field and demonstration of competency in each of the following two areas:

1. Information Systems Competency. Students must demonstrate this competency by successful completion of IS 301 or its equivalent, which will not count towards the requirements of the MS-CBS degree.
2. Computer Programming Competency. Students must demonstrate this competency by successful completion of IS 310 or its equivalent, which will not count towards the requirements of the MS-CBS degree.

Degree Requirements

The MS-CBS program consists of 30 semester hours of graduate coursework. The coursework includes a five-course core that is required of all students, 9 credit hours of management track required courses, and 6 credit hours of electives. The directed elective choices are designed to provide students a broader understanding of multiple cybersecurity functions normally expected in an organization.

IS 692/CPE 692/CS 692 is the capstone course and should be taken toward the end of the student's program. Students must earn a grade of B or better in the capstone course.

Code	Title	Semester Hours
Cybersecurity Core Courses		9
IS 550	CYBERSECURITY MANAGEMENT	
IS 663	COMPUTER FORENSICS	
or CS 580	MOBILE DIGITAL FORENSICS	
IS 692	CYBERSECURITY PRACTICUM	
or CPE 692	CYBERSECURITY CAPSTONE	
or CS 692	CYBERSECURITY CAPSTONE	
Management Track-required Courses		15
IS 501	CYBERSECURITY PRINCIPLES	
IS 560	NETWORKING & IT INFRASTRUCTURE ¹	
IS 577	NETWORK DEFENSE & SECURITY ¹	
IS 650	SELECTED RESEARCH TOPICS ²	
or IS 580	SEMINAR IN MGT INFO SYSTEMS	
IS 670	BUSINESS CONTINGENCY PLANNING	
Elective, select two courses from the following: ³		6
IS 571	BUSINESS ANALYTICS & AI	
IS 640	DATA MGT AND DATA MINING	
IS 691	INFORMATION SYS STRATEGY & APP	
CPE 534	OPERATING SYSTEMS	
CPE 647	UBIQUITOUS COMPUTING	
CPE 648	ADVANCED COMPUTER NETWORKS	
CS 687	DATA BASE SYSTEMS	
CS 553	CLIENT/SERVER ARCHITECTURES	
CS 617	DES & ANALY OF ALGORITHM	
CS 650	SOFT'W ENGINEERING PROC	
CS 670	COMPUTER NETWORKS	
CS 690	ADVANCED OPERATING SYSTEMS	
CPE 649	ADV CYBERSECURITY ENGINEERING	
CPE 645	COMPUTER NETWORK SECURITY	
CPE 646	MOBILE & WIRELESS NETWORKS	
CS 565	NETWORK SECURITY	

CS 685	COMPUTER SECURITY
Total Semester Hours	30
1	MS-CBS students whose previous studies include the undergraduate equivalents of IS 560 and IS 577 must substitute a 3-credit-hour graduate-level IS course for each of the latter.
2	Students may substitute an IS course approved by the Department Chair.
3	Students are required to satisfy the prerequisites for any elective they choose. Students who wish to substitute some other courses as directed electives may seek prior approval for such a substitution by contacting the Graduate Advisor in the UAH College of Business.

Additional Information

Thesis Option

A thesis option is available. Students interested in this option should contact both the faculty member who the student wants to serve as the thesis advisor, and the Graduate Advisor in the College of Business, before completing 12 hours of graduate study. If selected, the student will register for the IS 699 Master's Thesis course for 6 credit hours in lieu of 6 credit hours of electives.

Transfer Credit

Up to 12 semester hours of graduate credit taken at other AACSB-accredited universities may be transferred to meet MS-CBS degree requirements. Inquiries about the transferability of specific courses should be directed to the Graduate Advisor, who will consult with the faculty to determine whether the content of the class will be accepted for transfer credit.

For more information contact:

Tressa Hillman-Moore

Graduate Advisor

Business Administration Building Room 102

256.824.6732

g (<http://catalog.uah.edu/grad/colleges-departments/interdisciplinary-programs/cybersecurity-ms-interdisciplinary-management-track/>)
gradbusiness@uah.edu radbusiness@uah.edu (gradbiz@uah.edu)

Supply Chain and Logistics Management, MS

For an overview of the program click here (<https://www.uah.edu/business/grad/degrees/ms-sclm/>).

Program Prerequisites

Program prerequisites include a bachelor's degree in any field and demonstration of competency in statistics.

Degree Requirements

The MS-SCLM program consists of 30 semester hours of graduate coursework. MGT 693, Supply Chain Strategy & Practicum, is the capstone course and should be taken toward the end of the student's program. A student must earn a grade of B or better in MGT 693.

Code	Title	Semester Hours
Required Courses		30
ACC 600	FOUNDATIONS ACC MANAGERS & ENG ¹	
IS 522	SUPPLY CHAIN MANAGEMENT SYS	
MGT 501	INTRO TO CONTRACT MANAGEMENT	
MGT 611	SUPPLY CHAIN MANAGEMENT	
MSC 510	TRANSPORTATION & LOGISTICS	
MSC 600	QUANTITATIVE METHODS ¹	
MSC 605	OPERATIONS MANAGEMENT	
MSC 615	DECISION MODELING	
MGT 693	SUPPLY CHAIN STRATEGY & PRACT	
5xx or 6xx Level Elective ²		
Total Semester Hours		30

- ¹ Students whose previous studies include the undergraduate equivalents of ACC 600 and/or MSC 600 can substitute a 3-credit-hour graduate-level course for each of the latter.
- ² Recommended Elective: MGT 503

Additional Information

Thesis Option

A thesis option is available. Students interested in this option should contact both the faculty member who the student wants to serve as the thesis advisor, and the Graduate Advisor in the College of Business, before completing 12 hours of graduate study. If selected, the student will register for the IS 699 Masters Thesis course for 6 credit hours in lieu of 6 credit hours of electives.

Transfer Credit

Up to 12 semester hours of graduate credit taken at other AACSB-accredited universities may be transferred to meet MS-SCLM degree requirements. Inquiries about the transferability of specific courses should be directed to the Graduate Advisor, who will consult with the faculty to determine whether the content of the class will be accepted for transfer credit.

For more information contact:

Tressa Hillman-Moore

Graduate Advisor

Business Administration Building Room 102

256.824.6732

g (<http://catalog.uah.edu/grad/colleges-departments/business/supply-chain/gradbusiness@uah.edu>)radbusiness@uah.edu (gradbiz@uah.edu)

Management - Human Resource Management, MS

For an overview of the program click here (<https://www.uah.edu/business/grad/degrees/hrm/>).

Program Prerequisites

Program prerequisites include a bachelor's degree in any field and demonstration of competency in statistics.

Degree Requirements

The MSM-HRM program consists of 30 semester hours of graduate coursework.

MGT 695, Strategic Human Resource Management, is the capstone course and should be taken toward the end of the student's program. A student must earn a grade of B or higher in MGT 695.

Code	Title	Semester Hours
Required Courses		30
ACC 600	FOUNDATIONS ACC MANAGERS & ENG ¹	
MGT 560	EMPLOYEE STAFFING & DEVELOP	
MGT 561	STRATEGIC COMPENSATION MGMT	
MGT 562	EMPLOYMENT LAW FOR MANAGERS	
MGT 622	MANAGING HUMAN CAPITAL	
MGT 629	LEADERSHIP: THRY & PRACTICE	
MGT 631	HRM & ORGANIZATIONAL BEHAVIOR	
MSC 600	QUANTITATIVE METHODS ¹	
MSC 605	OPERATIONS MANAGEMENT	
MGT 695	STRATEGIC HUMAN RESOURCE MGT	
Total Semester Hours		30

- ¹ Students whose previous studies include the undergraduate equivalents of ACC 600 and/or MSC 600 can substitute a 3-credit-hour graduate-level course for each of the latter.

Additional Information

Thesis Option

A thesis option is available. Students interested in this option should contact both the faculty member who the student wants to serve as the thesis advisor, and the Graduate Advisor in the College of Business, before completing 12 hours of graduate study. If selected, the student will register for the MGT 699 Master's Thesis course for 6 credit hours in lieu of 6 credit hours of electives.

Transfer Credit

Up to 12 semester hours of graduate credit taken at other AACSB-accredited universities may be transferred to meet MSM-HRM degree requirements. Inquiries about the transferability of specific courses should be directed to the Graduate Advisor, who will consult with the faculty to determine whether the content of the class will be accepted for transfer credit.

For more information contact:

Tressa Hillman-Moore

Graduate Advisor

Business Administration Building Room 102

256.824.6732

g (<http://catalog.uah.edu/grad/colleges-departments/business/management-hr/gradbusiness@uah.edu>)radbusiness@uah.edu (gradbiz@uah.edu)

Management Science - Business Analytics, MS

For an overview of the program click here. (<https://www.uah.edu/business/grad/degrees/analytics/>)

Program Prerequisites

Program prerequisites include a bachelor's degree in any field and demonstration of competency in statistics.

Degree Requirements

The MSMS-BA program consists of 30 semester hours of graduate coursework.

MSC 692, Business Analytics Practicum, is the capstone course and should be taken toward the end of the student's program. A student must earn a grade of B or higher in MSC 692.

Code	Title	Semester Hours
Required Courses		30
ACC 600	FOUNDATIONS ACC MANAGERS & ENG ¹	
IS 571	BUSINESS ANALYTICS & AI	
IS 640	DATA MGT AND DATA MINING	
MSC 550	INTRO ANALYTICS & PROGRAMMING	
MSC 600	QUANTITATIVE METHODS ¹	
MSC 605	OPERATIONS MANAGEMENT	
MSC 610	MODELING & SIMULATION	
MSC 615	DECISION MODELING	
MSC 641	ADVANCED ANALYTICS	
MSC 692	BUSINESS ANALYTICS PRACTICUM	
Total Semester Hours		30

¹ Students whose previous studies include the undergraduate equivalents of ACC 600 and/or MSC 600 can substitute a 3-credit-hour graduate-level course for each of the latter.

Additional Information

Thesis Option

A thesis option is available. Students interested in this option should contact both the faculty member who the student wants to serve as the thesis advisor, and the Graduate Advisor, before completing 12 hours of graduate study. If selected, the student will register for the MSC 699 Master's Thesis course for 6 credit hours in lieu of 6 credit hours of electives.

Transfer Credit

Up to 12 semester hours of graduate credit taken at other AACSB-accredited universities may be transferred to meet MSMS-BA degree requirements. Inquiries about the transferability of specific courses should be directed to the Graduate Advisor, who will consult with the faculty to determine whether the content of the class will be accepted for transfer credit.

For more information contact:

Tressa Hillman-Moore

Graduate Advisor

Business Administration Building Room 102

256.824.6732

g (<http://catalog.uah.edu/grad/colleges-departments/business/management-science/gradbusiness@uah.edu>)radbusiness@uah.edu (gradbiz@uah.edu)

College of Education

323 Roberts Hall

Telephone: 256.824.6180

Email: education@uah.edu

Dean: Beth N. Quick, Ed.D.

Degrees

Master of Arts in Teaching (M.A.T.) (multiple concentrations; initial teaching certification only)

Master of Education in Differentiated Instruction (M.Ed.) (multiple concentrations; advanced teaching certification)

Master of Science in Applied Behavior Analysis (M.S.)

Graduate Certificate in Autism Spectrum Disorders

Mission

The College of Education at The University of Alabama in Huntsville is a member of a diverse academic community of teacher scholars that challenges teacher candidates to strive for excellence in all aspects of their lives. The professional environment affords the College of Education unique opportunities to make a difference in the lives of elementary, middle, and high school students regardless of socio-economic backgrounds. In addition, the College educates teacher candidates who will live and work effectively in increasingly complex societies. Consistent with the mission of the university, the College of Education defines its mission through three focal elements:

1. To prepare teachers and other school personnel who are academically strong, competent in both theory and practice, and prepared to contribute to the needs of a dynamic, complex world.
2. To provide an environment that encourages the department faculty to model sound pedagogy, engage in research and scholarly activities, and become leaders in their area of expertise.
3. To make our teaching, research, and service available to the entire community in order to meet the changing needs of schools, organizations, and professional communities in our region, state, nation, and international community.

The mission of the College of Education is communicated through our shared vision and articulated in our theme, ***Through Teaching, We Lead.***

The establishment of this theme codifies the major purpose of our College: to graduate teachers who are exceptionally well-prepared in disciplinary, pedagogical, and professional knowledge, who understand and are prepared to address the needs of all learners, and who are committed to serving as leaders in the educational community to ensure that all students receive a high-quality public or private education.

Master of Education (M.Ed.)

The Department of Curriculum and Instruction provides the Master of Education (M.Ed.) in Differentiated Instruction for teachers already certified at the baccalaureate level and seeking advanced level (Alabama Class A) certification. The M.Ed. has five **concentration** areas that include:

- Differentiated Instruction in Elementary Education (K-6)
- Special Education/Collaborative Teaching: Autism Spectrum Disorder (K-6 or 6-12)
- Reading Education (Reading Specialist P-12)
- English Speakers of Other Languages (ESOL; P-12)
- Differentiated Instruction in Secondary Education (6-12) (biology, chemistry, English language arts, history, mathematics, and physics)
- Visual Impairments (P-12)

Master of Arts in Teaching (M.A.T.) Alternative Fifth Year

The Alternative Fifth Year Program Master of Arts in Teaching (M.A.T.) is available to individuals who have completed a baccalaureate degree from a regionally accredited institution in a field other than teacher education. Students eligible for this program do not have a Class B (baccalaureate level) teaching certificate. Students should contact the Teacher Certification Officer and the advisor in the chosen teaching field for an individual evaluation concerning undergraduate deficiencies prior to initial registration in this program. The Alabama State Department of Education requires all applicants for the secondary education alternative fifth year programs to have an academic major in the teaching field or if an academic major is not on the official transcript, 32 semester hours appropriate to the teaching field including at least 19 semester hours of upper-division credit.

Certification for alternative fifth-year programs is available in the following areas:

- Secondary Elementary (K-6)
- Secondary Biology (6-12)
- Secondary Chemistry (6-12)
- Secondary English Language Arts (6-12)
- Secondary English Speakers of Other Languages (6-12)
- Secondary History (6-12)
- Secondary Mathematics (6-12)
- Secondary Physics (6-12)
- Physical Education (K-12)
- Music Instrumental (K-12)
- Music Choral (K-12)

Master of Science in Applied Behavior Analysis (M.S. in ABA)

The Master of Science in Applied Behavior Analysis will provide a unique opportunity to support the education of individuals with unique behavior needs by applying rigorous, scientific methods to develop programs and services for these individuals. This program will provide a unique opportunity to supply the state with more behavioral analysts.

Accreditation

Teacher education programs in the College of Education at The University of Alabama in Huntsville are accredited by the National Council for Accreditation of Teacher Education (NCATE) and approved by the Alabama State Board of Education, according to standards of the National Association of the State Directors of Teacher Education and Certification (NASDTEC), for the issuance of appropriate professional certificates for service in public schools.

Master of Arts in Teaching (M.A.T.) Degree Program

Admission Requirements

1. Unconditional admission to UAH and major department (if applicable)
2. GPA of 3.0 or higher in undergraduate teaching field courses and education courses; no grade lower than C
3. Passing score on required Praxis II Content Area Exam
4. Program of Study (POS) on file in Education

Master of Education (M.Ed.) Degree Program

Admission Requirements

1. Unconditional admission to UAH and major department (if applicable)
2. Valid Alabama Class B Teaching Certificate in same or broader field in which advanced certification is sought
3. GPA of 3.0 or higher in undergraduate teaching field courses and education courses; no grade lower than C
4. Program of Study (POS) on file in Education

Additional Requirements for Reading Specialist (P-12) Candidates

1. Two years of successful classroom teaching experience
2. A valid baccalaureate certificate (Class B) in an area of education
3. Certification in Early Childhood, Elementary, or Collaborative Teacher Education; or two reading courses, one of which is introductory

Mid-Point Review (After Completion of 19-21 Semester Hours)

1. Maintain 3.0 or higher GPA in Education and in teaching field courses with no grade lower than C
2. Interview with College of Education advisor and/or faculty to determine pacing in program of study

Completion Requirements

1. Completion of all education and teaching field courses with GPA of 3.0 or higher
2. Pass comprehensive written examinations in teaching field and education, and on Praxis II when required
3. Satisfactory Completion of Capstone Action Research Project

Certification Requirements for All Master's Degree Programs

Alabama teaching certificates are the legal responsibility of the Alabama State Department of Education. Colleges and universities cannot issue professional teaching certificates. In order to be recommended for certification, candidates must complete a state approved program. Approved graduate certification programs offered by the UAH College of Education are designed to prepare candidates for professional Class A certification with a master's degree.

It is the candidate's responsibility to initiate the application for the teaching certificate by meeting with the Certification Officer. Candidates must provide official transcripts of all undergraduate and graduate coursework, complete all forms required by the Alabama State Department of Education, and pay appropriate fees. Candidates who expect to teach in states other than Alabama are responsible for knowledge of the licensure requirements of those states. Such candidates should inform the certification officer of their intentions.

Certificate Renewal

1. The Class A certificate is valid for five years. This certification may be renewed upon verification of successful teaching for three years and completion of an approved professional development program or additional graduate level credits in the certification area.
2. Individuals who allow their certificates to lapse for more than 6 months will also be required to renew their certificates and to obtain another background clearance for the issuance of a renewed certificate or license. The UAH College of Education in accordance with the Alabama State Board of Education provides courses for persons who hold expired certificates and wish to reinstate them.

Master of Science in Applied Behavior Analysis (M.S.) Degree Program

Admission Requirements

To be admitted unconditionally, applicants must satisfy at least one of the following criteria:

1. A minimum grade-point average of 3.0 on the undergraduate record, **and**
2. A minimum score of 300 verbal and quantitative with no scores below 150 or a score of 410 on the Miller Analogies Test (MAT)
3. TOEFL or IELTS (for non-native English speakers):
 - a. TOEFL (iBT): all sub-scores greater than or equal to 18 OR
 - b. IELTS: all sub-scores greater than or equal to 6.0
4. Program of Study (POS) on file in Education

Master of Arts in Teaching Elementary (initial teaching license, Alt-A, for grades K-6)

Master of Arts in Teaching (initial teaching license, Alt-A, for grades 6-12)

- Biology (<http://catalog.uah.edu/grad/colleges-departments/education/biology/>)
- Chemistry (<http://catalog.uah.edu/grad/colleges-departments/education/chemistry/>)
- English Language Arts (<http://catalog.uah.edu/grad/colleges-departments/education/english-language-arts/>)
- English Speakers of Other Languages (<http://catalog.uah.edu/grad/colleges-departments/education/esol/>)
- History (<http://catalog.uah.edu/grad/colleges-departments/education/history/>)
- Mathematics (<http://catalog.uah.edu/grad/colleges-departments/education/mathematics/>)
- Physics (<http://catalog.uah.edu/grad/colleges-departments/education/physics/>)

Master of Education (leads to Class A licensure)

- Autism Spectrum Disorders (Collaborative K-6 or 6-12) (<http://catalog.uah.edu/grad/colleges-departments/education/autism/>)
- Elementary Education - Differentiated Instruction (Elementary K-6) (<http://catalog.uah.edu/grad/colleges-departments/education/elementary-education/>)
- English Speakers of Other Languages (P-12) (<http://catalog.uah.edu/grad/colleges-departments/education/english-other/>)
- Reading Specialist (P-12) (<http://catalog.uah.edu/grad/colleges-departments/education/reading/>)

- Secondary Education - Differentiated Instruction (6-12) (<http://catalog.uah.edu/grad/colleges-departments/education/secondary/>)
- Visual Impairments (P-12) (<http://catalog.uah.edu/grad/colleges-departments/education/visual-impairments/>)

Master of Science in Applied Behavior Analysis

Autism Spectrum Disorders (<http://catalog.uah.edu/grad/colleges-departments/education/autism-certificate/>)

ED 500 - SPEC TOPICS EDUCATION

Semester Hours: 1-3

Independent study, special projects, and special in-service programs.

ED 501 - INTRO TO EDUCATION

Semester Hour: 1

Initial practicum experience designed to provide the opportunity to explore the role of the classroom teacher in today's diverse school settings. Required for graduate students receiving their initial certification.

ED 510 - FOUNDATIONS OF LITERACY

Semester Hours: 3

This course includes a study of methods, materials, and strategies for reading instruction. Components of the course will include but not be limited to the five pillars of reading instruction identified by the National Reading Panel (2000): phonemic awareness, phonics, fluency, vocabulary, and comprehension. Emphasis is placed on the various stages of and approaches to literacy development, knowledge of which is required for the Alabama Reading Specialist licensure.

ED 513 - LITERATURE FOR CHILDREN & ADOL

Semester Hours: 3

Course content will include the study of various genres of children's and adolescent literature and their relationship to beginning reading, enhancement of reading comprehension, and intervention instruction in the various content areas. (Same as EH 613) Must be admitted to the Teacher Education Program.

ED 520 - COMPUTER BASED INSTRUCT'L TECH

Semester Hours: 3

Introduces prospective teachers to current state of the art in educational technology. Extensive hands-on experiences with microcomputers and other emerging technology. Emphasis on effectively integrating technology into instructional setting for both special and regular students.

ED 521 - SECNDRY ELA INSTR WRIT TO READ

Semester Hours: 2-3

Candidates explore the ways they can use specific writing-to-learn activities to enhance their students' capacity to understand a variety of complex texts. Candidates will learn techniques for engaging students in the questioning, inference-making, syntactical pattern recognition, and meaning-making of both fiction and nonfiction works.

ED 522 - MIDDLE & SECD SCH MATH METHODS

Semester Hours: 2-3

This course is part one in a series of two courses that are designed for teacher candidates who are pursuing teaching certification who are pursuing teaching certification in middle and/or secondary mathematics. This methods course provides background for middle school and secondary teaching from the perspective of theory, research, and practice.

ED 523 - TCHNG SCIENCE MID & SEC SCH I

Semester Hours: 2-3

This course will focus on how secondary students learn science. Candidates will learn how to develop and design developmentally appropriate lessons in which their students are able to make observations, examine relationships, notice patterns, and make inferences, while confronting naive misconceptions. Candidates will discuss the nature of science (NOS).

ED 524 - TCHNG SOC STUD MID & SEC SCH I

Semester Hours: 2-3

This course teaches research-based techniques and strategies employed by social science teachers at the secondary levels. As well as learning theoretical foundations and the goal of social science instruction (citizenship skills), students will learn pedagogic skills, instructional strategies, and modes of reasoning unique to the social studies classroom.

ED 530 - APPLIED MULTICULTURALISM

Semester Hours: 3

Through an examination of constructs such as race, ethnicity, social class, gender, sexual orientation, and religious affiliation, students will develop an understanding of the connections between identity, difference, power, and privilege and the role(s) school (could/should) play in perpetuating or ending discriminatory practices. Furthermore and more importantly, students will develop an understanding of the ways research in both the humanities and social sciences can be used to interpret, analyze, and critique multiculturalism. Students will leave the course with research-based pedagogical practices designed to help all students learn to the best of their abilities.

ED 531 - SEC ELA METHDS READING

Semester Hours: 2-3

In this course, candidates will explore the ways they can use specific reading activities to enhance their students' ability to express themselves in multiple registers and forms of discourse. Candidates will learn techniques for engaging students in the process of developing and expressing their ideas while demonstrating and improved command of the grammatical, syntactical, and discursive elements of language.

ED 532 - SPACE ORIENTATION TEACHERS

Semester Hours: 3

A weeklong course at the U.S. Space and Rocket Center in Huntsville, Alabama for pre-service and in-service teachers. The inquiry based workshops are taught around the theme of space exploration include activities to be done across the curriculum. All activities are correlated to National Math, Science, Technology, Social Studies, and Reading Standards. Activities based on curriculum developed by NASA, CAP, NSATA, and the USSRC. Topics include moon, mars, rocketry, propulsion, hydroponics, math, biology, history and literature.

ED 533 - TEACH SC MID & SEC SCHOOL II

Semester Hours: 2-3

Students will discuss the status of science education in our nation's schools, and the need for implementing research-based strategies in the classroom using the 5E learning cycle as framework.

ED 534 - TEACH SOC ST MID & SEC SCHL II

Semester Hours: 2-3

This methods course is designed to study effective techniques and strategies employed by social science teachers at the middle and secondary levels. As well as learning theoretical foundations in social studies education, students will learn pedagogic skills, instructional strategies, and modes of reasoning unique to the social studies classroom.

ED 535 - INTRO APPLIED EDUCATIONAL RES

Semester Hours: 3

Introduction to the nature of research and its relationship to educational thought and practice. Primary focus will be on planning and executing research activities (i.e. action research, thesis development) in the diverse classroom and analyzing the collected data to improve instruction, educational performance, and adding to the body of knowledge in educational practices.

ED 539 - TCH REASON/PROOF SEC MATH

Semester Hours: 2-3

This methods course provides background for middle school and secondary teaching from the perspective of theory, research, and practice. It is designed to provide an introduction to and practice in ways in which to encourage students in mathematical reasoning and proof.

ED 540 - COGN DEV THEORIES LEARNING

Semester Hours: 3

The course is designed to inform students about recent developments in Cognitive Psychology and their implications for teaching and learning. Students will leave the course with a variety of 'cognitive understandings' for use in differentiated classrooms.

ED 545 - CURR & INSTR IN SEC SCHOOLS

Semester Hours: 3

This course is designed to address various contemporary teaching and learning strategies, as well as related issues, assessments strategies, and applicable theories related to secondary teaching and learning.

ED 560 - CURR/EMERGING INSTR TECH

Semester Hours: 3

Designed to build competency in computer technologies appropriate to instructional use. Concepts of authoring and scripting will be used to unify course materials. (Same as CS 560.).

ED 565 - INTRO DIFFERENTIATED INSTRUCTI

Semester Hours: 3

The course provides an introduction to the philosophy and practice of differentiation. Students will examine the elements, content, process, product, affect and environment by which instruction can be differentiated to address the complex challenges of meeting the diverse learning needs of all students.

ED 570 - DIFF INSTRUCTION SPEC POP

Semester Hours: 3

The course provides practical strategies to maximize learning for all students, particularly those with disabilities, gifted/talented, and English language learners (ELL).

ED 575 - READING PRIMARY GRADES

Semester Hours: 3

An introduction to the basic principles of literary instruction in culturally and linguistically diverse primary grade classrooms, including theoretical bases for instruction, methods of instruction and organization, developmentally appropriate strategies and materials, and assessment of children's literacy. Class activities include mini-lessons, discussions, group activities, and presentations. An intensive school-based practicum in grades preK-2 is required.

ED 580 - PROJECT BASED LEARNING

Semester Hours: 3

Develop a robust understanding of Project Based Learning (PBL) through critiquing, evaluating, and synthesizing PBL's core theoretical concepts.

ED 593 - ED EXCEPT CHILD & YOUTH

Semester Hours: 3

Introduction to the field of exceptional children and youth, including observations. This course, or equivalent, is a prerequisite to certification. Intensive field experience required.

ED 600 - SPEC PROB IN EDUCATION

Semester Hours: 1-3

Independent study, special projects, and in-service programs.

ED 604 - CONTRIBUTION PSY TO EDUC

Semester Hours: 3

Principles, theory, and practice of psychology for teaching and administrative service in educational institutions. Factors that determine learning and conditions of effective teaching. Administrator and supervisor as organizer of the milieu wherein teaching, learning, and growth occur. Intensive field experience required.

ED 605 - READING RESEARCH & INSTRUCTION

Semester Hours: 3

Elements of effective reading instruction for beginning readers as supported by current research and practice. Topics include balance, language-rich/print-rich environment, language development, phonemic awareness, print awareness, phonics, writing, spelling, and comprehension. Intensive field experience required.

ED 607 - EDU LEADER AS EVALUATOR

Semester Hours: 3

Procedures and techniques of evaluation and research approaches. Emphasis on teachers as evaluators; based on action research in the classroom. Intensive field experience required.

ED 608 - EXPAND RDG ABIL CONT AREA INST

Semester Hours: 3

Strategies to enhance reading comprehension when using materials in all subject areas. Teacher directed, integrated instruction; extensive use of authentic printed materials; discussion at literal and higher levels of understanding, motivation, vocabulary, and writing. Intensive field experience required.

ED 609 - CLASSROOM & BEHAVIOR MGMT

Semester Hours: 3

A focus on the variety of instructional management options to meet classroom and individual student needs to ensure success in school is integrated throughout all course activities. A range of management practices, including strategies for diverse and special populations is offered. Theoretical and reflective practices are incorporated during classroom meetings. Students will observe, research, and discuss current classroom approaches. After reflections, effectiveness of observed practices will be assessed. Student will discuss and develop alternative activities that promote successful management techniques. Intensive field experience required. Admission to the Teacher Education program or permission of chair is required for this class.

ED 610 - TEACHING FINE ARTS ELEM SCHOOL

Semester Hours: 2-3

This course covers multiple aspects of fine arts education including the use of content, functions, and achievements of the performing arts (dance, music, theatre) and visual arts as primary media for communication, inquiry, and engagement among elementary students.

ED 612 - DIAGNOSIS & ASSMNT OF READING

Semester Hours: 3

Focuses on ways to address the needs of students who do not read at grade level. Intervention strategies such as on-going assessment and evaluation, explicit instruction in phonemic awareness and phonics, extensive practice, comprehension strategies, and writing, along with careful examination of standardized state assessment measures. Intensive field experience required.

ED 615 - READING INTERMEDIATE GRD

Semester Hours: 3

This course provides an in-depth study in and application of the process of reading and reading instruction, theoretical approaches, instructional strategies, classroom organization, and the formal/informal assessment of reading in intermediate grades. This course is required of all elementary education majors and secondary education candidates who are pursuing a middle school endorsement. Intensive field experience required.

Prerequisites: Admission to the Teacher Education Program.

ED 620 - USING TECH REACH SPEC POP

Semester Hours: 3

Prepares teachers to plan curriculum integration by using computer technology and software in various curriculum areas for both regular and special students. Students will develop competency in instructional design and production skill techniques and implement instructional events using long-distance technologies.

ED 635 - ASMT GUIDE DIFFRNT INSTRUCTION

Semester Hours: 3

The focus of this course would be to use a variety of norm-referenced, criterion-referenced and other assessment data to inform instruction for a diverse classroom within the RTi model. Students would learn to use formative and summative assessments to determine the type of strategies needed to teach content.

ED 640 - DIFD STRGTY RES & TEACH ELL

Semester Hours: 3

The course provides the foundation for informed and effective instruction of nonnative speakers of English across diverse settings. ED 640 introduces students to theoretical underpinnings of historical and contemporary ESOL education; to the analysis, critique and selection of instructional materials; to the design of courses and lessons; and, to strategies for pedagogically sound classroom instruction, lesson planning, and action research.

ED 650 - DIFFNT ELEM MATH & SCI INSTRUC

Semester Hours: 3

This course will focus on guiding the learner to apply the concepts of differentiated instruction within mathematics and science contexts. Participants will learn how to implement effective strategies for managing flexible groups, acquire ideas for providing students with a variety of options to successfully target mathematics and science standards and understand how to plan strategically in order to reach the needs of diverse learners within the classroom through inquiry-based learning.

ED 665 - DIFFNT ELEM LITERACY (R & W)

Semester Hours: 3

This course will focus on guiding the learner to apply the concepts of differentiated instruction to elementary literacy concepts. Advanced teacher candidates will develop and implement differentiated instructional plans that utilize individual and flexible grouping strategies and resources to support the growth of strategic, independent readers and writers.

ED 671 - TCHG ELEM LANGUAGE ARTS

Semester Hours: 3

Introduction to current practices in language arts instruction with emphasis on the development of an integrated curriculum using children's literature as a foundation. Includes appropriate techniques for teaching of grammar, spelling, and handwriting. Intensive field experience required. Prerequisites: Admission to the Teacher Education Program.

ED 672 - TCHG ELEM SOCIAL STUDIES

Semester Hours: 3

Teaching social studies in grades K-6. Helping beginning teachers acquire background skills in organizing and teaching units of work. Intensive field experience required. Prerequisites: Admission to the Teacher Education Program.

ED 673 - TCHG NATURAL/HLTH SCIENCE

Semester Hours: 3

Integrates concepts from reflective practice with elementary science teaching. Opportunity to refine teaching skills in the planning, implementation, and evaluation of science lessons and units of instruction. Intensive field experience required. Prerequisites: Admission to the Teacher Education Program.

ED 674 - TCHG ELEM. MATHEMATICS

Semester Hours: 3

Overview of the mathematics concepts and skills taught in grades K-6 with an emphasis on the principles, methods, and materials used in the teaching and evaluation of elementary school mathematics. Focuses on the attitudes and behaviors of students and teachers in the actual planning and implementation of mathematics instruction for an elementary school classroom. Intensive field experience required. Prerequisites: admission to the teacher education program.

ED 690 - MASTER'S ACTION RESEARCH PROJ

Semester Hours: 3

The capstone course will serve as a mechanism to support the research, methodology, development, and experimental stages of the required action research. The student's work will be approved and supervised by a selected faculty advisor with direct connections to the research area. A symposium in which students present their research report will be culminating activity.

ED 691 - PORTFOLIO SEMINAR & SYMPOSIUM

Semester Hour: 1

The seminar will provide a forum in which the student's culminating portfolio is refined and submitted for faculty review. The seminar will also serve as a mechanism to support the final writing stages of the required action research project or case study report. The student's work will be approved and supervised by the faculty advisor(s). A symposium in which students present their research will be the culminating activity.

ED 692 - ADVANCED P-12 INTERNSHIP

Semester Hours: 3

This internship is for students in advanced programs. The internship is completed throughout the program with a culminating portfolio of all internship assignments.

ED 693 - ELEMENTARY INTERNSHIP

Semester Hours: 6

Observation, participation and teaching in elementary school (full time, 15 week semesters). Students will also attend campus-based seminars designed to meet specific needs of the interns.

ED 696 - P-12 INTERNSHIP

Semester Hours: 3-6

ED 698 - HIGH SCHOOL INTERNSHIP

Semester Hours: 3-6

Observation, participation, and teaching in middle/high school (full-time, 15 week semester). Students will also attend campus based seminars designed to meet specific needs of interns.

EDC 511 - INSTRUCTIONAL STRATEGIES

Semester Hours: 3

This course provides foundational, in-depth pedagogical strategies for assisting learners in constructing their own understanding of information. This course focuses on multiple instructional options that all learners need in order to be successful. It takes a broad approach to the multiple teaching models that are necessary for working with diverse populations.

EDC 551 - FND OF VISUAL IMPAIRMENTS

Semester Hours: 3

Introduction to academic language found within the profession of special education of students with visual impairments. Examines standards, organizations, programs, and services for students with visual impairments. Studies the basic anatomy, diseases, and disorders of the visual system and explores how to conduct a Functional Vision Assessment.

EDC 610 - BEHAVIORAL ASSESSMENT

Semester Hours: 3

This course will provide an introduction to the strategies, methods, and ethics associated with behavioral assessment. The defining characteristics, strengths, and weaknesses of indirect assessments, descriptive assessments, and functional analysis will be reviewed. Students will learn to differentiate between and implement each type of assessment method. Assessment data collection, analysis, and interpretation will be discussed in the context of identifying appropriate behavioral interventions and goals.

EDC 611 - ETHICS IN ABA

Semester Hours: 3

This course will familiarize the student with ethical and professional responsibilities for Board Certified Behavior Analysts. Ethical decision-making processes will be emphasized with respect to the ethical guidelines set forth by the BACB (C), and the relationship between ethics, policy, and law will be explored.

EDC 612 - FUNDAMENTALS IN ABA I

Semester Hours: 3

This course will introduce students to the goals, philosophical assumptions, and dimensions of applied behavior analysis. Students will also be introduced to the basic concepts and principles of behavior analysis including, but not limited to, respondent and operant conditioning, reinforcement and punishment contingencies, schedules of reinforcement, extinction, motivating operations, and automatically and socially mediated consequences. The concepts and principles will be discussed with respect to how they are relevant to socially significant behavior.

EDC 613 - FUNDAMENTALS OF ABA II

Semester Hours: 3

Students will describe and explain behavior from the perspective of radical behaviorism and distinguish among behaviorism, the experimental analysis of behavior, applied behavior analysis, and professional practice guided by the science of behavior analysis. Students will be able to define and provide examples of more complex concepts and principles such as stimulus control, discrimination, generalization, verbal operants, and derived stimulus relations. Prerequisites: EDC 612.

EDC 614 - RESEARCH METHODS IN ABA

Semester Hours: 3

The purpose of this course is to introduce students to the fundamentals of behavior analytic research methods. The course will examine the strategies and tactics used in single-subject research to implement socially important behavior change.

EDC 615 - INTERVENTIONS IN ABA

Semester Hours: 3

This course will prepare students to identify and implement effective, data-based behavior-change procedures and interventions in applied settings. Elements of behavior change and procedures to accomplish behavior increases, decreases, generalization, and maintenance will be examined. Emphasis will be placed on reinforcement, schedules of reinforcement, extinction, and alternate treatment procedures. This course will also examine strategies, teaching self-management, group-oriented contingencies, shaping techniques, behavior chains, motivational systems, punishment, and other topics. Students will learn how to select and implement function-based interventions for the reduction of problem behaviors and skills-based prevention strategies.

EDC 616 - SUPERVISION & MGMT IN ABA

Semester Hours: 3

This course will prepare students to conduct supervision using the principles of behavior analysis. Students will develop performance expectations based on the context, select individualized, assessment-based goals to develop supervisee skills, develop function-based strategies to improve supervisee performance, and design staff training procedures based on behavior analytic research.

EDC 625 - ASSISTIVE TECH EDUC INDV W/ASD

Semester Hours: 3

This course provides an overview of assistive technology devices and services that are used in the instruction of students with autism spectrum disorders (ASD) and other communication disabilities.

EDC 636 - INTRO STUD AUTISM SPECTR DISOR

Semester Hours: 3

This course will provide advanced teacher candidates with an introduction to working with students diagnosed with autism spectrum disorders. Candidates will develop an understanding of the range of characteristics and behaviors associated with ASD, the effectiveness of early intervention on behaviors, and the theories regarding the etiology of the disorder.

EDC 645 - ASMT & BEHAVIOR APPLC ASD

Semester Hours: 3

This course focuses on assessment and intervention planning for children with ASD. Candidates will enhance their knowledge of various assessments appropriate to the ASD population and develop skills to administer and interpret assessments. The course will provide candidates with an overview of the Applied Behavioral Analysis approach to assessing and teaching students with ASD.

EDC 652 - INTRO TO O&M

Semester Hours: 3

Examines the psychosocial implications of blindness, with a particular focus on independence. Exploration of basic orientation mobility concepts including human guide and basic independent travel through the use of verbal description and tactile graphics.

EDC 653 - STRATEGIES FOR VI

Semester Hours: 3

Examines the strategies used to make education accessible to students with visual impairments through the creation of high-quality accommodations and/or modifications. Topics include organization, assessment, early intervention, and the expanded core curriculum. This course is a practicum for visual impairments.

EDC 654 - INTRO TO BRAILLE

Semester Hours: 3

Focused exploration of braille, braille literacy, and braille assessment.

EDC 655 - COLLAB & TRANSITION PLANNG

Semester Hours: 3

Using case-based instructional strategies, this course is designed to assist advanced teacher candidates in learning to build supportive relationships with families, paraprofessionals, and related service providers, including community agencies, as a foundation for designing differentiated learning experiences for students with disabilities.

EDC 656 - PROGRAMS FOR MIVI/DB

Semester Hours: 3

Intensive examination of curricular adaptations, assessment, and intervention for students with multiple disabilities and visual impairments or deafblindness.

EDC 657 - ADVANCED BRAILLE AND AT

Semester Hours: 3

Focused exploration of the braille for use in various contexts (STEM, music, foreign language), assistive technology and STEM education for students with visual impairments.

EDC 660 - PRCTL APPLC VIS INSTR STRATEGY

Semester Hours: 3

Advanced candidates will participate in an extensive summer clinic for children with ASD. Candidates learn how to create an appropriate learning environment, organize schedules for individual students, develop materials, engage in instruction, respond to behavioral issues, and document student progress.

MUA 511 - STUDIO INSTR - VOICE

Semester Hour: 1.5

For Music Majors' principal instrument.

MUA 521 - STUDIO INSTR - ORGAN

Semester Hour: 1.5

For Music Majors' principal instrument.

MUA 531 - STUDIO INSTR - PIANO

Semester Hour: 1.5

For Music Majors' principal instrument.

MUA 551 - STUDIO INSTR - STRINGS

Semester Hour: 1.5

For Music Majors' principal instrument.

MUA 561 - STUDIO INSTR - WOODWINDS

Semester Hour: 1.5

For Music Majors' principal instrument.

MUA 571 - STUDIO INSTR - BRASS

Semester Hour: 1.5

For Music Majors' principal instrument.

MUA 581 - STUDIO INSTR - PERCUSSION

Semester Hour: 1.5

For Music Majors' principal instrument.

MUA 598 - GRADUATE RECITAL

Semester Hour: 1.5

For Music Majors' principal instrument. Prerequisite: One of the following: MUA 511, MUA 521, MUA 531, MUA 551, MUA 561, MUA 571, MUA 581.

MUE 527 - TEACHING GENERAL MUSIC

Semester Hours: 3

Materials and methods. Emphasis on developing teaching competencies in general music, with an emphasis on the elementary school level.

Prerequisite: MU 301.

MUE 528 - VOCAL/CHORAL METH SEC SCH

Semester Hours: 3

Includes principles of breathing, posture and resonance; repertoire for both vocal and choral students; organizational methods for leading choral programs, rehearsal techniques; classroom management skills.

MUX 591 - UAH CHAMBER CHOIR

Semester Hour: 1

Preparation of the finest literature for choral forces. Open to all students by audition with the conductor. Required attendance at rehearsals and performances. Ensemble participation is essential for all music majors and minors, and music majors are expected to participate in an appropriate ensemble each semester the student is enrolled for degree requirements.

MUX 599 - UAH WIND ENSEMBLE

Semester Hour: 1

Preparation of the finest literature for wind ensemble and concert band. Open to all students by audition with the conductor. Required attendance at rehearsals and performances. Ensemble participation is essential for all music majors and minors, and music majors are expected to participate in an appropriate ensemble each semester the student is enrolled for degree.

College of Engineering

102 Engineering Building

Telephone: 256.824.6474

Email: eng_grad@uah.edu (%20eng_grad@uah.edu)

Dean: Shankar Mahalingam, PhD

Associate Dean for Graduate Education and Research: Michael D. Anderson, PhD

Mission

The mission of the College of Engineering is to advance knowledge through research and education of students in core engineering disciplines. The college promotes ethical, innovative, and multidisciplinary approaches in an environment of collaboration with local and global partners to address society's technological problems.

Departments and Degree Programs

The College of Engineering has five academic departments: Chemical and Materials Engineering, Civil and Environmental Engineering, Electrical and Computer Engineering, Industrial and Systems Engineering and Engineering Management, and Mechanical and Aerospace Engineering. The academic departments offer several graduate degree programs including:

- Master of Science in Engineering (Options in Civil, Chemical, Computer, Electrical, Industrial, and Mechanical)
- Master of Science in Aerospace Systems Engineering
- Master of Science in Operations Research
- Master of Science in Software Engineering
- Doctor of Philosophy (Aerospace Systems, Civil, Computer, Electrical, Industrial, and Mechanical)

The College of Engineering also supports several interdisciplinary graduate degree programs including:

- Master of Science in Cybersecurity
- Master of Science in Material Science
- Doctor of Philosophy in Biotechnology Science and Engineering
- Doctor of Philosophy in Material Science
- Doctor of Philosophy in Optical Science and Engineering

Engineering Graduate Study

The College of Engineering comprises five academic departments of instruction and research. These units offer programs of study and research leading to master's and doctoral degrees. Some departments also offer programs in one or more subdisciplines as well as joint programs with other UAH colleges/departments or other universities in the University of Alabama system.

The College of Engineering graduate programs are designed to provide a balance of strong academics and graduate level research. Engineering faculty members provide broad and vigorous research programs with excellent opportunities for thesis and dissertation work.

Admissions

Applicants for graduate study in the College of Engineering must apply for admission to the Graduate School. More information about the admissions process may be found on the Graduate School Admission webpage (<https://www.uah.edu/admissions/graduate/>).

Unconditional admission to an Engineering Master's degree program may be granted to applicants who have

1. earned a baccalaureate degree in engineering from institutions with ABET-accredited or equivalent programs (not required for MS in Operations Research),
2. earned a minimum 3.0/4.0 grade point average for their baccalaureate work
3. earned minimum GRE scores of 145 (Verbal) and 155 (Quantitative) and
4. have met specific program requirements. An engineering department may choose to waive one or more of these requirements with appropriate and documented justification.

International students may be granted unconditional admission if they meet the requirements for unconditional admission described above AND have earned a minimum of 18 on each TOEFL subscore.

For admission to an Engineering Doctoral degree program, additional admissions criteria are specified by each department or program. Students should consult their major engineering department for the additional requirements.

Graduate Assistantships

Financial aid, in the form of teaching and research assistantships, is available for qualified students. Admission to an Engineering graduate degree program does not guarantee financial aid. Students should consult their major department for information on applying for assistantships.

Initial Advisement

Applicants who are granted admission to graduate study in the College of Engineering will be referred to the major department for the assignment of a temporary advisor.

Master's Degree General Requirements

The College of Engineering master's degree programs include a Plan I, thesis option, or a Plan II, non-thesis option. Students who choose the Plan I option must complete and defend a thesis based on research performed under a faculty advisor. Students who choose the Plan II option must complete a capstone experience or a comprehensive exam. Each engineering master's degree program requires a minimum of 30 semester hours. Students should consult with their major department for additional requirements.

A minimum overall grade point average of 3.0/4.0 is required for all graduate courses at UAH, whether or not the course is required to satisfy the master's degree requirements. Further, a minimum overall grade point average of 3.0/4.0 is required for all courses taken at the 600-level or above.

With prior approval, up to 12 hours of courses numbered 500-599 may be taken in fulfillment of the basic program of study. A minimum grade of B must be attained in each engineering course in the student's program of study designated by a number less than 600. If a lower grade is attained, a substitution of another approved course is required. With permission of the major department, students may transfer up to 12 semester hours of acceptable graduate credit earned at an approved institution to satisfy master's degree requirements. Transfer coursework may not be older than 10 years at the time of graduation. All requirements for the master's degree must be completed in six years.

Doctoral Degree General Requirements

The College of Engineering doctoral degree programs require a minimum of 48 hours of graduate level coursework and a minimum of 18 hours of dissertation. All programs require a qualifying examination, which is administered by the supervisory committee within a year after the student has completed their graduate coursework. All programs also require the completion and defense of a dissertation based on research performed under a faculty advisor. Some programs may also require a preliminary examination or other subject examination as well as a research proposal presentation. For those students who have already earned a Master's degree, a minimum of 18 semester hours of approved coursework beyond the Master's degree, with an average grade no lower than a B.

A minimum overall grade point average of 3.0/4.0 is required for all graduate courses at UAH, whether or not the course is required to satisfy the doctoral degree requirements. Further, a minimum overall grade point average of 3.0/4.0 is required for all courses taken at the 600-level or above.

With prior approval, up to 12 hours of courses numbered 500-599 may be taken in fulfillment of the basic program of study. A minimum grade of B must be attained in each engineering course in the student's program of study designated by a number less than 600. If a lower grade is attained, a substitution of another approved course is required. With permission of the major department, students may transfer acceptable graduate credit earned at an approved institution to satisfy Ph.D. degree requirements. Transfer coursework may not be older than 10 years at the time of graduation.

Starting in the Fall semester of 2020, all newly admitted PhD students will be required to complete their degree within 10 calendar years. If a student does not complete the degree within the 10 year limit, the student will automatically be withdrawn from the PhD program and from the College of Engineering. Students may reapply to UAH after the 10 year limit.

Programs leading to the degree of Doctor of Philosophy are offered in the College of Engineering and are granted on the basis of general demonstrated ability to do independent, original investigation. These attributes are tested in a comprehensive examination and in a dissertation that must clearly and effectively present the substantial results of research. These accomplishments, rather than mere accumulation of residence and course credits, are essential considerations in awarding the Ph.D. degree.

Residency Requirements

A majority of semester hours (including thesis/dissertation hours) must be earned at UAH or in the case of joint/shared program, at the participating institution. Residence may be established through either (1) being enrolled as a full-time student (at least 9 graduate semester hours) either for one continuous academic year, or for Spring and Fall semesters in the same calendar year, or (2) being enrolled in at least 6 hours of graduate course work in at least three of the four consecutive semesters.

All research effort presented for residence credit toward the Ph.D. degree must be performed under the direction of a member of the graduate faculty who holds full membership status.

Master's Programs in Engineering

- Aerospace Systems Engineering, MSASE (p. 929)
- Chemical Engineering, MSE (p. 883)
- Civil Engineering, MSE (p. 890)
- Computer Engineering, MSE (p. 907)
- Cybersecurity, MS - Computer Engineering Track (p. 908)
- Cybersecurity, MS Interdisciplinary - Computer Engineering Track (p. 934)
- Cybersecurity, MS Interdisciplinary - Computer Science Track (p. 935)
- Cybersecurity, MS Interdisciplinary - Management Track (p. 863)
- Electrical Engineering, MSE (p. 909)
- Industrial and Systems Engineering, MSE (p. 916)
- Industrial and Systems Engineering, MSOR (p. 918)
- Materials Science, MS (p. 939)
- Mechanical Engineering, MSE (p. 931)
- Software Engineering, MSSE (p. 910)

Doctoral Programs in Engineering

- Aerospace Systems Engineering, PhD (p. 929)
- Biotechnology Science and Engineering, PhD (p. 932)
- Civil Engineering, PhD (Joint with UAB) (p. 891)
- Computer Engineering, PhD (Shared with UAB) (p. 906)
- Electrical Engineering, PhD (p. 907)
- Industrial and Systems Engineering, PhD (p. 915)
- Materials Science, PhD (p. 940)
- Mechanical Engineering, PhD (p. 930)
- Optical Science and Engineering, PhD (p. 942)

Chemical and Materials Engineering

117 Engineering Building
Telephone: 256.824.6810
Email: chegrad@uah.edu

Chair: Anu Subramanian, PhD

Mission

The Department of Chemical and Materials Engineering is dedicated to developing and maintaining undergraduate and graduate programs that educate students in the safe control and manipulation of matter in industrially important chemical and materials systems. The faculty will continue to educate students and maintain its programs by providing intellectual leadership, innovative teaching, university and community service, while conducting internationally recognized research. Undergraduate and graduate programs within the department are continuously refined based on national standards and are designed to encourage interdisciplinary education. Research objectives focus on technology important to the further development of the university, the community, the state of Alabama, and the nation.

Degree Programs

The Department of Chemical and Materials Engineering offers coursework and research leading to the Master of Science degree in Engineering. The Doctor of Philosophy degree is available through the Materials Science PhD program, the Biotechnology Science and Engineering Program, or the Chemical Engineering Option of the Mechanical Engineering PhD program.

The range of research interests in the chemical engineering faculty is broad. It affords graduate students opportunities for advanced work in processes, reaction engineering, electrochemical systems, material processing and biotechnology and energy. The MSE degree granted in these areas of concentration is equivalent to those available in a traditional chemical engineering program. Please contact the Department of Chemical and Materials Engineering (256.824.6810) or visit the CHE homepage at <http://www.uah.edu/eng/departments/cme> (<http://www.uah.edu/eng/departments/cme/>) for further details.

Chemical Engineering, MSE

The MSE in CHE requires a total of 30 semester hours. There are two options: Plan One includes 24 semester hours of coursework and 6 semester hour of thesis work and Plan Two The basic program of study contains a minimum of 18 semester hours of graduate-level course work that must include 12 semester hours in graduate chemical engineering courses and 6 semester hours of courses in Graduate Engineering Analysis.

Chemical Engineering, PhD options

The College of Engineering does not offer a PhD in Chemical Engineering. However, students with a background in chemical engineering may pursue one the following interdisciplinary options:

- PhD in Materials Science. This program is innovative joint-program involving all three campuses of the University of Alabama System (UAB, UAH, and UA) and multiple departments from the UAH College of Science and College of Engineering. The requirements include a three-part program examination, 48 credit hours of graduate coursework, 18 credit hours of dissertation (MTS 799) and successful defense of a doctoral dissertation.
- PhD in Biotechnology Science and Engineering. This is a joint program between the UAH College of Science and College of Engineering. The requirements include 48 credit hours of graduate coursework, 18 credit hours of dissertation (BSE 799) and successful completion of a preliminary examination and a doctoral dissertation.
- PhD in Mechanical Engineering with a Chemical Engineering option. The Chemical Engineering Option of the Mechanical Engineering PhD program requires 48 credit hours of graduate coursework. Students should consult the requirements for the Mechanical Engineering PhD.

Students who wish to pursue one of these options should consult the catalog entries for these programs for more information or visit the CME Department office.

Graduate Programs in Chemical & Materials Engineering

- Chemical Engineering, MSE (p. 883)

CHE 540 - PHYSICAL PROP OF FLUIDS

Semester Hours: 3

Theoretical, experimental, and correlation methods for determining and predicting the thermodynamic and transport properties of various fluids. Critical properties, equations of state, vapor pressure and latent heat, heat capacity. Viscosity, thermal conductivity, diffusion coefficient, phase equilibrium, heat and free energy for formation.

CHE 541 - CHEMICAL KINETICS & REACTOR DE

Semester Hours: 3

Fundamental principles of chemical kinetics and chemical reactor engineering along with the design of both thermal and catalytic reactors.

CHE 549 - INTRO ENVIRONMENTAL ENGR

Semester Hours: 3

Engineering aspects of air, water, and thermal pollution. Hydrologic cycle, water sources and uses; industrial and other sources of primary and secondary pollutants. Transport process in environmental problems and in their control.

CHE 552 - EXPER TECH IN FLUID MECH

Semester Hours: 3

CHE 559 - SELECTED TOPICS/CHE

Semester Hours: 1-6

Discussion of biocompatible polymers and their application in drug delivery systems. Polymers of natural and synthetic origin will be studied, special emphasis will be placed upon the synthesis of biocompatible polymers. The formation of polymeric micelles, hydrogels and liposomes will be studied. The process of extravasation as uptake mechanism for polymeric delivery systems will be discussed. Reading material will be based on the latest publications in the field.

CHE 560 - INTRO TO BIOPROCESS ENGR

Semester Hours: 3

Application of engineering principles to the analysis of and the development and design of processes using biological catalysts including enzymes, plant and animal cells, and genetically engineered cells. Other topics include fermentation and biological mass transport processes.

CHE 561 - BIOSEPARATIONS RECOMBI TECH/PR

Semester Hours: 3

General characteristics of separation processes used in the biotechnology industry, including removal of insolubles, isolation and purification of thermally sensitive products for final use by the customer. Application of unit operation principles for biological separations, recombinant DNA techniques, protein engineering. Prerequisite: CHE 560.

CHE 594 - APPLIED MATERIALS PROCESSING

Semester Hours: 3

Synthesis and processing methods of materials for engineering applications. Selection and use of materials performance factors for design of structural and functional components. Use of computational methods in solving open-ended design problems that depend on an understanding of the nature and properties of materials will be emphasized. All classes of materials are covered.

CHE 595 - POLYMER ENGINEERING

Semester Hours: 3

Engineering principles of polymers and their role in manufacturing processes. Aspects of polymer phenomena and their relationship to processing of structural and functional components.

CHE 641 - ADV THERMODYNAMICS

Semester Hours: 3

Application of classical thermodynamics. Treatment of problems involving nonideal gases and liquids, phase equilibrium, and chemical equilibrium.

CHE 642 - PHYSICOCHEMICAL HYDRODYNAMICS

Semester Hours: 3

Treatment of electrokinetic phenomena, axial dispersion, convective diffusion in liquids, Brownian motion, flows driven by surface tensions, capillary motion.

CHE 644 - INTRO ELECTROCHEM SYSTEM

Semester Hours: 3

Thermodynamics, transport, and kinetics of electrodes and cells. Systems analysis of batteries, fuel cells, porous electrodes, electroplating, electrowinning, and corrosion processes. Convective diffusion at high Schmidt numbers.

CHE 646 - THERMODYNAMICS OF MATRLS

Semester Hours: 3

Fundamental thermodynamic review, phase equilibrium, chemical reaction equilibrium, free energy, binary and ternary phase transformations, solution models and selected topics.

CHE 648 - TRANSPORT PHENOMENA I

Semester Hours: 3

Introduction to transport phenomena, fluid and continuum mechanics. Exact solutions of the Navier-Stokes equation. Introduction to boundary-layer. Multiphase flows. Capillary flows.

CHE 649 - TRANSPORT PHENOMENA II

Semester Hours: 3

Introduction to transport phenomena with emphasis on energy and mass transport. Equations of energy change. Free and forced convection. Equations of mass change. Ficks Law. The Stephan-Maxwell equations. Mass transport in multiphase systems. Prerequisite: CHE 648.

CHE 650 - PRINC LIQUID/SOLID INTER

Semester Hours: 3

Applies basic principles in thermodynamics and kinetics to characterize surfaces and surface phenomena. Fundamental properties of gas-liquid, liquid-liquid, solid-liquid, and solid-gas interfaces and phenomena occurring at these interfaces.

CHE 652 - INTRO TO AIR POLLU CONTROL

Semester Hours: 3

Technology of air pollution dealing with air pollutants, effects, sources, combustion processes, and abatement and control technology. Engineering contributions to both the problems and their solutions. Nature of air pollution problem and fundamental technological approaches to its solution.

CHE 657 - ADVANCED PROCESS CONTROL

Semester Hours: 3

Application of modern control theory to chemical processes; multivariable control; estimation and adaptive control, optimal control.

CHE 658 - CATALYSIS/REACTOR DESIGN

Semester Hours: 3

Treatment of homogeneous and heterogeneous reaction kinetics, transport in fluid-solid reactions, catalyst deactivation and their effects on the analysis and design of chemical reactors. Prerequisite: CHE 541.

CHE 659 - SELECTED TOPICS/CHE

Semester Hours: 1-6

CHE 696 - GRAD INTERNSHIP CHE ENGR

Semester Hours: 1-9

Active involvement in an engineering project in an engineering enterprise, professional organization or government agency that has particular interest and relevance to the graduate student. Permission of CHE faculty member required.

CHE 699 - MASTER'S THESIS

Semester Hours: 1-9

CHE 724 - INSTR METH/BIO-MTLS CHARACTERI

Semester Hours: 3

CHE 725 - INSTR METH/BIO-MTLS CHARACTERI

Semester Hours: 4

CHE 747 - ADV TOP/BIOENGINEERING

Semester Hours: 3

Engineering aspects of microbial processes and the processing of biological materials. Integrating knowledge of governing biological properties and principles with chemical engineering methodology. Emphasis on current literature in the areas of purification and separation technology, bioprocess development and biomaterials.

CHE 749 - MASS TRANSPORT

Semester Hours: 3

Mass transfer in solid and fluid systems under steady and transient conditions. Integration of momentum, heat and mass transfer equations with application to reactive, rheological and multicomponent systems.

CHE 757 - OPT TECH/FLUID MECHANICS

Semester Hours: 3

Laser courses, molecular interactions with light and diatomic spectroscopy needed fluorescence, Brillouin scattering, four wave mixing, CARS and other applications in optical fluid diagnostics.

CHE 759 - ADV SELECTED TOPICS IN CHE

Semester Hours: 1-3

CHE 799 - DOCTORAL DISSERTATION

Semester Hours: 1-9

Required each semester student is enrolled and receiving direction on doctoral dissertation.

Chemical Engineering, MSE

The CME Department offers two plans leading to the MSE degree for the Chemical Engineering option. These are designated:

- Plan I (Thesis)
- Plan II (Non-thesis)

The following sections describe the requirements for each of these options. Additional requirements, policies, and required forms may be found in the CME Department office.

Basic Program of Study

The Basic Program of Study, common to both the Plan I and Plan II (Non-thesis) MSE options, contains a minimum of 24 semester hours of graduate-level course work that must include:

Code	Title	Semester Hours
Engineering Major		
Select an engineering major consisting of 12 semester hours of graduate courses including supporting engineering courses		12
First Minor ¹		
Select a first minor of 6 semester hours of graduate courses in an approved engineering area of specialization		6
Second Minor		
MAE 692	GRAD ENGR ANALYSIS I	3
MAE 693	GRAD ENGR ANALYSIS II	3
Total Semester Hours		24

¹ Additional CHE courses and/or other five/six-hundred level courses listed in the graduate catalog can be used as elective courses. Students are required to select an academic advisor and set up the MSE Program of Study early on to identify these elective courses.

Plan I, Thesis Option

Students selecting this option must:

Code	Title	Semester Hours
Complete Basic Program of Study as described above		24
Master's Thesis		
CHE 699	MASTER'S THESIS	6
Complete an acceptable thesis including a public defense		
Total Semester Hours		30

Plan II, Non-Thesis Option

Students selecting this option must:

Code	Title	Semester Hours
	Complete Basic Program of Study as described above	24
	Select 6 semester hours of graduate courses to complete an approved extended program of study	6
Total Semester Hours		30

Civil and Environmental Engineering

S201 Technology Hall
Telephone: 256.824.6854
Email: ceegrad@uah.edu

Chair: Michael Anderson, PhD, Associate Dean and Professor

Mission

The mission of the Civil Engineering program is to educate students with the fundamental knowledge, and analytical skills necessary for successful careers in civil and environmental engineering. Through rigorous scholarship, innovative instruction, and service, we advance knowledge to improve our global community.

Degrees

- Master of Science in Engineering (Civil Engineering) (p. 890)
- Doctor of Philosophy in Civil Engineering (p. 891)

The Civil and Environmental Engineering (CEE) Department offers coursework and research leading to the MSE and PhD degrees. The PhD program is offered jointly with the Department of Civil and Environmental Engineering at the University of Alabama at Birmingham (UAB).

Research performed by the civil engineering faculty emphasizes state-of-the-art technology and is geared largely toward space-based applications. The philosophy and unique qualifications of the faculty afford graduate students opportunities for advanced work in structural engineering and structural materials, geotechnical engineering, engineering mechanics, environmental engineering, hydraulics and hydrologic processes, transportation planning, intelligent transportation systems, experimental mechanics/applied optics and natural hazard mitigation.

Under a cooperative agreement, several courses are co-listed and jointly taught by civil and mechanical engineering faculty so that a variety of courses can be offered on a regular basis. Courses are also available by the Intercampus Interactive Telecommunications System (IITS) from faculty at UAB, USA, and UA. Financial support is available at attractive levels for qualified students in the form of assistantships. Graduate Co-op positions are also available with many local research and industrial organizations. UAH has the intellectual and social environment to provide a well-rounded, high technology oriented degree. The MSE degree granted by the department is equivalent to those available in traditional civil and environmental engineering programs.

Civil Engineering, MSE

Students wishing to pursue the MSE in Civil Engineering must meet the admission requirements of the UAH Graduate Studies as well as the College of Engineering. A beginning student files a Program of Study in consultation with the faculty advisor. The MSE in Civil Engineering requires a minimum of 30 semester hours and consists of two options. The thesis option requires 24 hours of graduate coursework and 6 hours of thesis. Under this options, students must complete a written thesis and an oral defense. The non-thesis option requires 30 hours of graduate coursework.

Civil Engineering, PhD

The CEE Department offers a program (jointly with UAB) leading to the Doctor of Philosophy (PhD) in Civil Engineering. Courses are offered jointly by CEE faculty from both universities and are available in real time via IITS. The doctoral work is supervised by an experienced researcher and recognized authority in the field and the supervisory Committee is made up of faculty from both UAH and UAB and a minimum number of course semester hours must be taken from each campus. Coursework, written and oral examinations, and the dissertation are all essential components of the doctorate. The doctoral program requires 48 semester hours of coursework beyond the BS degree, plus 24 semester hours of dissertation. However, for students entering with an MSE degree with thesis, the dissertation requirement is 18 semester hours. PhD students must meet the minimum requirements set by the School of Graduate Studies, the College of Engineering, and the department.

In addition to the graduate coursework, students must pass a preliminary exam which ascertains their academic, technical and intellectual preparedness to pursue doctoral level work. For doctoral students with a master's degree, the preliminary exam must be administered within the first two semesters of

study, and for doctoral students with a baccalaureate degree after completion of 24 semester hours of graduate coursework. More information about this exam is available in the CEE Department office.

Students must also pass a qualifying exam, which is administered after all course work is completed by the student's supervisory committee. The qualifying exam is given in conjunction with the presentation of the dissertation proposal to the supervisory Committee and is designed to determine the student's research competence. This exam process includes both written questions related to the coursework and an oral presentation of the proposal to the committee. The exam should be completed at least two semesters (one academic year) before the PhD is awarded. Students are allowed two attempts at the qualifying exam.

Finally, students must write a dissertation on their research work. When the dissertation has been completed, the supervisory committee will give the candidate a final oral examination as a part of a public dissertation defense. More information about the dissertation process is available in the CEE department office

Master's Program in Civil and Environmental Engineering

- Civil Engineering, MSE (p. 890)

Doctoral Program in Civil and Environmental Engineering

- Civil Engineering, PhD (Joint with UAB) (p. 891)

CE 511 - INTRO GEOGRAPHICAL INFO SYS

Semester Hours: 3

Introduces vector, raster and tabular concepts, emphasizing the vector approach. Topics include: spatial relationships, map features, attributes, relational database, layers of data, data ingesting, digitizing from maps, projections, output, applications, and availability of public data sets.

CE 520 - URBAN TRANSPORTATION PLANNING

Semester Hours: 3

Planning of highway systems and terminals as part of a complete planning approach; public transportation system planning; transportation planning studies, projection analysis, plan formulation, and programming.

CE 541 - OPEN CHANNEL HYDRAULICS

Semester Hours: 3

Design and analysis of erodible and non-erodible channels. Uniform flow, channel roughness, gradually and spatially varied flow, rapidly varied flow, hydraulic jumps, gradually varied unsteady flow, flood routing, flow measurements, channel models, channel and culvert design.

CE 549 - INTRO ENVIRONMENTAL ENGR

Semester Hours: 3

Engineering aspects of air, water, and thermal pollution. Hydrologic cycle, water sources and uses; industrial and other sources of primary and secondary pollutants. Transport process in environmental problems and in their control.

CE 550 - ENVIRONMENTAL CONTROL

Semester Hours: 3

Engineering design and synthesis of environmental control systems. Control of multiphase systems with application to air and water pollution control.

CE 552 - INDUSTRIAL WASTE TREATMENT

Semester Hours: 3

Advanced topics in the area of hazardous waste management and water quality control. Emphasis on industrial waste, including hazardous waste management. Topics include: generation, storage, collection, transfer, disposal, recycling, economic, environmental, and regulatory considerations.

CE 554 - SOLID & HAZARDOUS WASTE MGMT

Semester Hours: 3

Waste characterization, minimization, collection, treatment, transport, and disposal. Landfill design and incineration options. Leachate characteristics and potential groundwater contamination. Prerequisite: CE 549.

CE 555 - WATER QUALITY LABORATORY

Semester Hours: 3

Properties of natural water sources and laboratory methods associated with water and wastewater treatment systems. Students design and demonstrate a water treatment system to bring a water sample into compliance with drinking water standards.

CE 556 - WATER QUALITY CONTROL PROC

Semester Hours: 3

Principles of public water supply design. Source selection, collection, purification, and distribution for municipal use. Collection of waste waters, their treatment, and disposal. Prerequisite: CE 549.

CE 557 - HYDROLOGY

Semester Hours: 3

Occurrence and movement of water over the earth's surface for engineering planning and design. Relationship of precipitation to streamflow with frequency analysis, flood routing, and unit hydrograph theory.

CE 558 - ENVIRONMENTAL ENGR DSGN

Semester Hours: 3

Engineering design and project management of environmental quality/restoration systems. Students will complete a design project focusing on one of the following systems: sanitary landfill, municipal incinerator, or groundwater/site remediation. Lectures will address skills for technical presentations and proposal writing, as well as process design and decision making.

CE 559 - SEL TOPICS CIVIL ENGINEERING

Semester Hours: 1-6

CE 561 - VIBRATIONS ELASTIC SYS

Semester Hours: 3

Formulation of the equations of motion of discrete and continuous systems, analytical and numerical methods of solution, eigenvalue problems, and dynamic response.

CE 571 - ADVANCED SOIL MECHANICS

Semester Hours: 3

Continuum mechanics applied to soil behavior. Theoretical approaches to consolidation, shear strength, slope stability and soil stabilization.

CE 572 - SOIL DYNAMICS

Semester Hours: 3

Behavior of soils under dynamic, earthquake and blast loading. Analysis of foundation vibration and isolation.

CE 573 - EARTH STRUCTURES ENGINEERING

Semester Hours: 3

Principles of earth structure design. Theories of earth pressures and the design of retaining wall systems including gravity, cantilever, mechanically stabilized earth, flexible sheet pile, and anchored wall systems. Methods of stability analyses for retaining walls, earth slopes, and embankment design.

CE 574 - APP MECHANICS OF SOLIDS

Semester Hours: 3

Stresses and strains at a point, theories of failures, stress concentration factors, thick-walled cylinders, torsion of noncircular members, curved beams, unsymmetrical bending, and shear center.

CE 577 - EXP TECH SOLID MECHANICS

Semester Hours: 3

Experimental methods to determine stress, strain, displacement, velocity, and acceleration in various media. Theory and laboratory applications of electrical resistance strain gages, brittle coatings, and photoelasticity. Application of transducers and experimental analysis of engineering systems.

CE 578 - MATRIX METH STRUCT MECH

Semester Hours: 3

Matrix application to formulation and solution of linear problems in structural mechanics. Stresses, vibrations, and stability of engineering structures.

CE 581 - STRUCTURAL ANALYSIS II

Semester Hours: 3

Reactions, shears, moments and deformations in complex structural systems. Statically indeterminate systems, advanced geometric and energy methods.

CE 583 - REINFORCED CONCRETE DESIGN

Semester Hours: 3

Theory and practice of reinforced concrete design. Theory and design of high strength concrete mixtures. Design of reinforced concrete beams, slabs and columns using the ultimate strength design code of the American Concrete Institute.

CE 584 - STEEL DESIGN

Semester Hours: 3

Principles of the design of steel structures using ASD methods. Analysis and design of structural elements including beams, columns, connection details.

CE 585 - FOUNDATION ENGINEERING

Semester Hours: 3

Design of foundations with emphasis on reinforced concrete, footings, caissons, piles, retaining walls, and mat foundations. Effect of bearing pressure on foundations. Prerequisite: CE 583.

CE 586 - ADV CEMENTITIOUS & COMPOSITE

Semester Hours: 3

Concrete structures, rheology, mechanical properties, environmental durability, dimensional stability, advanced concrete technologies (such as high strength, fiber reinforced, and fracture mechanics), advanced fiber polymer composites, and repair/rehabilitation of concrete structures.

CE 587 - BRIDGE DESIGN

Semester Hours: 3

Bridge loads, load distribution, composite beam bridges, bridge bearings, reinforced and prestressed concrete slab and T-beam bridges, bridge evaluations and ratings, and upgrade methodology.

CE 603 - ADVANCED CONCRETE DESIGN

Semester Hours: 3

Design of concrete columns; bond, anchorage and reinforcing details; design of two-way slabs; design and analysis of multistory building frames; introduction to prestressed concrete; design of prestressed cross-sections for moment.

CE 611 - GIS IN CIVIL ENGINEERING

Semester Hours: 3

Advanced topics in geographical information systems (GIS) with civil engineering applications. Emphasis will be placed on spatial/temporal data analyses using digitized maps and database information in an area of CE specialization. Research project will be required.

CE 622 - ADVANCED TRAFFIC ENGRG DESIGN

Semester Hours: 3

In depth analysis of traffic engineering concepts related to intersection analysis (signalized and un-signalized) as well as arterial systems.

CE 646 - EROSION & SEDIMENTATION

Semester Hours: 3

River morphology and river response, incipient erosion and its prediction, bed form and roughness, degradation, aggradation, and local scour in alluvial rivers. Design of stable channels, computation of bed load.

CE 650 - ENVIRONMENTAL IMPACT ANAL

Semester Hours: 3

National environmental policy act and its implementation. Environmental impact process. Writing an environmental impact statement.

CE 651 - ENVIRONMENTAL REGULATIONS

Semester Hours: 3

Basic understanding of environmental law with an appreciation for the practical implementation of regulations for environmental engineers. Includes an overview of the major American environmental laws for protection of water and air resources, as well as permitting requirements and health/safety responsibilities. Prerequisite: CE 549.

CE 652 - INTRO TO AIR POLLUTION CONTROL

Semester Hours: 3

Technology of air pollution dealing with air pollutants, effects, sources, combustion processes, and abatement and control technology. Engineering contributions to both the problems and their solutions. Nature of air pollution problem and fundamental technological approaches to its solution.

CE 653 - GROUNDWATER ENGINEERING

Semester Hours: 3

Application of engineering principles to the movement of groundwater. Influence of physical and geological environment on groundwater hydraulics. Water well hydraulics and aquifer evaluation. Emphasis on practical groundwater engineering problems. Prerequisites: MA 526 or MAE 693.

CE 654 - ENVIRONMENTAL TRANSPORT

Semester Hours: 3

Fundamental principles of mass transport, chemical partitioning/transformations in environmental systems. Practical transport examples for surface water, ground water, and atmospheric systems will be presented and mathematical modeling will be utilized for solutions.

CE 655 - HAZARDOUS WASTE MGMT

Semester Hours: 3

Topics include definition of hazardous waste, regulatory considerations, risk assessments, and categories of waste. Current and emerging treatment and disposal technologies will be explored.

CE 656 - ENV SYSTEMS SAMPLING & ANAL

Semester Hours: 3

CE 657 - ADVANCED HYDROLOGY

Semester Hours: 3

Hydrologic cycle, including interrelationships between classical and statistical methods of hydrology. Evaluation of governing equations, linearizations, analytical approximations and numerical solution techniques for various boundary conditions. Stochastic hydrologic modeling in both temporal and spatial domains. Prerequisites: ISE 690, MAE 586, MAE 693, and CE 557.

CE 658 - SUSTAINABLE DESIGN

Semester Hours: 3

The built environment has a substantial impact on energy and material resources as well as being a critical determinant of health and productivity. This course covers topics such as site planning and construction variables, energy and water alternatives, and current rating systems. Case studies and field trips of historic and contemporary projects exemplifying various sustainability features will be included.

CE 659 - SEL TOPICS CIVIL ENGINEERING

Semester Hours: 1-6

CE 660 - STRUCTURAL DYNAMICS

Semester Hours: 3

Application of the theory of vibrations to discrete and continuous models of structures. Numerical methods of analysis for both spatial and temporal variables. Model synthesis and step-by-step time integration methods. Finite element applications: substructuring techniques.

CE 662 - GEOTECHNICAL ENGINEERING

Semester Hours: 3

Shallow foundation's immediate and consolidated settlement, advanced deep foundations under lateral and axial loads, design of single and pile groups, soil-pile interaction, introduction to seismology, earthquake characteristics, dynamic soil properties and response, soil profile response spectra, soil liquefaction. Prerequisite: CE 585.

CE 666 - EARTHQUAKE ENGR & STRUCT DYNAM

Semester Hours: 3

This allows structural engineers to consolidate their knowledge on the effect of earthquake ground motions on civil engineering structures. The course will cover the analysis and the theories of structures made of various materials that are located in active seismic zones. Finally, the course will allow structural engineers to acquire new basic knowledge in earthquake engineering that will allow them to communicate better with scientists and engineers of other disciplines in earthquake engineering (e.g. seismologist, geotechnical engineers, etc.,).

CE 671 - CONTINUUM MECHANICS

Semester Hours: 3

Kinematics and kinetics, various coordinate systems, constitutive equations for continuous media; governing partial differential equations from first and second laws of thermodynamics; applications to solids, liquids, and gases.

CE 672 - THEORY OF ELASTICITY

Semester Hours: 3

Formulation of boundary-value problems of classical elasticity. Application to plane problems, prismatic members, and axisymmetric problems. Introduction to three-dimensional problems.

CE 673 - PLASTICITY

Semester Hours: 3

Fundamentals of mechanical behavior of metals and nonmetals for stress states greater than the yield stress state. Deformation and flow theories. Stress-strain relations and yield criteria. Solution of boundary value problems with plastic bodies. Limit analysis of structures.

CE 674 - FINITE ELEMENT ANALYSIS I

Semester Hours: 3

Finite element theory, variational methods, weighted residuals. Applications to linear partial differential equations in continuous media. Solution of boundary value and initial value problems.

CE 675 - ROCK MECHANICS

Semester Hours: 4

Principles of continuum mechanics applied to the design of structures in rock; tunnels, underground structures and foundations. Joint behavior; stresses; analysis of rock slopes; instrumentation.

CE 676 - VISCOELASTICITY

Semester Hours: 3

Mechanical behavior of materials having time-dependent and temperature-dependent material properties. Creep and relaxation phenomena. Elastic-viscoelastic analogies. Formulation of stress-strain laws. Solution of boundary value problems for viscoelastic bodies.

CE 677 - OPTICAL TECH IN SOLID MECH

Semester Hours: 3

Overview of conventional methods for experimental stress analysis. Introduction to applied optics with emphasis on non-destructive, laser-based testing methods, fiber optic recording systems, photoelectronic-numerical data acquisition, and computer aided analysis.

CE 678 - MECHANICS OF COMPOSITE MATERIALS

Semester Hours: 3

Introduction to composite materials, micro- and macro-mechanical behavior of laminae; bending, buckling and vibration of laminated plates.

CE 679 - HYPERVELOCITY IMPACT PHENOMENA

Semester Hours: 3

Fundamental principles of penetration mechanics. Analytical and numerical approaches to perforation and penetration problems. Shock jump conditions, Hugoniot, and equations of state; low, high, and hypervelocity impacts of finite and thin targets.

CE 681 - ADVANCED STRUCTURAL ANALYSIS

Semester Hours: 3

Explores modern methods of structural analysis, matrix formulation of flexibility and stiffness methods, and analysis of structures with material and geometric nonlinearities. Also introduces energy methods for indeterminate structures. Prerequisite: CE 581.

CE 683 - GRADUATE SEMINAR

Semester Hour: 1

Professional activities designed to promote the skills required to organize and deliver oral technical presentations and to broaden the individual's awareness of technical issues. Required for all students pursuing a graduate degree. Students will be graded 'S' (Satisfactory) or 'U' (Unsatisfactory) based upon their performance and attendance. Students who do not receive an 'S' grade must register for the course until an 'S' is obtained.

CE 696 - GRAD INTERNSHIP CE ENGR

Semester Hours: 1-9

Active involvement in an engineering project in an engineering enterprise, professional organization or government agency that has particular interest and relevance to the graduate student. Permission of CEE faculty member required.

CE 697 - MASTER'S PLAN II PROJECT

Semester Hours: 3

Application-oriented student project designed to show competence in an area of civil engineering.

CE 699 - MASTER'S THESIS

Semester Hours: 1-9

Required each semester in which a student is working and receiving direction on a master's thesis. Minimum of two semesters and 6 hours required for M.S.E. students. A maximum of nine hours of credit is awarded upon successful completion of master's thesis. The 1 hour option is only available to students who have successfully defended their thesis and submitted it for approval, but do not meet the deadlines for graduation in the semester submitted. Students may only use the 1 hour option once in their career.

CE 722 - SLIDING MODE CONTROL

Semester Hours: 3

CE 756 - HAZARDOUS WASTE REMEDIAT

Semester Hours: 3

Engineering design skills applied to the solution of real world hazardous waste remediation problems. Remedy screening and selection; treatment train development for a Superfund facility.

CE 762 - WAVE MOTION CONT ELASTIC BODIE

Semester Hours: 3

Elements of stress wave propagation in bounded elastic media. Propagation of elastic waves in infinite and semi-infinite bodies, cylinders, rods and beams.

CE 765 - RAND VIBRAT ELASTIC SYSTEM

Semester Hours: 3

Dynamic analysis of elastic systems including the response of complex structures to random excitations. Typical excitations include random wind, thermal, earthquake, aerodynamic, and ocean wave phenomena. Probabilistic mechanics methods. Concepts of reliability. Stationary and ergodic processes.

CE 772 - THEORY STRUCT STABILITY

Semester Hours: 3

Energy criterion for stability of elastic structure under conservative loading. Stability concept for general continuous systems. Rigorous and approximate methods of analysis. Buckling of structural elements under impulsive and nonconservative loading. Postbuckling behavior.

CE 773 - THEORY OF SHELLS

Semester Hours: 3

Analysis of thin plates and shells, including higher approximations theories and transverse-shear deformations; illustration of theories by selected problems.

CE 774 - FINITE ELEMENT ANAL II

Semester Hours: 3

Advanced topics in finite element analysis: application to nonlinear partial differential equations in continuum mechanics; theoretical studies of convergence and stability of solutions.

CE 778 - FRACTURE MECHANICS

Semester Hours: 3

CE 779 - ADV PENETRATION MECHANIC

Semester Hours: 3

Advanced analytical modeling of penetration and perforation phenomena, hydrocode development and applications, and similitude analysis.

CE 799 - DOCTORAL DISSERTATION

Semester Hours: 3-9

Civil Engineering, MSE

Civil Engineering, MSE

The CEE Department offers two plans leading to the MSE degree for the Civil Engineering option. These are designated:

- Plan I (Thesis),
- Plan II (Non-thesis)

The following sections describe the requirements for each of these options. For both options, 50% of the graduate coursework must be at the 600-level or above and students must earn a grade of B or better in all 600-level or above coursework. Students should consult their faculty advisor when selecting courses for their Program of Study.

Basic Program of Study

The Basic Program of Study, common to both Plan I and Plan II MSE options, contains a minimum of 24 semester hours of graduate-level course work that must include:

Code	Title	Semester Hours
Engineering Major		
	Select 12 semester hours of graduate courses in an engineering major including supporting engineering courses	12
First Minor		
	Select a first minor of 6 semester hours in an approved engineering area of specialization	6
Second Minor		
	Select a second minor of 6 semester hours in Mathematics, Graduate Engineering Analysis, or Statistics (ISE 690)	6
Total Semester Hours		24

Plan I, Thesis Option

Students selecting this option must:

Code	Title	Semester Hours
	Complete Basic Program of Study as described above	24
CE 699	MASTER'S THESIS	6
	Complete an acceptable thesis including a public defense	
Total Semester Hours		30

Plan II, Non-Thesis Option

Student selecting this option must:

Code	Title	Semester Hours
	Complete Basic Program of Study	24
	Select 6 semester hours of graduate coursework to complete an approved extended program of study	6
	Pass comprehensive final examination	
Total Semester Hours		30

Civil Engineering, PhD (Joint with UAB)

The CEE Department offers a PhD program (jointly with UAB) in Civil Engineering.

The following table is an outline of the program of study requirements. Students should consult their dissertation advisor and supervisory committee to develop their program of study.

Program of Study

Students entering the joint PhD degree program with a baccalaureate degree and without a master's degree must complete the following graduate coursework:

Code	Title	Semester Hours
Engineering Major ¹		
	Select a minimum of 27 semester hours of graduate coursework in a major area	27
First Minor ¹		
	Select 9 semester hours of graduate coursework in an approved engineering area of specialization	9
Second Minor ¹		
	Select 6 semester hours of graduate coursework in Mathematics, Graduate Engineering Analysis, or Statistics (ISE 690)	6
Additional Courses		
	Select 6 additional semester hours of graduate coursework in the major, first or second minors	6
Doctoral Dissertation ²		
	24 hours of CE 799 - Doctoral Dissertation	24
Total Semester Hours		72

- 1 Students entering the joint PhD program after completing their master's degree must complete 24 semester hours of coursework beyond the coursework required for their master's degree. The combined coursework completed in the master's and doctoral programs of study must satisfy the semester hour requirements for the major and minor areas specified above.
- 2 24 semester hours of CE 799 must be completed for those who entered the program with a master's degree without a thesis. 18 semester hours of CE 799 must be completed for those who entered the program with a thesis.

Electrical and Computer Engineering

272 Engineering Building

Telephone: 256.824.6316

Email: ecegrad@uah.edu

Chair: Ravi Gorur, Professor

Mission

The mission of the Electrical and Computer Engineering Department is to develop and maintain high quality undergraduate and graduate programs in electrical, computer, and cybersecurity engineering to meet the needs of its constituents, and to participate in scholarly and productive research that contributes to the economic well-being and quality of life for the residents of Huntsville, the State of Alabama, and the citizens of the United States of America.

Degree Programs

The ECE Department supports several degree programs that provide a unique academic and research experience for students including:

- Master of Science in Engineering (Computer Engineering)
- Master of Science in Engineering (Electrical Engineering)
- Master of Science in Software Engineering
- Master of Science in Cybersecurity
- Doctor of Philosophy in Computer Engineering
- Doctor of Philosophy in Electrical Engineering

The Department of Electrical and Computer Engineering (ECE) offers opportunities for advanced work in a variety of fields including radar and radar systems, digital signal processing, digital communications, digital and analog electronics, computer architecture, parallel processing, software engineering, software safety, optics, and photonics.

Co-located in one of the nation's largest research parks, UAH has the intellectual and social environment to provide a well-rounded, technologically-oriented degree. ECE graduate students have outstanding opportunities for research, collaboration, cooperative employment, and future employment with government research centers and high-tech businesses. In addition, a number of UAH research centers collaborate with the ECE Department, including the Center for Rotorcraft Systems Engineering and Simulation, the Center for Modeling, Simulation & Analysis, the Center for Applied Optics, and the Nano and Micro Devices Center.

Prospective and current students are encouraged to visit the ECE Department web site at www.uah.edu/eng/departments/ece (<http://www.uah.edu/eng/departments/ece/>) for information about faculty research interests, ongoing research projects, funding opportunities and course availability. Other information about the ECE graduate programs are available in the department office.

MSE in Computer or Electrical Engineering

The MSE in Computer or Electrical Engineering each require 30 semester hours and consist of two options. The thesis option requires 24 semester hours of graduate coursework and a minimum of 6 semester hours of thesis. Students under this option, must complete a written thesis and an oral defense. The non-thesis option requires 30 hours of graduate coursework and 1 hour of Practicum.

Students wishing to pursue a MSE degree in Computer or Electrical Engineering must meet the admission requirements of UAH Graduate Studies as well as the College of Engineering. Students who are admitted to these programs must file a program of study made in consultation with their faculty advisor.

MS in Software Engineering (MSSE)

The MSSE degree program has two options: Plan I and Plan II. Plan I requires 24 semester hours of graduate coursework and a minimum of 6 semester hours of thesis. Plan I students must also write and defend a thesis as a final examination. Plan II requires 36 semester hours of coursework including 6 semester hours of Software Studio. Students who are admitted to these programs must file a program of study made in consultation with their faculty advisor. Students wishing to pursue a MSSE degree must meet the admission requirements of UAH Graduate Studies, as well as the College of Engineering.

MS in Cybersecurity (MSCBS)

The MSCBS degree program is an interdisciplinary program with the Colleges of Science and Business with a distinct computer engineering track. The MSCBS has one option: 30 semester hours of graduate coursework with no thesis. Students who are admitted to these programs must file a program of study made in consultation with their faculty advisor. Students wishing to pursue a MSCBS degree must meet the admission requirements of UAH Graduate Studies, as well as the College of Engineering.

PhD in Computer or Electrical Engineering

The ECE Department offers a program leading to the degree of Doctor of Philosophy (PhD) in Computer or Electrical Engineering. The PhD is a research-oriented degree awarded upon completion of a defined program of study, demonstration of scholarly competence, distinctive achievement in a special field, and demonstrated ability to do an independent, original investigation. Demonstration of substantial scholarly research accomplishments, rather than mere accumulation of residence and course credits, is an essential consideration in awarding the PhD degree.

The ECE Department doctoral programs require 48 semester hours of approved coursework. Students must register for a minimum of 18 semester hours of dissertation research. Students must meet with their doctoral advisors to develop a program of study, which lists the approved coursework required for the PhD. In addition, students must register for dissertation research every semester after the completion of the program of study until the dissertation defense. At the end of the coursework, a student must pass a Qualifying Examination. Finally, a student must write an acceptable dissertation which must be defended in front of the supervisory committee. More details about these examinations are available in the department office. In order for a student's doctoral dissertation to be approved, at least one refereed journal or refereed national conference article must be published or accepted for publication.

Students wishing to pursue a PhD must meet the admission requirements of UAH Graduate Studies as well as the College of Engineering. Students who do not have the appropriate bachelor's or master's degree from an ABET-accredited Computer or Electrical Engineering program must complete the foundation courses described below or demonstrate proficiency by completing similar courses or providing evidence based on employment experience.

Foundation Courses

The Computer and Electrical Engineering degree programs described above assume that students have a bachelor's degree and/or master's degree in Computer or Electrical Engineering, respectively.

To pursue the MSE or PhD in Computer Engineering, students who do not have a bachelor's degree in Computer Engineering should complete coursework or demonstrate knowledge in the following CPE foundation areas¹:

Code	Title	Semester Hours
Programming Languages/Software Engineering		
CPE 211	INTRO COMPUTER PROG FOR ENGR	3
CPE 212	FUNDAMENTALS SOFTWARE ENGRG	3
CS 317	INTRO DESIGN/ANALYSIS OF ALG	3
Digital Logic Design/Electronics		
EE 202	INTRO DIGITAL LOGIC DSGN	3
EE 315	INTRO ELECTRONIC ANAL & DESIGN	3
Computer Organization/Microprocessors		
CPE 221	COMPUTER ORGANIZATION	3
CPE 323	INTRO TO EMBEDDED COMPUTER SYS	3
CPE 531	INTRO COMPUTER ARCHITECTURE	3
Total Semester Hours		24

¹ An entering student can demonstrate knowledge of the material in one of the following ways: completing the courses at UAH, completing similar courses at another institution, or by providing evidence based on employment experience. A student may be required to successfully pass a placement exam to demonstrate their knowledge of the material. Up to 3 credit hours from CPE 531 may be applied towards a student's graduate program if: (1) The student has completed the foundation courses at UAH as a part of their graduate program, and (2) the student is enrolled in Plan II (non-thesis) MSE in the CPE program.

To pursue the MSE or PhD in Electrical Engineering, students who do not have a bachelor's degree in Electrical Engineering should complete coursework or demonstrate knowledge in the following subjects¹:

Code	Title	Semester Hours
EE 202	INTRO DIGITAL LOGIC DSGN	3
EE 213	ELECTRICAL CIRCUIT ANALYSIS I	3

EE 307	ELECTRICITY & MAGNETISM	3
EE 315	INTRO ELECTRONIC ANAL & DESIGN	3
EE 382	ANALY METH CONTINUOUS TIME SYS	3
EE 383	ANALY METH MULTIVARIABLE	3
EE 385	RANDOM SIGNALS & NOISE	3
Total Semester Hours		21

¹ An entering student can demonstrate knowledge of the material in one of the following ways: completing the courses at UAH, completing similar courses at another institution, or by providing evidence based on employment experience. A student may be required to successfully pass a placement exam to demonstrate their knowledge of the material.

To pursue either the MSSE or the MSCBS degrees, students who do not have a Computer Science or Computer Engineering bachelor's degree from an ABET-accredited program must complete the following courses or demonstrate knowledge in those subject areas¹. Experience in the development of a large scale, industrial strength software system is highly desirable.

Code	Title	Semester Hours
CPE 211	INTRO COMPUTER PROG FOR ENGR (or programming in C, C++ or Java)	3
CPE 212	FUNDAMENTALS SOFTWARE ENGRG (Data Structures)	3
CS 214	INTRO DISCRETE STRUCTURE	3
CS 317	INTRO DESIGN/ANALYSIS OF ALG	3
CPE 348	INTRO TO COMPUTER NETWORKS	3
CPE 431	INTRO COMPUTER ARCHITECTURE	3
CPE 434	OPERATING SYSTEMS	3
Total Semester Hours		21

¹ An entering student can demonstrate knowledge of the material in one of the following ways: completing the courses at UAH, completing similar courses at another institution, or by providing evidence based on employment experience. A student may be required to successfully pass a placement exam to demonstrate their knowledge of the material.

Master's Programs in Electrical & Computer Engineering

- Computer Engineering, MSE (p. 907)
- Electrical Engineering, MSE (p. 909)
- Master of Science in Cybersecurity (p. 908)
- Master of Science in Software Engineering, MSSE (p. 910)

Doctoral Programs in Electrical & Computer Engineering

- Computer Engineering, PhD (p. 906)
- Electrical Engineering, PhD (p. 907)

CPE 512 - INTRO PARALLEL PROGRAMMING

Semester Hours: 3

Introduction to processing in parallel and distributed computing environments. General concepts of parallel machine models, processes, mutual exclusion, process synchronization, message passing, and programming languages for parallel computing and scheduling. Design and analysis of parallel algorithms. Parallel programming environments: Pthreads for shared memory multiprocessor systems and PVM/MPI for distributed networked computers.

CPE 523 - HARDWARE/SOFTWARE CO-DESIGN

Semester Hours: 3

Study and design of Systems On a Chip (SOC). Emphasis on Field Programmable realizations of SOC systems. Prerequisite: CPE 522 or CPE 526.

CPE 526 - VLSI HARDWARE DESC LANG/MODL/S

Semester Hours: 3

Modern VLSI design techniques and tools, such as silicon compilers, (V)HDL modeling languages, placement and routing tools, synthesis tools, and simulators. Students will design, simulate, and layout using both programmable logic families and ASIC libraries.

CPE 527 - VLSI DESIGN I

Semester Hours: 3

Introduction to VLSI design using CAD tools, CMOS logic, switch level modeling, circuit characterization, logic design in CMOS, systems design methods, test subsystem design, design examples, student design project. Design project to be fabricated and tested in CPE 528. Students enrolling in CPE 527 must enroll concurrently in CPE 527L.

CPE 527L - LABORATORY

Semester Hours: 0

Students enrolling in CPE 527L must enroll concurrently in CPE 527.

CPE 528 - VLSI DESIGN II

Semester Hours: 3

Advanced experience with CAD tools for VLSI design, IC testing. Design project from CPE 527 will be fabricated and tested. Implementation and verification of test programs, IC testing and troubleshooting, legal, economic, and ethical design issues. Oral presentations and written reports are required. Students enrolling in CPE 528 must enroll concurrently in CPE 528L.

CPE 528L - LABORATORY

Semester Hours: 0

Students enrolling in CPE 528L must enroll concurrently in CPE 528.

CPE 531 - INTRO COMPUTER ARCHITECTURE

Semester Hours: 3

Existing computer structures. Computer organization with emphasis on busing systems, storage systems, and instruction sets. Special purpose architecture, performance models and measures, VLSI influence on architecture.

CPE 534 - OPERATING SYSTEMS

Semester Hours: 3

Study of the fundamentals of operating systems. Emphasis on processes, file management, interprocess communication, input-output, virtual memory, networking and security.

CPE 536 - INTERNALS OF MODERN OPER SYS

Semester Hours: 3

In depth study of the design of modern operating systems such as Unix, NT, and Linux. Emphasis on the internals and implementation details of interrupt processing, real-time clocks, device independent I/O, process management, memory management, file management.

CPE 538 - REAL TIME & EMBEDDED SYSTEMS

Semester Hours: 3

Study of design methodologies for reliable real time systems.

CPE 549 - INTRO TO CYBERSECURITY ENGINEERING

Semester Hours: 3

Introduction to cryptography and computer security through hardware and physical security to a knowledge of audit methods, security management, and public law. The course will introduce security engineering skills such as business process analysis, software security, IAE evaluation, and IAE testing.

Prerequisite: CPE 548.

CPE 549L - INTRO CYBERSECURITY ENGINEERING LAB

Semester Hours: 0

Students enrolling in CPE 549 must enroll concurrently in CPE 549L.

CPE 555 - SECURE SOFTWARE DEVELOPMENT

Semester Hours: 3

Overview of methodologies for development of high-assurance software. Major topics include analysis of security and safety risks, software certification criteria, the software development lifecycle, risk mitigation, design and coding best practices, verification techniques, and auditing of software for insecure and unsafe coding constructs.

CPE 557 - SOFTWARE REVERSE ENGR

Semester Hours: 3

This course provides fundamental knowledge of software reverse engineering. The course provides the ability (a) to understand software of unknown origin or software for which source code is unavailable, (b) to determine how something works, (c) to discover data used by software, and (d) to aid in the analysis of software. The course introduces tools for reverse engineering, including disassemblers, debuggers, monitors, virtual machines and modern tools for software analysis.

CPE 559 - SYSTEMS SECURITY

Semester Hours: 3

This course (1) introduces cyber physical, industrial control, embedded and Supervisory Control and Data Acquisition (SCADA) control systems, (2) examines common vulnerabilities and threats associated with these systems, and (3) examine techniques to defend these systems from cyber-attacks.

CPE 561 - TRANSLATION SYSTEMS

Semester Hours: 3

Grammars, parsers, and lexical analyzers; implementation of translators via top-down and bottom up techniques; grammar analysis to identify ambiguities. Practical applications of translators including conversion of file formats and compilation of traditional computer languages.

CPE 590 - SPECIAL TOPICS IN COMP ENGR

Semester Hours: 1-3

CPE 590L - SELECTED TOPICS LABORATORY

Semester Hours: 0

CPE 601 - SURVEY INFORMATION ASSURANCE

Semester Hour: 1

CPE 610 - SELECTED TOPICS IN COMPUTER EN

Semester Hours: 1-6

CPE 612 - PARALLEL ALGORITHMS

Semester Hours: 3

Introduction to metrics describing the performance and scalability of parallel algorithms. Performance analysis of parallel algorithms for performing sorting, matrix multiplication, solving linear equations, and FFT.

CPE 613 - GEN PURPOSE GPU COMPUTING

Semester Hours: 3

The focus of this course is to introduce emerging techniques and programming paradigms that can be used to accelerate the processing speed of scientific and other high performance applications using Graphics Processing Units, GPUs. GPUs represent low-cost highly parallel video processing hardware that can be programmed for general purpose applications using UDA/OpenCL software architecture. The course will survey the current state of research and industrial activity and will give student's hands-on experience implementing design applications on real-world GPU facilities for a wide range of scientific applications. Prerequisite: CPE 512.

CPE 619 - MODELING & ANAL COMPU/COMMUN S

Semester Hours: 3

Modeling of single and multiprocessor systems, single and multi-stage interconnection networks, Computer Networks. Analysis using Stochastic processes, Markov and Queuing techniques. Modeling using Petri Nets and Finite State models. Prerequisite: EE 500 or MA 585.

CPE 621 - ADVANCED EMBEDDED SYSTEMS

Semester Hours: 3

Deeply embedded low-power wireless sensors. Low-power microcontroller architectures, sensor platform architecture, wireless intelligent sensors, low power wireless communication standards, battery powered systems, resource constrained operating systems, data aggregation/sensor synergy, and collaborative signal processing.

CPE 625 - CMOS ANALOG CIRCUIT DESIGN

Semester Hours: 3

Analog circuit design in CMOS technology. CMOS processing technology. MOS transistor modeling. Basic current mirrors and single-stage amplifiers. Noise analysis and modeling. Basic OPAMP design and compensation. Advanced current mirrors and OPAMPs. Bandgap references. Oscillators. CMOS technology characterization for radio-frequency (RF) design.

CPE 626 - ADVANCED VLSI DESIGN

Semester Hours: 3

Advanced VLSI Design. Case study of the VLSI design of a modern RISC processor using a Hardware Description Language. Prerequisite: CPE 526.

CPE 628 - TESTING OF HARDWARE SYSTEMS

Semester Hours: 3

Introduction to testing of digital electronic circuits and systems. Topics include: fault modeling, testing problems, testing schemes, test generation for combinational and sequential circuits, the complexity of testing, design for testability, built-in self-testing and boundary scan.

CPE 631 - ADV COMP SYSTEMS ARCHITECTURE

Semester Hours: 3

Study of architectural features of modern processors, including cache memories and memory systems, pipeline designs, branch prediction techniques. Design of superscalar, multithreaded VLIW processors, code optimization for such systems will be studied. Quantitative evaluation of architectural features are emphasized throughout the course. Prerequisite: CPE 512 and CPE 531.

CPE 633 - FULT-TOLERANT COMPUTING SYSTEM

Semester Hours: 3

Analysis and design of very high reliability and availability systems. Fault types, reliability techniques, and maintenance techniques. Case studies of high-availability long-life, life-critical systems. Both hardware and software techniques for achieving fault-tolerance will be studied.

CPE 635 - SYSTOLIC ARRAY PROCESSING

Semester Hours: 3

Systolic structure of fast algorithms and switchable array realizations.

CPE 641 - DATA & DIGITAL COMMUNICATIONS

Semester Hours: 3

Introduction to digital and data communications; transmission channels; modulation and coding; telephone networks; data communication standards; noise and distortion; computer interfacing; protocols.

CPE 643 - OPTICAL COMMUNICATIONS

Semester Hours: 3

CPE 645 - COMPUTER NETWORK SECURITY

Semester Hours: 3

Principles and concepts of computer network security. Introduction to cryptography, confidentiality, authentication, digital signatures, E-mail security, IP security, web security, intruders, malicious software, firewall, and other network security-related issues. Prerequisite: CPE 548.

CPE 646 - MOBILE & WIRELESS NETWORKS

Semester Hours: 3

High-level issues in mobile and wireless networks. The main topics are mobile IP, mobile Ad hoc NETWORKS (MANETS) wireless sensor networks, wireless LAN, Bluetooth, cellular networks, satellite systems and security issues in mobiles and wireless networks. Prerequisite: CPE 548.

CPE 647 - UBIQUITOUS COMPUTING

Semester Hours: 3

The course is based on the new 'anytime, anywhere' computing paradigm, also known as ubiquitous computing. This course is project oriented, and explores issues of mobile, wireless, and distributed computing in Internet environment, advanced human-computer interfaces, and power efficient computing.

CPE 648 - ADVANCED COMPUTER NETWORKS

Semester Hours: 3

Advanced principles and concepts of general-purpose computer networks, with a special emphasis to internetworking and Internet. Transport and higher level protocols emphasis. Programming issues. High-speed networking, congestion control, data compression, security and distributed processing will be covered. Prerequisite: CPE 548.

CPE 649 - ADV CYBERSECURITY ENGINEERING

Semester Hours: 3

Introduction to topics ranging from how to attack computer systems and networks to how to protect and recover from attacks on computer systems and networks. Basic process utilized by computer attackers in order to develop a complete understanding and appreciation of the threat to information assurance. Process of detecting, preventing, and recovering from information assurance attacks. Intrusion Detection and Prevention Systems, Auditing, Security Vulnerability Assessments, and the Incident Response process. Prerequisite: CPE 549.

CPE 649L - ADV CYBERSECURITY ENG LAB

Semester Hours: 0

Students enrolling CPE 649 must enroll concurrently in CPE 649L.

CPE 656 - SOFTWARE ENGRG STUDIO I

Semester Hours: 3

This is the first course in a two course studio series required for the MSSE degree in the College of Engineering. Students will work in small design teams on medium sized software projects. Activities include developing requirements, designing and constructing system prototypes, developing and implementing test and verification plans, and presenting the project for evaluation. The practice of software design and evaluation will be conducted in an iterative cycle using best software engineering practices, so that design and execution can be refined over the lifecycle of the project. Prerequisite: CS 650.

CPE 658 - SOFTWARE ENGRG STUDIO II

Semester Hours: 3

This is the second course in a two course studio series required for the MSSE degree in the College of Engineering. Students will work in small design teams on medium sized software projects. Activities include developing requirements, designing and constructing system prototypes, developing and implementing test and verification plans, and presenting the project for evaluation. The practice of software design and evaluation will be conducted in an iterative cycle using best software engineering practices, so that design and execution can be refined over the lifecycle of the project. Prerequisite: CPE 656.

CPE 690 - SELECTED TOPICS COMPUTER ENGRG

Semester Hours: 1-6

CPE 692 - CYBERSECURITY CAPSTONE

Semester Hours: 3

A capstone course emphasizing the integration of various principles, theories, and techniques for developing, implementing and using cybersecurity strategies and applications in organizations. Includes readings, lectures, tours, situation analysis, cases, and the completion of a major practical project. Normally taken in the last semester of a student's program. Minimum grade B required. Prerequisites: CS, 585, CPE 549, IS 660, IS 663.

CPE 695 - PROJECTS IN COMPUTER ENGRG

Semester Hours: 3

CPE 699 - MASTER'S THESIS

Semester Hours: 1-9

Required each semester student is working and receiving direction on a master's thesis. Minimum of two semesters and 6 hours required for M.S.E. students. A maximum of 9 hours credit is awarded upon successful completion of master's thesis. The 1 hour option is only available to students who have successfully defended their thesis and submitted it for approval, but do not meet the deadlines for graduation in the semester submitted. Students may only use the 1 hour option once in their career.

CPE 710 - SEL TOPICS IN PARALLEL PROC

Semester Hours: 3

CPE 715 - SELECTED TOPICS IN COMPUTAT TH

Semester Hours: 3

CPE 720 - SELECTED TOPICS IN VLSI DESIGN

Semester Hours: 3

Prerequisite: CPE 626.

CPE 726 - ALGORITHMS FOR VLSI DESIGN TOO

Semester Hours: 3

Tools for VLSI Design. This course is concerned with the algorithms found in VLSI design tools.

CPE 730 - SELECTED TOPICS IN COMPUTER SY

Semester Hours: 3

Prerequisite: CPE 631.

CPE 731 - DISTRIBUTED SHARED MEMORY SYS

Semester Hours: 3

Study issues related to performance, granularity of sharing, multithreading, cache coherence, memory consistency models, pull vs push caching, false sharing, thread migration. Case studies systems, including DASH, FLASH ThreadMarks, SHRIMP, Calypso, Alewife to understand these issues.

CPE 735 - SELECTED TOPICS IN OPERATING S

Semester Hours: 3

CPE 740 - SPEC TOPICS COMPUTER NETWORKS

Semester Hours: 3

Prerequisite: CPE 648.

CPE 742 - PARALLEL PROCESS DESIGN

Semester Hours: 3

CPE 748 - MOBILE & WIRELESS NETWORKS

Semester Hours: 3

High-level issues in mobile and wireless networks. The main topics are mobile IP, Mobile Ad hoc NETWORKS (MANETs), wireless sensor networks, wireless LAN, Bluetooth, cellular networks, satellite systems, and security issues in mobiles and wireless networks. Prerequisite: CPE 648 or CS 670.

CPE 760 - SEL TOPICS COMPILER/TRANSLAT S

Semester Hours: 3

CPE 790 - SEL TOPICS COMPUTER ENGRG

Semester Hours: 1-6

CPE 795 - RESEARCH IN COMPUTER ENGRG

Semester Hours: 1-6

CPE 799 - DOCTORAL DISSERTATION

Semester Hours: 3-9

Required each semester student is enrolled and receiving direction on doctoral dissertation.

EE 500 - RANDOM SIGNALS & NOISE

Semester Hours: 3

Random variables and probabilistic description of signals. Introduction to random processes: autocorrelations, cross correlations, power spectral density. Noise analysis: thermal, shot, white, colored. Response of electrical systems to random inputs.

EE 501 - DIGITAL SIGNAL PROC ARCHITECTU

Semester Hours: 3

Introduction to digital signal processor architecture, applications, assembly language programming, and development tools for designing and implementing DSP systems.

EE 503 - COMMUNICA SYS & SIMULAT W/LAB

Semester Hours: 3

Modern test equipment and computer-based simulation methods are used to conduct experiments in the area of communication systems. Hands-on experiments are conducted using digital oscilloscopes, arbitrary waveform generators, vector impedance meters and other relevant test and measurement equipment. Methods are investigated for signal modulation and demodulation; studies are conducted on AM, FM, PSK, PCM and delta modulation circuits and systems. Several types of filters are investigated, both analytically and experimentally. Properties and behavior of phase-locked loop are studied by using both hardware and numerical simulations.

EE 504 - INTRO DATA COMMUNICA NETWORKS

Semester Hours: 3

Overview of historic development of modern telephone and data communication system, system architecture, standards, broadband switching systems, modems, protocols, personal and mobile communications, digital modulation techniques.

EE 505 - INTRO CONTROL/ROBOTIC SY

Semester Hours: 3

The basic theories and analytical techniques for modeling, analysis and control of dynamical systems. Transfer functions, block-diagrams, frequency response, stability criteria, series and feedback controller design, digital control. Introduction to the dynamic analysis and control of robotic systems.

EE 506 - COMMUNICATION THEORY

Semester Hours: 3

Review of elementary signals and systems including the Hilbert transform, cross and auto correlation, power density spectrum, and the Wiener-Khinchine theorem. Butterworth and Chebyshev lowpass filters. Bandpass signals and systems. The lowpass equivalent of a bandpass signal/system. Commonly used forms of linear and nonlinear modulation. Demodulation methods and circuits. Phase lock and frequency feedback techniques.

EE 510 - SELECTED TOPICS/ECE

Semester Hours: 1-6

EE 510L - SELECTED TOPICS LABORATORY

Semester Hours: 0

EE 514 - ANALOG AND DIGITAL

Semester Hours: 3

Analog filter design via Butterworth, Chebyshev, and elliptical approximation. Active filter design using operational amplifiers. Digital filter design methods.

EE 516 - DIGITAL ELECTRONICS

Semester Hours: 3

Introduction to digital electronics. The Metal-Oxide-Semiconductor (MOS) transistor. MOS inverters and gate circuits. Bipolar junction transistors, ECL inverters, and bipolar digital gates. Semiconductor memories. Circuit design for VLSI.

EE 519 - DIGITAL ELECTRONICS LAB

Semester Hour: 1

EE 527 - ELECTROMAGNETIC ENGINEERING

Semester Hours: 3

Review of Maxwell's equations, uniform plane waves in different types of media, reflection and transmission of uniform plane waves, transmission lines, microwave and fiber optic waveguides, antennas, wireless applications.

EE 532 - OPTICAL SYSTEMS DESIGN

Semester Hours: 3

Introduction to the geometrical design and analysis of optical systems, and to the design principles of lens systems.

EE 534 - OPTICAL FIBER COMMUNICATIONS

Semester Hours: 3

Introduction to optical fibers and their transmission characteristics, optical fiber measurements, sources and detectors, noise considerations for digital and analog communications, optical fiber systems. Prerequisite: EE 527.

EE 541 - OPTICS I

Semester Hours: 3

Foundations and physics of geometrical optics, Fermat's principles and Huygen wavelets, refraction and reflection. The many forms of Snell's Law. Optical path lengths, geometrical wavefronts and rays. Ray tracing, ynu-chart and matrix methods. Gaussian imagery and paraxial optics, conjugate elements, cardinal points, and image-object relations. Stops and pupils, chief and marginal rays, vignetting, and the optical or Lagrange invariant. The y-ybar diagram, design of common systems: objectives, magnifiers, microscopes, collimators and detectors. Optical glasses and chromatic aberrations, wavefront and transverse aberrations, spot diagrams and ray fan plots.

EE 542 - PHYSICAL OPTICS

Semester Hours: 3

Scalar and electromagnetic waves, polarization, coherence, reflection and refraction; two beam and multiple beam interference, interferometers, Fabry-Perots, thin films, diffraction, and absorption and dispersion.

EE 543 - OPTICAL COMM SYS & NETWORKS

Semester Hours: 3

EE 553 - LASER SYSTEMS

Semester Hours: 3

Spontaneous and stimulated emission, population inversion, optical resonators, three- and four-level systems, Q-switching and modelocking, semiconductor lasers, integrated optic waveguides and couplers, scanning systems, high power industrial applications. Includes a research project and oral presentation.

EE 570 - OPT & PHOTONIC SYSTEMS DESIGN

Semester Hours: 3

EE 586 - INTRO MODERN CONTROL SYSTEMS

Semester Hours: 3

The basic ideas and techniques of modern control theory. Analytical techniques for modeling, analysis and control of MIMO dynamic systems. State variable description of dynamic systems. State variable feedback control design and state observers. Kalman-filtering. Fundamentals of nonlinear systems analysis. Introduction to discrete time system modeling, analysis and control. Basics of adaptive and optimal control. Applications to aerospace and electric power systems.

EE 601 - LINEAR SYSTEMS

Semester Hours: 3

Formulation and solution by transform methods of differential equations of linear electrical and electromechanical systems, state equations, signal-flow graphs, and discrete-time systems.

EE 603 - RANDOM SIGNALS IN COMMUNICATIO

Semester Hours: 3

Random processes applied to communication and control. Concepts covered include stationarity, correlation, power spectrum, Brownian motion, thermal noise, Markov processes, and queuing theory. Emphasis on systems with noisy excitation.

EE 604 - DIGITAL IMAGE PROCESSING

Semester Hours: 3

Review of digital filters. Spatial filters and realizations. Edge and wedge detectors. Derivative matrices and u-notch, r-notch filters. Periodic images, their transformation and scanning, their two-dimensional Fourier transforms. Rational vectors and image filtering.

EE 605 - CLASSICAL CONTROL DESIGN

Semester Hours: 3

Design of feedback, feedforward, and minor-loop controllers/compensators using classical control engineering techniques and classical performance criteria. Frequency domain synthesis of lead, lag, lead-lag, etc. compensators; tuning of PD and PID controllers; error budgets; use of commercial CAD software for classical control design and performance evaluation; digital simulation techniques. CAD laboratory sessions.

EE 606 - STATISTICAL COMM THEORY

Semester Hours: 3

Generalized harmonic analysis. Correlation, convolution, power density spectra. Probability and statistics. Correlation detection. Optimum linear filtering and prediction.

EE 607 - ROBOTIC SYSTEMS CONTROL

Semester Hours: 3

In-depth study of information, decision and control problems associated with robotic system design. Sensor systems, recognition and decision algorithms, kinematics and dynamics, trajectory planning, analog and digital controllers, adaptive and optimal control.

EE 609 - ELECTROMAGNETIC FIELD THEORY

Semester Hours: 3

Mathematical approach to electromagnetic phenomena. Basic field concepts. Radiation and propagation. Waveguides and simple radiating and scattering systems. Perturbational and variational techniques. Prerequisite: EE 527.

EE 610 - SELECTED TOPICS/ECE

Semester Hours: 1-6

EE 612 - GRADUATE DESIGN PROJECT

Semester Hours: 3

Graduate design project in support of an M.S.E. program.

EE 613 - LASER ELECTRONICS

Semester Hours: 3

Resonant optical cavities. Atomic radiation. Laser oscillation and amplification. General characteristics of lasers. Laser excitation. Semiconductor lasers. Gas discharge phenomenon. Transition rates. Spectroscopy of common lasers. Detection of optical radiation.

EE 614 - DATA COMPRESSION

Semester Hours: 3

Introduction to the fundamental theories and techniques of lossless and lossy data compression. Topics include Huffman codes, arithmetic codes, Golomb-Rice code, dictionary techniques, context-based compression, scalar quantization, vector quantization, transform coding, subband coding, wavelets, compression standards, and selected advanced topics of data compression.

EE 615 - ANALOG CIRCUIT DESIGN

Semester Hours: 3

Use of operational amplifiers to synthesize special-purpose filters and circuits for analog signal processing and conditioning; linear and switching power supplies; high-frequency effects; circuits for transmitters and receivers; digital circuits from an analog viewpoint; A/D and D/A converters; selected topics.

EE 616 - MICROELECT DEV/INTE CIRC

Semester Hours: 3

Analysis and design of microelectronic devices for integrated circuits. Properties of semiconductors important to microelectronic device operation. Analysis and modeling of MOS devices and circuits. Analysis and modeling of metal semiconductor devices, junction diodes, bipolar transistors. Device fabrication technology. Prerequisite: EE 516.

EE 617 - VLS INTEGRATION DEVICES

Semester Hours: 3

Operation and modeling of the MOS transistor. Second-order considerations for a MOSFET, VLSI device fundamentals and scaling laws. Micron-length and submicron-length semiconductor devices. Basic technology and applications of VLSI. Impact of VLSI on computer architecture. VLSI computer aided design.

EE 618 - VLSI CIRCUITS

Semester Hours: 3

MOS device electronics. MOS processing and design rules. Circuit design with MOSFETS. MOS circuit technique. Combinational logic gate in CMOS. Pseudo-NMOS logic gates. Very high performance digital circuits. Sequential logic circuits. Designing semiconductor memories. Low power CMOS VLSI circuit design.

EE 619 - INTRO RADAR SYSTEMS

Semester Hours: 3

Topics include radar equation, CW radar, MTI and pulse Doppler radar, tracking radar, major systems components, detection in the presence of noise and clutter, ambiguity, and resolution.

EE 620 - CMOS ANALOG CIRCUIT DESIGN

Semester Hours: 3

Analog circuit design in CMOS technology. CMOS processing technology. MOS transistor modeling. Basic current mirrors and single-stage amplifiers. Noise analysis and modeling. Basic OpAmp design and compensation. Advanced current mirrors and OpAmps. Bandgap references. Oscillators. CMOS technology characterization for radio-frequency (RF) design. Same as CPE 625.

EE 622 - HARDWARE RELIABILITY

Semester Hours: 3

The objective for this course is to provide students with an understanding of the essential reliability physics of electronic devices as well as some of the practical technological considerations.

EE 629 - ANAL & COMP METH IN ELEC ENG I

Semester Hours: 3

Analytic and numerical solution techniques applicable to problems arising in engineering, utilizing complex variable theory, linear algebra, matrix theory, and transform methods.

EE 630 - ANAL & COMP METHODS ELEC EG II

Semester Hours: 3

Analytical and numerical solution techniques applicable to problems arising in electrical engineering. Partial differential equations, vector differential and integral calculus, special functions, Fourier analysis with applications and integral equations.

EE 632 - FOURIER OPTICS

Semester Hours: 3

Introducing the optical system as an invariant linear system, convolution, Sommerfield's diffraction integral, Fourier Transform, angular spectrum, coherent and incoherent imaging, optical transfer function.

EE 633 - ELECTRO-OPTICAL ENGINEER

Semester Hours: 3

Propagation of optical beams in homogeneous and guiding media, optical resonators, and spectrum analyzers, theory of laser oscillation, some specific laser systems, parametric oscillators, electro-optical and acousto-optical modulators.

EE 634 - OPTICAL COMMUNICATIONS

Semester Hours: 3

Optical communication systems; counting statistics; the optical detector response process; direct detection; heterodyne detection parameter estimation in optical communications; pointing, spatial acquisition and tracking.

EE 642 - DATA & DIGITAL COMMUNICATION

Semester Hours: 3

Introduction to digital and data communications; transmission channels; modulation and coding; telephone networks; data communication standards; noise and distortion; computer interfacing; protocols. Prerequisite: EE 603.

EE 648 - DIGITAL SIGNAL PROCESSING

Semester Hours: 3

Theory and applications of signal processing by digital techniques. Difference equations, Ztransform theory, digital-filter design, fast Fourier transform, quantization effects, and discrete estimation. Applications in digital filtering, signal processing, data analysis and smoothing, and image processing. Prerequisite: EE 528.

EE 654 - OPTICAL TESTING

Semester Hours: 3

EE 670 - OPTOMECHANICAL DESIGN & MANUF

Semester Hours: 3

EE 672 - DIGITAL PROC RANDOM SIGNALS I

Semester Hours: 3

Discrete signals, linear systems, spectral analysis and probability; and random discrete-time signals. Introduction to statistical interference, time-series analysis and spectral estimation of random discrete-time signals. Cross correlation and cross spectra, multitaper spectrum estimation and multivariable spectral analysis.

EE 673 - DIGITAL PROC RANDOM SIGNALS II

Semester Hours: 3

Parametric models for random signal processing; AR (autoregressive), MA (moving average), ARMA (autoregressive moving average), and Prony method. Two-dimensional spectral estimation; higher-order spectral analysis and multiresolution signal analysis.

EE 690 - UNIFORM GEOM THY DIFFRAC

Semester Hours: 3

Geometrical optics fields, geometrical optics reflected fields, two-dimensional wedge diffraction (GTD and UTD), three-dimensional wedge diffraction and corner diffraction, equivalent currents, diffraction at a smooth convex conducting surface, radar cross section.

EE 693 - ECE CAPSTONE

Semester Hours: 1-3

The purpose of this course is for students to perform research in a subject gained from courses taken at the graduate level. Students will be introduced to rhetorical theory, training in oral and written communication skills. They are required to organize and deliver oral and written technical presentations on individual research, journal articles, or design projects.

EE 696 - GRAD INTERN EE ENGR

Semester Hours: 1-9

Active involvement in an engineering project in an engineering enterprise, professional organization or government agency that has particular interest and relevance to the graduate student. Permission of EE faculty member is required.

EE 699 - MASTER'S THESIS

Semester Hours: 1-9

Required each semester student is working and receiving direction on a master's thesis. Minimum of two semesters and 6 hours required for M.S.E. students. A maximum of nine hours of credit is awarded upon successful completion of master's thesis. The 1 hour option is only available to students who have successfully defended their thesis and submitted it for approval, but do not meet the deadlines for graduation in the semester submitted. Students may only use the 1 hour option once in their career.

EE 700 - SAMPLED DATA CONT SYS

Semester Hours: 3

Classical and modern methods for analysis and design of sampled data-control systems; Ztransforms, transport lags, z and w plane analysis, state variables, and the transition matrix.

EE 701 - ADV LINEAR CONTROL THRY

Semester Hours: 3

Modern techniques for analysis and design of linear control systems. Matrix formulation, multivariable control systems, state variable concepts. Linear transformation, controllability, observability, discrete-time systems. Prerequisite: EE 505.

EE 703 - MODERN CONTROL DESIGN

Semester Hours: 3

Use of modern (state-variable) control concepts and theories to design high-performance controllers for multi-input/multi-output set-point regulation and servo-tracking/pointing problems. Modeling of uncertain disturbances; design of disturbance-accommodating controllers; introduction to adaptive and stochastic control. Use of commercial CAD software for modern control design and performance evaluation. CAD laboratory sessions. Prerequisite: EE 701.

EE 704 - NONLINEAR CONTROL SYSTEM

Semester Hours: 3

Classical and modern methods for analysis and design of nonlinear automatic control systems. State variables, phase plane, limit cycles, stability, describing functions, relay control, stabilization theory. Prerequisite: EE 701.

EE 705 - THEORY OPTIMAL CONTROL

Semester Hours: 3

General theory of optimal control of dynamic processes. Calculus of variations. Hamilton-Jacobi theory. Pontryagin's maximum principle, dynamic programming.

EE 706 - KALMAN FILT TECH CON & SIG PRO

Semester Hours: 3

Basic concepts of Kalman Filtering Theory with applications to: 1) analysis and design of control systems for dynamic processes with noisy sensors and random-type disturbance inputs, and 2) estimation, smoothing and prediction of information in noisy signals; Optimum Stochastic Control and the Separation Principle. Matrix Riccati Equation, Covariance Matrix, Orthogonal Projection Theorem. Prerequisite: EE 701.

EE 707 - INFORMATION THEORY

Semester Hours: 3

Self-information, entropy, mutual information, and channel capacity, encoding, error detecting and correcting codes. Sampling theorem. Discrete and continuous channels.

EE 709 - DISCR RANDOM SIG/SPEC ES

Semester Hours: 3

Review of linear systems theory, random discrete processes, classical spectral estimation, parametric models of discrete random processes, autoregressive (AR), moving average (MA), autoregressive moving average (ARMA) models.

EE 710 - SELECTED TOPICS/ECE

Semester Hours: 1-6

EE 711 - ANTENNA THEORY

Semester Hours: 3

Antennas and antenna arrays. Radiation patterns and impedance characteristics. Spheres, cylinders, horns, slots, microwave lenses, traveling-wave, and frequency independent antennas.

EE 716 - DEVICE MOD INTEG CIR DSG

Semester Hours: 3

Fundamental limits in integrated circuits. Advanced and detailed development of the theory of MOS and bipolar transistors. MOS and bipolar transistor models for IC design. Numerical algorithms for modeling microelectronic devices. Device modeling and simulation for radio frequency (RF) application. Computer-aided design and VLSI device development.

EE 717 - SPACE APPLI/ELECTROMAGNE

Semester Hours: 3

Plasma as a dielectric; dielectric functions for cold, warm, isotropic and anisotropic plasmas, body-plasma interaction; space craft electrodynamics, antennas in plasmas; mode of radiation, input impedance and radiation pattern, scattering problems involving plasmas.

EE 718 - MICROWAVE TECHNIQUES

Semester Hours: 3

Network representations and analysis of microwave devices. Discontinuities from a circuit point of view. Symmetry consideration. Scattering matrices in circuit design. Cavity resonators.

EE 721 - ROBUST AND ADAPTIVE CONTROL

Semester Hours: 3

Introduction to fundamental ideas of robust and adaptive control. Effects of parameter and disturbance uncertainties, H-infinity and mu-synthesis ideas; parameter estimation techniques; adaptive control algorithms; stability considerations; model-reference and linear adaptive control techniques.

EE 722 - SLIDING MODE CONTROL

Semester Hours: 3

The basic and advanced theories and analytical techniques for modeling and analysis of systems dynamics in sliding manifolds. Traditional and High Order Sliding mode controller design. Discontinuous and equivalent control, robustness. Applications to control of electro-mechanical systems, reusable launch vehicle, air craft, spacecraft, and DC-to-DC power converters. Prerequisite: EE 701.

EE 724 - RADAR WAVEFORMS & SIGNAL PROCES

Semester Hours: 3

Stretch Processing. Synthetic Aperture Radar and SAR signal processing, Space-time adaptive processing (STAP). Phase coded waveforms and processing. Frequency hop waveforms Prerequisite: EE 619.

EE 725 - ADVANCED RADAR TECHNIQUE

Semester Hours: 3

Modern radar systems for search and tracking are analyzed with emphasis on signal processing. Modeling and simulation of system and environment. Advanced techniques include CFAR, binary modulation, frequency agility, polarization agility, and synthetic aperture. Prerequisite: EE 603 and EE 619.

EE 726 - DECIS/ESTIMATION THEORY

Semester Hours: 3

Classical detection theory, including maximum likelihood, Neyman-Pearson, Bayes and minimax criteria. Estimation theory concepts and criteria, linear estimators, Kalman filters, maximum likelihood and least-squares estimator, matched filters, Cramer-Rao lower bound. Introduction to pattern recognition.

EE 727 - NUMER METH ELECTROMAGNET

Semester Hours: 3

Review of concepts in electromagnetics, antennas and scattering problems, method of moments and applications, finite difference and finite element methods, numerical solutions of transient problems associated with broadband systems, impulse response, direct solution of field equations in time domain.

EE 733 - NONLINEAR OPTICS APPLICATIONS

Semester Hours: 3

Modeling of optical nonlinearities; Kerr, thermal and photorefractive effects; nonlinearity-induced beam distortion; applications of nonlinearities in crystals and fibers; quantum well and SEED devices; soliton-based communication system; nonlinear optical switches, deflectors and limiters; measurements of nonlinearities.

EE 734 - FIBER OPTICS

Semester Hours: 3

Propagation in dielectric slab and fibers with step and graded index of refraction; electromagnetic and ray optical methods; eikonal equations; ray trajectory; WKB method; paraxial approximation; weakly guiding structures.

EE 735 - STATISTICAL OPTICS

Semester Hours: 3

Introduction to random variables and random processes; first-order properties of light waves; coherence of optical waves, partial coherence and imaging systems, imaging in randomly inhomogeneous media, fundamental limits in photoelectric detection of light.

EE 737 - CHAN CHAR COMM RAND MEDI

Semester Hours: 3

Modeling stationary and not strictly stationary random media; scatter communications channels; line of sight communication channels ? weak scattering and strong scattering.

EE 738 - OPT TRANSF/PATTN RECOGNI
Semester Hours: 3

Systems and transforms in diffraction theory; two-dimensional Fourier transform; Hankel transforms; generalized Hankel transforms; optical signals, correlation coherence; filtering; apodization; applications to optical pattern recognition.

EE 742 - WIRELESS COMMUNICATIONS
Semester Hours: 3

Design and analysis of wireless transmission systems. Prerequisite: EE 642.

EE 744 - CODING THRY & SPREAD SPECTRUM
Semester Hours: 3

Linear block coding techniques, convolutional codes and the Viterbi decoding algorithm, probability of error bounds, channels with intersymbol interference and additive Gaussian noise. Introduction to spread spectrum direct sequence and frequency hopping methods.

EE 745 - MOD/PHASE LOCK TECH COMM
Semester Hours: 3

Treatment of analog and digital phase locked loops. Applications in carrier regeneration, demodulation, and synthesis discussed. Linear and nonlinear PLL models and analysis. Noise analysis via Volterra Series and Fokker-Planck equation. False lock phenomenon.

EE 747 - PATTERN RECOGNITION ALGORITHMS
Semester Hours: 3

EE 748 - DIGITAL SIG PROC ALG/APP
Semester Hours: 3

Introduction to digital signal processors hardware architecture. Applications of digital signal processing in telecommunications, speech and image processing, radar and sonar. Development and implementation of DSP algorithms; DSP laboratory session.

EE 799 - DOCTORAL DISSERTATION
Semester Hours: 3-9

Required each semester student is enrolled and receiving direction on doctoral dissertation.

Computer Engineering, PhD (Shared with UAB)

The ECE Department offers, jointly with UAB, a PhD program in Computer Engineering.

The following table is an outline of the program of study requirements. Students should consult their dissertation advisor and supervisory committee to develop their program of study. At least 42 credit hours applied towards degree requirements must have the CPE prefix and be taken at UAH.

Program of Study

Code	Title	Semester Hours
CPE Major		
Select a major consisting of a minimum of 18 semester hours of approved related coursework in Computer Engineering		18
Math Minor		
Select one of the following options:		12
Option 1: Select 12 semester hours in approved graduate level mathematics courses		
Option 2: Select 6 semester hours in approved graduate level mathematics courses and select one of the following approved two-course sequences		
MA 585 & CPE 619	PROBABILITY and MODELING & ANAL COMPU/COMMUN S	
MA 540 & MA 640	COMBINATORIAL ENUMERATION and GRAPH THEORY	
MA 640 & MA 740	GRAPH THEORY and COMBINATORIAL ALGORITHMS	
EE 629 & EE 630	ANAL & COMP METH IN ELEC ENG I and ANAL & COMP METHODS ELEC EG II	
MA 542 & CPE 645	ALGEBRA and COMPUTER NETWORK SECURITY	

Engineering or Computer Science Area of Specialization Minor

Select a minor consisting of 12 semester hours of approved coursework in engineering or computer science	12
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Supporting Coursework and Dissertation Hours

Select 6 semester hours of approved ECE graduate coursework	6
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Complete a dissertation	18
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Total Semester Hours	66
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Electrical Engineering, PhD

The ECE Department offers a PhD in Electrical Engineering.

The following table is an outline of the program of study requirements. Students should consult their dissertation advisor and supervisory committee to develop their program of study.

Program of Study

Code	Title	Semester Hours
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EE Major

Select a minimum of 18 semester hours of approved related coursework in Electrical Engineering	18
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Math Minor

Select one of the following options:	12
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Option 1: Select 12 semester hours in approved graduate level mathematics courses

Option 2: Select 6 or 9 semester hours in approved graduate level mathematics courses and one of the following approved two-course sequences
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Select one of the following approved two course sequences:
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EE 629 & EE 630	ANAL & COMP METH IN ELEC ENG I and ANAL & COMP METHODS ELEC EG II
PH 607 & PH 609	MATHEMATICAL METHODS I and MATHEMATICAL METHODS II

Engineering or Computer Science Area of Specialization Minor

Select a minor consisting of 12 semester hours of approved coursework in engineering or computer science	12
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Supporting Coursework and Dissertation Semester Hours

Select 6 additional semester hours of approved graduate level ECE coursework	6
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Complete a dissertation	
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Dissertation research	18
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Total Semester Hours	66
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Computer Engineering, MSE

The CPE program offers two plans leading to the MSE with a Computer Engineering option. These are designated:

- Plan I (Thesis)
- Plan II (Non-thesis)

The following sections describe the requirements for each of these options. With prior approval, up to 12 semester hours of 500-level courses may be taken in fulfillment of the MSE requirements. At least 15 credit hours counted towards the degree must be courses with a CPE prefix taken at UAH.

Basic Program of Study

The Basic Program of Study, common to both the Plan I and Plan II MSE options, contains a minimum of 24 semester hours of graduate-level course work that must include:

Code	Title	Semester Hours
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CPE Core ¹

CPE 512	INTRO PARALLEL PROGRAMMING	3
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CPE 526	VLSI HARDWARE DESC LANG/MODL/S	3
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CPE 631	ADV COMP SYSTEMS ARCHITECTURE	3
3 semester hour graduate course in computer engineering or a related field		3
Math Minor		
6 hours of coursework with mathematical or theoretical foundation. The courses must be approved by the student's academic advisor.		6
Engineering Area of Specialization Minor		
Select a 2-course sequence from engineering, or computer science ²		6
Total Semester Hours		24

¹ Students who have completed these or similar courses elsewhere may request course substitutions. All substitutions must be approved by the student's academic advisor.

² At least one of those courses should be at the 600 level. The selected courses must be approved by the student's academic advisor or Supervisory Committee.

Plan I, Thesis Option

Students selecting this option must:

Code	Title	Semester Hours
Complete the Basic Program of Study as described above		24
CPE 699	MASTER'S THESIS	6
Complete an acceptable thesis including a public defense		
Total Semester Hours		30

Plan II, Non-Thesis Option

Students selecting this option must:

Code	Title	Semester Hours
Complete the Basic Program of Study as described above		24
Select 6 semester hours of graduate coursework to complete an approved extended program of study ¹		6
Total Semester Hours		30

¹ At least 3 semester hours must be at the 600-level or above

Cybersecurity, MS - Computer Engineering Track

The CPE program offers a Master of Science degree in Cybersecurity as part of an interdisciplinary program with the College of Science and the College of Business. The program requires 30 semester hours of graduate course work. There is no thesis option.

For this degree program, at least 50% of the coursework must be at the 600-level or above and a grade of B or better is required for all courses. All coursework must be approved by a faculty advisor.

Program of Study

The program of study for the MS in Cybersecurity must include:

Code	Title	Semester Hours
CBS Core		
IS 660	CYBERSECURITY MANAGEMENT	3
IS 663	COMPUTER FORENSICS	3
CPE 549	INTRO TO CYBERSECURITY ENGINRG	3
CS 585	INTRO TO COMPUTER SECURITY	3
CBS: Computer Engineering Track		
CPE 645	COMPUTER NETWORK SECURITY	3
CPE 646	MOBILE & WIRELESS NETWORKS	3
CPE 649	ADV CYBERSECURITY ENGINEERING	3

CBS: Electives

Select 3 semester hours from the following approved CPE electives	3
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CPE 534, CPE 548, CPE 647, or CPE 648	
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Select 3 semester hours from the following approved electives in Computer Engineering (see list above), Computer Science, or Information Systems	3
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Computer Science: CS 553, CS 565, CS 570, CS 617, CS 650, CS 670, CS 685, or CS 690	
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Information Systems: IS 560, IS 571, IS 577, IS 640, IS 670, or IS 691	
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CBS: Capstone

CPE 692	CYBERSECURITY CAPSTONE	3
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Total Semester Hours	30
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Electrical Engineering, MSE

The EE program offers two plans leading to the MSE with a Electrical Engineering option. These are designated:

- Plan I (Thesis)
- Plan II (Non-thesis)

The following sections describe the requirements for each of these options. With prior approval, up to 6 semester hours of 500-level courses may be taken in fulfillment of the MSE requirements. All courses in the program of study must be approved by a faculty advisor.

Basic Program of Study

The Basic Program of Study, common to both the Plan I and Plan II MSE options, contains a minimum of 24 semester hours of graduate-level course work that must include:

Code	Title	Semester Hours
EE Major		12
Select 12 semester hours of related graduate-level courses in an EE subject area		
Math Minor ¹		
6 hours of coursework with mathematical or theoretical foundation.		6
Engineering Area of Specialization Minor		
Select a 2-course sequence from engineering, or computer science ²		6
Total Semester Hours		24

¹ Typically, students take EE 629 and EE 630 or an approved sequence of courses in mathematics.

² At least one of those courses should be at the 600 level.

Plan I, Thesis Option

Students selecting this option must:

Code	Title	Semester Hours
Complete the Basic Program of Study as described above		24
EE 699	MASTER'S THESIS	6
Complete an acceptable thesis including a public defense		
Total Semester Hours		30

Plan II, Non-Thesis Option

Students selecting this option must:

Code	Title	Semester Hours
Complete the Basic Program of Study as described above		24
Select 6 semester hours of graduate coursework to complete an approved extended program of study		6
Total Semester Hours		30

Software Engineering, MSSE

The CPE program offers two plans leading to the MSSE. These are designated:

- Plan I (Thesis)
- Plan II (Non-thesis)

The following sections describe the requirements for each of these options. Students must consult their faculty advisor when constructing their program of study.

Basic Program of Study

The Basic Program of Study, common to both Plan I and Plan II MSSE options, contains a minimum of 24 semester hours of graduate-level coursework that must include:

Code	Title	Semester Hours
Computer Science Core		
CS 650	SOFT'W ENGINEERING PROC	3
CS 617	DES & ANALY OF ALGORITHM	3
CS 652	OBJECT-ORIENTED DESIGN	3
Select one of the following (CS 690, CS 613, CPE 536, CPE 631)		
Cybersecurity (Choose one)		
CPE 549	INTRO TO CYBERSECURITY ENGINRG	3
CS 585	INTRO TO COMPUTER SECURITY	3
or CS 685	COMPUTER SECURITY	
Select 6 hours from one concentraion		6
Area 1: Big Data/Data Mining (CS 554, CS 637, CS 640, or CS 641)		
Area 2: Project Management (ISE 690-required and EM 660, MGT 601 or MKT 604)		
Area 3: Parallel Programming (CPE 512, CPE 612, CPE 613)		
Area 4: Embedded Systems (CPE 538, CPE 523, CPE 621)		
Area 5: Advanced Cybersecurity (CPE 649, CPE 645, IS 663)		
Elective (approved by advisor)		3
Total Semester Hours		24

Plan I, Thesis Option

Students selecting this option must:

Code	Title	Semester Hours
Complete the Basic Program of Study as described above		24
CPE 699	MASTER'S THESIS	6
Total Semester Hours		30

Plan II, Non-thesis Option

Students selecting this option must:

Code	Title	Semester Hours
Complete the Basic Program of Study described above		24
Select 3 hour elective approved by advisor		3
Capstone CPE 657		3
Total Semester Hours		30

Industrial and Systems Engineering and Engineering Management

N143 Technology Hall
Telephone: 256.824.6256
Email: isegrad@uah.edu

Chair: James J. Swain, Professor

Mission

To provide integrated, applications-oriented education and research programs in the areas of Industrial Engineering, Systems Engineering, and Engineering Management to support the needs of students and organizations in the Huntsville area and beyond.

Degrees

Master of Science in Engineering (Engineering Management, Industrial Engineering, Systems Engineering concentrations)

Master of Science in Operations Research

Doctor of Philosophy in Industrial Engineering (with Engineering Management, Industrial Engineering, Operations Research, and Systems Engineering majors)

The Department of Industrial and Systems Engineering and Engineering Management offers major options and associated minors in the subject areas of Operations Research, Industrial Engineering, Systems Engineering, and Engineering Management. All students are encouraged to tailor their graduate programs with a blend of theory and applications. ISEEM faculty are actively involved in research programs, which affords graduate students opportunities for coursework and research inquiry in the areas described above. Please contact the ISEEM Department (256.824.6256) or visit the ISEEM homepage at <http://www.uah.edu/iseem> (<http://www.uah.edu/iseem/>) for further details.

Industrial and Systems Engineering, MSE & MSOR

Additional Admission Requirements

The requirements for admission for graduate study in an ISEEM program conform to the policies of the School of Graduate Studies and the College of Engineering. In addition, the MSE Engineering Management and Systems Engineering Options require two years of engineering work experience.

General Requirements

Students pursuing an MSE option or the MSOR under ISEEM must follow the requirements for either Plan I (Thesis Option) or Plan II (Non-Thesis Option). Both plans require 24 semester hours of approved graduate coursework. Plan I requires a minimum of 6 semester hours of thesis work and the successful completion of the thesis as approved by the supervisory committee. Plan II requires an additional 6 semester hours of approved graduate coursework.

MSE Concentrations

The **MSE-Engineering Management Concentration** was developed to meet the needs of practicing engineers who find themselves performing engineering management functions without the benefit of formal management education. The Engineering Management Concentration is designed to build upon the mathematical and analytical expertise gained from both a formal engineering education and professional experience. The Engineering Management curriculum emphasizes the application of the management function in the technological setting, while recognizing the basic and applied sciences in engineering systems. To learn more, visit our Engineering Management page and request more information (<https://www.uah.edu/admissions/learn-more-mseem/>).

The **MSE-Industrial Engineering Concentration** is offered for engineers who possess a bachelor's degree in a traditional engineering discipline and who have the desire to broaden their engineering problem-solving skills. This is accomplished by providing them with a better understanding of traditional and contemporary problem-solving skills in the areas of operation research, quality control, computer integrated manufacturing, and simulation. The program is applications-oriented and can be tailored to fit the individual needs of the student.

The **MSE-Systems Engineering Concentration** is offered for engineers with a bachelor's degree in a traditional engineering area who desire to broaden their background into systems oriented aspects of engineering. Methods of systems design, cost-benefit analysis, decision making and trade studies, and systems modeling provide students with knowledge and skills to supplement their baccalaureate engineering program.

MS Operations Research

The MS in Operations Research Option is for individuals who desire to broaden their background into operations research. Courses in the curriculum include linear programming, optimization, queueing, Markov processes, and systems modeling.

Industrial and Systems Engineering, PhD.

The PhD in Industrial Engineering offers majors in Engineering Management, Industrial Engineering, or Systems Engineering. The content of these programs can vary to suit the needs and goals of the student.

Additional Admission Requirements

The requirements for admission for graduate study in an ISEEM program conform to the policies of the School of Graduate Studies and the College of Engineering. In addition, the PhD in Industrial Engineering majors of Engineering Management and Systems Engineering Options require five years of engineering work experience.

General Requirements and Exams

Students pursuing a PhD option under ISEEM must complete 48 semester hours of approved graduate coursework beyond the bachelor's degree. A maximum of six hours of Master's Thesis credit may be included in the 48 semester hour requirement. A Program of Study must be submitted to the student's supervisory committee for review and approval.

The PhD program in the ISEEM Department has a Preliminary Examination requirement under which students must achieve a 4.0 GPA in their four principal core courses. If courses fail to meet the GPA requirement, they may be retaken until the requirement is met.

After completing the coursework on the Program of Study, students will complete a Comprehensive Exam that either contains both written and oral portions, or, at the option of the student's committee, is based on writing a journal article.

After passing the Comprehensive exam, students will prepare a dissertation proposal to satisfy the Qualifying Examination requirement. Starting in the Fall semester of 2020, all newly admitted PhD students will be required to complete their degree within 10 calendar years. If a student does not complete the degree within the 10 year limit, the student will automatically be withdrawn from the PhD program and from the College of Engineering. Students may reapply to UAH after the 10 year limit.'

Foundation Courses

Outstanding students (3.5 GPA) from other technical fields may gain admittance to the College of Engineering MSE and PhD graduate programs by completing the following courses, or equivalents as approved by the ISEEM Faculty. Applicants who have passed the Fundamental of Engineering Exam (FE) may substitute the exam for the courses.

Code	Title	Semester Hours
Mathematics		
MA 171	CALCULUS A	4
MA 172	CALCULUS B	4
MA 201	CALCULUS C	4
MA 238	APPL DIFFERENTIAL EQUATIONS	3
MA 244	INTRO TO LINEAR ALGEBRA	3
Science		
PH 111	GEN PHYSICS W/CALCULUS I	3
PH 112	GEN PHYSICS W/CALC II	3
CH 121	GENERAL CHEMISTRY I	3
Engineering		
EE 213	ELECTRICAL CIRCUIT ANALYSIS I	3
MAE 271	STATICS	3
MAE 310	FLUID MECHANICS I	3
ISE 321	ENGINEERING ECONOMY	3
MAE 341	THERMODYNAMICS I	3
ISE 390	PROB & ENGR STATISTICS I	3
Total Semester Hours		45

Master's Programs in Industrial and Systems Engineering and Engineering Management

- Industrial and Systems Engineering, MSE (p. 916)
- Industrial and Systems Engineering, MSOR (p. 918)
- Engineering Management (<https://www.uah.edu/admissions/learn-more-mseem/>)

Doctoral Program in Industrial Engineering

- Industrial and Systems Engineering, PhD (p. 915)

ISE 502 - INDUSTRIAL & ORGANIZA PSY

Semester Hours: 3

Application of basic principles of learning, motivation, and perception to typical industrial and organizational problems.

ISE 503 - HUMAN FACTORS PSYCHOLOGY

Semester Hours: 3

Study of human performance in human-technology-environment systems. Consideration of human capabilities and limitations as related to controls and displays, and the role of human cognition in decision-making and training effectiveness.

ISE 523 - INTR STATISTICAL QUALITY CONTR

Semester Hours: 3

This course introduces statistical theory and techniques to control quality of manufacturing products. This course will provide a solid foundation in Statistical Quality Control (SQC). The Six Sigma methodology is also introduced in this course. Students can take the certification exam to earn a Green Belt in Six Sigma. Prerequisites: ISE 690.

ISE 526 - DESIGN/ANALY OF EXPERIMENT

Semester Hours: 3

Advanced topics in statistical experiments with emphasis on design aspect. Confounding, fractional replication, factorial and nested design.

ISE 530 - MANUF SYS & FACILITIES DESIGN

Semester Hours: 3

Overview of modern manufacturing systems design with emphasis on facility location and plant layout. Includes classical systems, just-in-time systems, basic principles of integrated manufacturing systems design, as well as analysis of process flow, process productivity, and available space to determine plant layout. Includes laboratory exercises.

ISE 533 - PRODUCTION/INVENTORY CONTR SYS

Semester Hours: 3

Inventory models including classical optimal economic order quantity models, manufacturing resource planning (MRP) systems, master production scheduling, material requirements planning, and purchase order control. Emphasis on manufacturing system revision, continuous process improvement, and the implementation of lean principles. Prerequisite: ISE 690.

ISE 537 - ELECTRONICS MANUF PROCESSES

Semester Hours: 3

Current concepts, facilities, and technology utilized in the manufacture of electronic components and products. Includes printed wiring board fabrication and component mounting methods, automation, quality and reliability, product testing, and economic issues.

ISE 539 - SELECTED TOPICS/ISE

Semester Hours: 1-3

ISE 547 - INTRO TO SYSTEMS SIMULATION

Semester Hours: 3

Philosophy and elements of digital discrete-event simulation. Emphasis on modeling and analysis of stochastic systems, including probabilistic models, output analysis, and use of simulation software. Prerequisite: ISE 690.

ISE 623 - ENGR ECON ANALYSIS

Semester Hours: 3

This course is designed for graduate students in industrial engineering, systems engineering and engineering management. This course involves mathematical models for expenditure analysis under uncertainty; investment decision criteria; capital planning and budgeting; and decisions involving expansion, acquisitions, replacement, and disinvestment. Prerequisite: ISE 690.

ISE 626 - INTRO OPERATIONS RESEARCH

Semester Hours: 3

Philosophy and methodology of operations research. Includes linear programming, game theory, sequencing, and networks.

ISE 627 - ENGINEERING SYSTEMS

Semester Hours: 3

Development of a systems-scientific framework for the integration of systems theory, systems thinking, systems engineering, and systems management. Emphasis is on the conception, design, and management of systems to accommodate complex environments.

ISE 637 - SYSTEMS MODELING & ANALYSIS

Semester Hours: 3

System analysis and modeling of large complex systems using systems engineering fundamentals. Life cycle simulations developed as a focus for the multidisciplinary analysis integration using computational systems engineering techniques including probability, statistics, design of experiments, response surfaces, and optimization. State of the art software tools will be used for simulation development.

ISE 638 - ENGINEERING RELIABILITY

Semester Hours: 3

Methodology of reliability prediction including application of discrete and continuous distribution models. Reliability estimation, reliability logic diagrams, life testing, and reliability demonstrations.

ISE 639 - SELECTED TOPICS/ISE

Semester Hours: 1-6

ISE 641 - ADVANCED QUALITY CONTROL

Semester Hours: 3

This capstone course uses advanced statistical quality tools such as autocorrelated data, multi-variate quality controls charts, response surface methodology, ridge analysis, and evolutionary operations (EVOP). Advanced Six Sigma concepts will be taught and students will have the opportunity to earn a Black Belt in Six Sigma upon successful completion of the certification exam and an acceptable project.

ISE 690 - STATISTICAL METHODS FOR ENGR

Semester Hours: 3

Application of statistics for estimation and inference using parametric and nonparametric methods. Descriptive statistics, sampling distributions, point and interval estimates, tests of hypotheses, ANOVA, and linear regression.

ISE 696 - GRAD INTERN ISE ENGR

Semester Hours: 1-9

Active involvement in an engineering project in an engineering enterprise, professional organization, or government agency that has particular interest and relevance to the graduate student. Permission of ISE faculty member required.

ISE 697 - INDUS & SYSTEMS ENGR PROJECT I

Semester Hours: 3-9

Application oriented student project designed to show competence in Industrial and Systems Engineering.

ISE 698 - IND & SYSTEMS ENGR PROJECT II

Semester Hours: 3-9

Required each semester student is working and receiving direction on a master's thesis. Minimum of two semesters and 6 hours required for M.S.E. students. A maximum of 9 hours of credit is awarded upon successful completion of master's thesis. Prerequisite: ISE 697.

ISE 699 - MASTER'S THESIS

Semester Hours: 1-9

Required each semester student is working and receiving direction on a master's thesis. Minimum of two semesters and 6 hours required for M.S.E. students. A maximum of 9 hours of credit is awarded upon successful completion of master's thesis. The 1 hour option is only available to students who have successfully defended their thesis and submitted it for approval, but do not meet the deadlines for graduation in the semester submitted. Students may only use the 1 hour option once in their career.

ISE 726 - SYSTEMS MODELING

Semester Hours: 3

The capstone course for the operations research option studies the philosophy and methodology for modeling probabilistic systems. Includes Markov processes, queueing theory, and inventory theory. Team project required. Prerequisite: ISE 690 and (ISE 626 or ISE 627).

ISE 734 - DECISION ANALYSIS

Semester Hours: 3

Decision making for systems engineering and engineering management, with an emphasis on applications to complex systems. Builds a rigorous foundation in decision making under uncertainty using expected utility theory. Topics include decision trees, value models, predictive models, preferences and bias. Prerequisite: ISE 690.

ISE 739 - SELECTED TOPICS/ISE

Semester Hours: 1-6

ISE 761 - EVOL THRY ENG MGMT/IND SYS ENG

Semester Hours: 3

Development of applicable engineering management or industrial and systems engineering theory using classical concepts, contemporary studies and practices at successful technology-based organizations.

ISE 790 - ADV STATISTICAL APPLICATIONS

Semester Hours: 3

Continuation of ISE 690 with extension to regression models and nonparametric methods. Prerequisite: ISE 690.

ISE 799 - DOCTORAL DISSERTATION

Semester Hours: 3-9

Required each semester student is enrolled and receiving direction on doctoral dissertation.

Industrial and Systems Engineering, PhD

The ISEEM Department offers a PhD in Industrial Engineering with the following concentrations: Engineering Management, Industrial Engineering, or Systems Engineering. The following tables provide an outline of the program of study for these concentrations. Students must consult with their faculty advisor and supervisory committee when developing their program of study.

Program of Study: Engineering Management ¹

Code	Title	Semester Hours
Engineering Major		
EM 660	ENGR MGMT THEORY	3
EM 666	ENGR PROJECT MANAGEMENT	3
EM 711	RES METHODS IN SURVEY DEVELOPM	3
EM 760	ENGR MGMT STRUCTURES & SYSTEMS	3
EM 761	EVOL THRY ENG MGMT/IND SYS ENG	3
EM 766	MANAGING CHG IN HIGH TECH ORG	3
Supporting Courses		
Select 15 semester hours of graduate coursework to add the necessary breadth and depth.		15
Strongly suggested: EM 661 and ISE 734		
First Minor		
Select 12 semester hours in graduate coursework from the following areas: Industrial Eng, Quality Eng, Reliability Eng, Systems Simulation, Operations Research, Human Factors, or other approved areas		12
Second Minor: Mathematics/Statistics		
ISE 526	DESIGN/ANALY OF EXPERIMENT	3
ISE 690	STATISTICAL METHODS FOR ENGR	3
ISE 790	ADV STATISTICAL APPLICATIONS	3
Math/Statistics Elective		3
Dissertation		
Minimum of 18 hours of EM 799		18
Total Semester Hours		75

¹ Students not minoring in ISE may be required to take 9-12 semester hours of graduate ISE coursework to provide a basic knowledge of the discipline. This is at the discretion of the student's supervisory committee.

Program of Study: Industrial Engineering

Code	Title	Semester Hours
Engineering Major		
ISE 626	INTRO OPERATIONS RESEARCH	3
ISE 627	ENGINEERING SYSTEMS	3
ISE 641	ADVANCED QUALITY CONTROL	3
ISE 726	SYSTEMS MODELING	3
Supporting Courses		
ISE 523	INTR STATISTICAL QUALITY CONTR	3
ISE 530	MANUF SYS & FACILITIES DESIGN	3
ISE 547	INTRO TO SYSTEMS SIMULATION	3
ISE 623	ENGR ECON ANALYSIS	3
ISE 761	EVOL THRY ENG MGMT/IND SYS ENG	3
First Minor		
Select 12 semester hours in graduate coursework from the following areas: Industrial Eng, Quality Eng, Reliability Eng, Systems Simulation, Operations Research, Human Factors, or other approved areas		12
Second Minor: Mathematics/Statistics		
ISE 690	STATISTICAL METHODS FOR ENGR	3
ISE 526	DESIGN/ANALY OF EXPERIMENT	3
ISE 790	ADV STATISTICAL APPLICATIONS	3
Math/Statistics Elective		3
Dissertation		
Minimum of 18 hours of ISE 799		18
Total Semester Hours		69

Program of Study: Systems Engineering

Code	Title	Semester Hours
Engineering Major		
ISE 623	ENGR ECON ANALYSIS	3
ISE 627	ENGINEERING SYSTEMS	3
ISE 637	SYSTEMS MODELING & ANALYSIS	3
ISE 638	ENGINEERING RELIABILITY	3
ISE 734	DECISION ANALYSIS	3
Supporting Courses		
Select 15 semester hours of graduate coursework to support student's professional and academic goals including ISE 761		15
First Minor		
Select 12 semester hours in graduate coursework from the following areas: Industrial Eng, Quality Eng, Reliability Eng, Systems Simulation, Operations Research, Human Factors, or other approved areas		12
Second Minor: Mathematics/Statistics		
ISE 690	STATISTICAL METHODS FOR ENGR	3
ISE 526	DESIGN/ANALY OF EXPERIMENT	3
ISE 790	ADV STATISTICAL APPLICATIONS	3
Math/Statistics Elective		3
Dissertation		
Minimum of 18 hours of ISE 799		18
Total Semester Hours		72

Industrial and Systems Engineering, MSE

The ISEEM Department offers two plans leading to the Master of Science in Engineering degree. Each plan is designated as:

- Plan I (Thesis),
- Plan II (Non-thesis, coursework only)

For each plan, students may choose concentrations in Industrial Engineering or Systems Engineering. The following sections describe the requirements for each of these concentrations. Additional requirements, policies, and required forms may be found in the ISEEM Department office.

Program of Study: Industrial Engineering

The Basic Program of Study, common to the Plan I and Plan II MSE options, contains a minimum of 24 semester hours of graduate-level course work that must include:

Code	Title	Semester Hours
Engineering Major		
ISE 623	ENGR ECON ANALYSIS	3
ISE 626	INTRO OPERATIONS RESEARCH	3
ISE 641	ADVANCED QUALITY CONTROL	3
ISE 726	SYSTEMS MODELING	3
First Minor		
Select six hours in approved Engineering Management or Systems Engineering		6
Second Minor		
ISE 690	STATISTICAL METHODS FOR ENGR	3
ISE 526	DESIGN/ANALY OF EXPERIMENT	3
Total Semester Hours		24

Plan I, Thesis Option

Students selecting this option must:

Code	Title	Semester Hours
Complete Basic Program of Study as described above		24
Master's Thesis		
ISE 699	MASTER'S THESIS	6
Complete an acceptable thesis including a public defense		
Total Semester Hours		30

Plan II, Non-Thesis Option (Coursework Only)

Students selecting this option must:

Code	Title	Semester Hours
Complete Basic Program of Study as described above		24
Select 6 semester hours of graduate courses to complete an approved extended program of study		6
Total Semester Hours		30

Program of Study: Systems Engineering

The Basic Program of Study, common to the Plan I and Plan II MSE options, contains a minimum of 24 semester hours of graduate-level course work that must include:

Code	Title	Semester Hours
Engineering Major		
ISE 623	ENGR ECON ANALYSIS	3
ISE 627	ENGINEERING SYSTEMS	3
ISE 726	SYSTEMS MODELING	3

ISE 734	DECISION ANALYSIS	3
First Minor		
Select six hours in approved Engineering Management, Quality Engineering, Systems Engineering, Industrial Engineering, Operations Research, Engineering Reliability or Human Factors courses		6
Second Minor		
ISE 690	STATISTICAL METHODS FOR ENGR	3
ISE 526	DESIGN/ANALY OF EXPERIMENT	3
Total Semester Hours		24

Plan I, Thesis Option

Students selecting this option must:

Code	Title	Semester Hours
Complete Basic Program of Study as described above		24
Master's Thesis		
ISE 699	MASTER'S THESIS	6
Complete an acceptable thesis including a public defense		
Total Semester Hours		30

Plan II, Non-Thesis Option (Coursework Only)

Students selecting this option must:

Code	Title	Semester Hours
Complete Basic Program of Study as described above		24
Select 6 semester hours of graduate courses to complete an approved extended program of study		6
Total Semester Hours		30

Industrial and Systems Engineering, MSOR

The ISEEM Department offers three plans leading to the MSOR degree. These are designated:

- Plan I (Thesis),
- Plan II (Non-thesis with final project paper; exit exam is an oral examination)
- Plan II (Non-thesis, coursework only; exit exam is over coursework)

The following sections describe the requirements for each of these options. Additional requirements, policies and required forms may be found in the ISEEM Department office.

Basic Program of Study

The Basic Program of Study, common to the Plan I and Plan II (Non-thesis) MSE options, contains a minimum of 24 semester hours of graduate-level course work that must include:

Code	Title	Semester Hours
Engineering Major		
ISE 626	INTRO OPERATIONS RESEARCH	3
ISE 726	SYSTEMS MODELING	3
Select two of the following		6
ISE 547	INTRO TO SYSTEMS SIMULATION	
ISE 638	ENGINEERING RELIABILITY	
ISE 734	DECISION ANALYSIS	
First Minor		
Select a first minor of 6 semester hours of graduate courses in an approved engineering area of specialization		6
Choose from the following areas (courses are approved by advisor):		

Manufacturing Systems, Quality Engineering, Systems Engineering, Operations Research, Reliability Engineering, Systems Simulation, and Engineering Management

Second Minor

ISE 690	STATISTICAL METHODS FOR ENGR	3
ISE 526	DESIGN/ANALY OF EXPERIMENT	3
Total Semester Hours		24

Plan I, Thesis Option

Students selecting this option must:

Code	Title	Semester Hours
Complete Basic Program of Study as described above		24
Master's Thesis		
ISE 699	MASTER'S THESIS	6
Complete an acceptable thesis including a public defense		
Total Semester Hours		30

Plan II, Non-Thesis Option (Coursework Only)

Students selecting this option must:

Code	Title	Semester Hours
Complete Basic Program of Study as described above		24
Select 6 semester hours of graduate courses to complete an approved extended program of study		6
Total Semester Hours		30

Mechanical and Aerospace Engineering

N274 Technology Hall
Telephone: 256.824.6154
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Chair: D. Keith Hollingsworth, Professor

Mission

The mission of the Department of Mechanical and Aerospace Engineering is to provide undergraduate and graduate education, research, and public service in the Mechanical and Aerospace Engineering disciplines and to support the Mechanical and Aerospace Engineering needs of Huntsville, the State of Alabama, the region, our nation, and the international community.

Degree Programs

- Master of Science in Engineering (Mechanical Engineering)
- Master of Science in Aerospace Systems Engineering
- Doctor of Philosophy in Mechanical Engineering
- Doctor of Philosophy in Aerospace Systems Engineering

The broad range of faculty research interests in the Department of Mechanical and Aerospace Engineering offers opportunities for advanced work in rocket propulsion, combustion, applications of plasma science, fluid and solid mechanics, heat transfer, acoustics, aerodynamics, transport phenomena in energy systems, computational mechanics, experimental mechanics, dynamics and controls, and autonomous vehicles.

Located in one of the nation's leading centers for aviation and space research, UAH has the intellectual and social environment to provide a well-rounded, technologically-oriented degree. MAE graduate students have outstanding opportunities for research, collaboration, cooperative employment, and future employment with government research centers and high-tech businesses. In addition, a number of UAH research centers collaborate with the MAE Department, including the Propulsion Research Center, the Center for Rotorcraft Systems Engineering and Simulation, the Center for Modeling, Simulation & Analysis, the Center for Space Plasma and Aeronomic Research, the Center for Applied Optics, and the Nano and Micro Devices Center.

Prospective and current students are encouraged to visit the MAE Department web site at www.uah.edu/eng/departments/mae (<http://www.uah.edu/eng/departments/mae/>) for information about faculty research interests, ongoing research projects, funding opportunities and course availability. Other information about the MAE graduate programs are available in the department office.

MS in Aerospace Systems Engineering or MSE in Mechanical Engineering

Students wishing to pursue an MAE master's degree must meet the admission requirements of the UAH Graduate School as well as the College of Engineering. Students who are admitted to the MAE department master's program have the option to enroll in the MS in Aerospace Systems Engineering or the MSE in Mechanical Engineering. All courses in the department are open to students in either option. A beginning student files a Program of Study in one of the specialized areas of concentration (e.g. aerodynamics, materials, solid mechanics, etc). These selections are made in consultation with the faculty advisor (for students in the thesis program) or with the Graduate Director (for students in the non-thesis program). Each area of concentration may have other requirements.

The MS in Aerospace Systems Engineering and the MSE in Mechanical Engineering each require 30 semester hours and consist of two options. The thesis option requires 24 hours of graduate coursework and 6 hours of thesis. Students under this option must complete a written thesis and an oral defense. The non-thesis option requires 30 hours of graduate coursework.

PhD in Aerospace Systems Engineering or in Mechanical Engineering

The MAE Department offers a program leading to the degree of Doctor of Philosophy (PhD) in Aerospace Systems Engineering or in Mechanical Engineering. The PhD is a research-oriented degree awarded upon completion of a defined Program of Study, demonstration of scholarly competence, distinctive achievement in a special field, and demonstrated ability to do an independent, original investigation. Demonstration of substantial scholarly research accomplishments, rather than mere accumulation of residence and course credits, is an essential consideration in awarding the PhD degree. A Program of Study leading to a PhD degree in Chemical Engineering is also administered by the MAE Department. In addition to the admission requirements of the Graduate School and the College of Engineering for the MSE, students must also have a minimum graduate grade point average of 3.25 for an application to be processed. Specific admission requirements for students with an MSE degree from UAH or from another graduate institution are available by contacting the MAE department office.

The PhD Program of Study should exhibit both a breadth of understanding of engineering with a demonstrated depth in a focused area of Aerospace or Mechanical Engineering. The MAE PhD Program of Study consists of a minimum of 66 course and research semester hours beyond the BS degree. The course semester hour requirement for students with an MSE degree is a minimum of 48 semester hours, that is, a minimum of 18 semester hours beyond the MSE degree. The specific PhD Program of Study is designed by the student, his/her advisor, and the Supervisory Committee. In addition to the coursework required, a PhD student must pass three examinations before being awarded the degree; the Preliminary Examination, the Qualifying Examination, and the Final Comprehensive Examination. Specific details on each examination are provided in the MAE Department Office.

Details about these degree options can be found at <http://catalog.uah.edu/grad/colleges-departments/engineering/mechanical-aerospace-engineering/#text>.

Timing Requirements

Students who are pursuing a Ph.D. degree are subject to the following four timing requirements:

1. Part I of the Qualifying Examination (i.e., MAE Ph.D. Prelim Exam) must be completed successfully either within **one year** from the start of the Ph.D. degree program or prior to the completion of **12 credit hours of graduate course work** (whichever comes later).
2. A Ph.D. Dissertation Advisor and Ph.D. Supervisory Committee must be arranged and approved within **one year** of the successful completion of Part I of the Qualifying Examination.
3. Part II of the Qualifying Examination must be completed successfully within **two years** of the successful completion of Part I of the Qualifying Examination but **no less than six months** prior to the Dissertation Defense.
4. Starting in the Fall semester of 2020, all newly admitted PhD students will be required to complete their degree within 10 calendar years. If a student does not complete the degree within the 10 year limit, the student will automatically be withdrawn from the PhD program and from the College of Engineering. Students may reapply to UAH after the 10 year limit.

Exceptions to any of these requirements may be requested only one time (per each requirement) by petition from the student and the associated Ph.D. Dissertation Advisor. Approval of these petitions (including modifications or alterations) are made both by the MAE Department Graduate Committee and by the MAE Department Chair.

Master's Programs in Mechanical and Aerospace Engineering

- Aerospace Systems Engineering, MSASE (p. 929)
- Mechanical Engineering, MSE (p. 931)

Doctoral Programs in Mechanical and Aerospace Engineering

- Aerospace Systems Engineering, PhD (p. 929)
- Mechanical Engineering, PhD (p. 930)

MAE 520 - COMPRESSIBLE AERODYNAMICS

Semester Hours: 3

Principles of compressible flow including area change, friction, and heat transfer. Fundamentals of acoustic waves, one and two-dimensional shock and expansion waves, shock-expansion theory, and linearized flow with applications to inlets, nozzles, wind tunnels, and supersonic flow over aerodynamic bodies and wings. (Same as MAE 420.).

MAE 530 - FUNDAMENTALS OF AERODYNAMICS

Semester Hours: 3

Application of the principles of fluid mechanics and thermodynamics to the prediction of aerodynamic performance of aircraft, missiles and other flight vehicles. Topics include lift and drag, thrust and power, and the influence of wing loading, power loading, zero-lift drag, wing geometry, high lift devices Mach number, etc., on the performance and design trades of flight vehicles. (Same as MAE 430.).

MAE 531 - INTRO TO PLASMA DYNAMICS

Semester Hours: 3

MAE 540 - ROCKET PROPULSION I

Semester Hours: 3

Introduction to the operation, analysis and design of liquid and solid rockets. The course incorporates an experience in design and realization of a thermal system in which students work in teams to design a rocket motor or component.

MAE 541 - AIRBREATHING PROPULSION

Semester Hours: 3

Survey of airbreathing propulsion systems with special emphasis on gas turbine engines for aircraft and rotorcraft. Thermodynamic power cycles, design of components, and overall engine performance analysis. Discussion of practical design and operations considerations including engine controls, reliability, and durability. The course incorporates an experience in design and realization of a thermal system in which students work in teams to design a turbine engine. Students majoring in Aerospace Engineering must take either MAE 440 or MAE 441 to satisfy the Aerospace propulsion elective.

Prerequisite: MAE 520.

MAE 544 - INTRO TO ELECTRIC PROPULSION

Semester Hours: 3

Elements of electrically-driven rocket propulsion for applications from low earth orbit to the outer planets. The physics of ionizing and heating gases and plasmas for electrothermal, electrostatic and electromagnetic acceleration. Characteristics of Resistojet, Arcjet, Magnetoplasmadynamic thrusters, Electrothermal, Pulsed plasma, Electrostatic, and Hall thrusters. Review thruster system performance, power requirements, and selection for space missions. Overview of current research efforts, including thruster systems, physics, and performance. Prerequisite: MAE 520.

MAE 545 - HEAT DISTRIB SYS DESIGN

Semester Hours: 3

Design of hydronic and air distribution systems used in heating and air conditioning. Piping design, pump selection, heat coils, room air distribution, ducting design, fan selection, controls, and complete systems.

MAE 548 - ENERGY CONVERSION & POWER GEN

Semester Hours: 3

Application of principles of thermodynamics, heat transfer, and fluid mechanics to combustion engines and turbines. Basic engine types, engine components, idealized cycles, combustion, fuels, engine variables, testing, exhaust gas analysis, and air pollution as related to spark-ignition, compression-ignition, and turbine engines.

MAE 552 - COMPRESSIBLE AERODYNAMICS

Semester Hours: 3

Principles of compressible flow including area change, friction, and heat transfer. Fundamentals of acoustic waves, one and two-dimensional shock and expansion waves, shock-expansion theory, and linearized flow with applications to inlets, nozzles, wind tunnels, and supersonic flow over aerodynamic bodies and wings.

MAE 561 - VIBRATIONS ELASTIC SYS

Semester Hours: 3

Formulation of the equations of motion of discrete and continuous systems, analytical and numerical methods of solution, eigenvalue problems, and dynamic response. (Same as MAE 461 and CE 461/561.).

MAE 563 - INTERMEDIATE DYNAMICS

Semester Hours: 3

Kinematics and dynamics of particles, system of particles, and rigid-bodies. Variational principles and Lagrangian mechanics.

MAE 568 - ELEMENTS OF SPACECRAFT DESIGN

Semester Hours: 3

Fundamentals of spacecraft engineering and design. Topics include: orbital mechanics, space environment, attitude determination and control, communications, space structures, thermal control, propulsion and power, and systems and mission design. (Same as MAE 468.) Prerequisite: MAE 520.

MAE 574 - APP MECHANICS OF SOLIDS

Semester Hours: 3

Stresses and strains at a point, theories of failures, stress concentration factors, thick-walled cylinders, torsion of noncircular members, curved beams, unsymmetrical bending, and shear center. (Same as MAE 474 and CE 474/574.).

MAE 576 - COMP MATLS: FABRIC/DES/ANALY

Semester Hours: 3

Introduction to the mechanics of advanced composite materials. Design and analysis of composite structures. Analysis of orthotropic and transversely isotropic materials and systems. Hands on fabrication of a composite structure. (Same as MAE 476.).

MAE 577 - EXP TECH SOLID MECHANICS

Semester Hours: 3

Experimental methods to determine stress, strain, displacement, velocity, and acceleration in various media. Theory and laboratory applications of electrical resistance strain gages, brittle coatings, and photoelasticity. Application of transducers and experimental analysis of engineering systems. (Same as MAE 477 and CE 477/577.).

MAE 580 - AIRCRAFT STABILITY & CONTROL

Semester Hours: 3

Stability and control of aerodynamic vehicles. Design of aircraft to obtain good flying characteristics. Complete governing equations and analog solutions of linearized equations. (Same as MAE 480.) Prerequisite: MAE 530.

MAE 585 - NUM METH & ENGR COMPUTAT III

Semester Hours: 3

Advanced topics in numerical methods and engineering computation including: finite elements and finite differences in solving various engineering problems; Gaussian quadrature; interpolation, integration, and differentiation; and stability and convergence analysis of iterative methods. Numerical applications to fluid mechanics, heat transfer, structural mechanics, and machine design.

MAE 589 - COMPUTER AIDED ENGR

Semester Hours: 3

Application of computer methods in the analysis and design of structural, thermal, and dynamical systems. Use of state-of-the-art finite element and finite difference computer programs. Practical guidelines for discrete modeling; analysis of modeling errors. Comparison of exact and approximate solutions to boundary value problems. Use of microcomputers in engineering design and analysis. (Same as MAE 489.).

MAE 593 - ROCKET DESIGN

Semester Hours: 3

Design, build, test and fly a high-powered rocket with a payload to a specified altitude. Students work on multi-disciplinary teams to design payloads, avionics, recovery systems, structures and other sub-systems and then integrate them into the final vehicle. Course may be used for senior design credit.

MAE 594 - AIRCRAFT DESIGN

Semester Hours: 3

Design and build an unmanned aircraft to meet specified requirements, and then verify design through ground and flight tests. Students work on multi-disciplinary teams to address configuration aerodynamics, avionics, structures, propulsion/power and payloads. Systems engineering aspects including simulation, fabrication, integration, scheduling and cost estimation are also emphasized. Course may be used for senior design credit.

MAE 595 - SELECTED TOPICS MECH & AERO EG

Semester Hours: 1-6

MAE 610 - AERODYNAMICS

Semester Hours: 3

Fundamental concepts in aerodynamics including conservation laws, complex potential theory, thin airfoil theories, finite-wing lifting-line theory, boundary layers and Von Karman momentum integral equations.

MAE 620 - COMPRESSIBLE FLOW

Semester Hours: 3

Study of compressible subsonic, transonic and supersonic flows as described by the Euler equations. Linear and nonlinear theories of shockwaves, expansion waves, and their interactions. Applications to wind tunnels, nozzles, diffusers and aerodynamic bodies.

MAE 623 - COMPUTATIONAL FLUID DYNAMICS I

Semester Hours: 3

Formulations by finite difference, finite element, finite volume, and spectral element methods for incompressible and compressible flows. Explicit and implicit methods, Von Neumann error analysis, consistency, convergence, and accuracy.

MAE 631 - ROTORCRAFT DESIGN I

Semester Hours: 3

Conceptual design of rotorcraft systems with an emphasis on multidisciplinary design. Comprehensive methodologies for vehicle synthesis and sizing including consideration of aerodynamics, propulsion, materials and structures, flight performance and control, and operations. Integration of advanced technologies. Rotorcraft Design I and II are the capstone design courses for the MSE (Aerospace) program of study in Rotorcraft Systems Engineering. Corequisite: MAE 657.

MAE 632 - ROTORCRAFT DESIGN II

Semester Hours: 3

Continuation of Rotorcraft Design I including higher fidelity simulations and trade studies. Consideration of maneuverability, structural dynamics, drive train and hub design, advanced flight control system design, sensors, weapons, component integration, packaging, and life-cycle cost. Rotorcraft Design I and II are the capstone design courses for the MSE (Aerospace) program of study in Rotorcraft Systems Engineering.

MAE 633 - TACTICAL MISSILE DESIGN I

Semester Hours: 3

Conceptual design of missile systems with an emphasis on multi-disciplinary design. Comprehensive methodologies for vehicle synthesis and sizing including consideration of aerodynamics, propulsion, materials and structures, flight performance and control, and operations. Integration of advanced technologies. Tactical Missile Design I and II are the capstone design courses for the MSE (Aerospace) program of study in Missile Systems Engineering. Prerequisite with concurrency: MAE 755.

MAE 634 - TACTICAL MISSILE DESIGN II

Semester Hours: 3

Continuation of Tactical Missile Design I including higher fidelity simulations and trade studies. Consideration of trajectory modeling and simulation, open-loop flight control system design, sensors, component integration and packaging, and life-cycle cost. Tactical Missile Design I and II are the capstone design courses for the MSE (Aerospace) program of study in Missile Systems Engineering. Prerequisite: MAE 633.

MAE 635 - AEROSPACE SYSTEMS ENGINEERING

Semester Hours: 3

Introduction to Integrated Product and Process Development (IPPD) and life cycle analysis with application to Aerospace Systems. Systems engineering and quality engineering methods and tools. Top-down design decision support process. Computer integrated environment and robust design simulation will be addressed. Prerequisite: ISE 601 or ISE 690.

MAE 639 - SYSTEM SAFETY

Semester Hours: 3

The process of system safety?from the creation and management of a safety program on a system under development to the analysis that must be performed as this system is designed and produced to assure acceptable risk in its operation. Full discussion of the management and analysis processes and procedures. Incorporates the safety procedures used by the Department of Defense and NASA. Basic statistical methods and network analysis methods which provide an understanding of the engineering analysis methods that follow are covered.

MAE 640 - ROCKET PROPULSION II

Semester Hours: 3

MAE 641 - ADV THERMODYNAMICS

Semester Hours: 3

Application of classical thermodynamics. Treatment of problems involving nonideal gases and liquids, phase equilibrium, and chemical equilibrium. (Same as CHE 641.).

MAE 643 - ADVANCED HEAT & MASS TRANSFER

Semester Hours: 3

Continuation of MAE 450 in the study of conductive, convective, and radiative heat transfer and mass transfer. Emphasis is placed on heat transfer in turbulent flows and high speed flows, combined mode heat transfer, and mass transfer in reacting flows.

MAE 644 - ADVCD SOLID ROCKET PROPUL

Semester Hours: 3

Overview of the design, manufacture and testing of solid rocket propulsion systems. Specific topics include propellant ballistics and combustion, grain design, motor case and nozzle design, thermal protection, motor performance, and reliability and failure. Prerequisite: MAE 540.

MAE 645 - COMBUSTION I

Semester Hours: 3

Combustion chemistry, introduction to mass transfer, chemical kinetics, reactors, simplified governing equations for chemically reacting flow, laminar diffusion and premixed flames.

MAE 646 - COMBUSTION I

Semester Hours: 3

Combustion chemistry, introduction to mass transfer, chemical kinetics, reactors, simplified governing equations for chemically reacting flow, laminar diffusion and premixed flames.

MAE 647 - UNCERTAINTY ANAL IN EXPER

Semester Hours: 3

Uncertainty analysis concepts and techniques; application in planning, design, construction, debugging, execution, data analysis and reporting phases of experimental programs. Discussion of national and international standards and current engineering uncertainty analysis literature.

MAE 649 - TRANSPORT PHENOMENA

Semester Hours: 3

Mass, energy, and momentum transport in steady and transient motions in real and rheological substances. (Same as CHE 649.).

MAE 651 - VISCOUS FLUID MECHANICS

Semester Hours: 3

Fundamentals of incompressible viscous fluid motion, including development of Navier Stokes equation. Exact and approximate solutions for both large and small Reynolds number. Laminar and turbulent boundary layers.

MAE 657 - HELICOPTER THEORY

Semester Hours: 3

Vertical flight, forward flight, performance, design, mathematics of rotating systems, rotary wing dynamics, rotary wing aerodynamics, helicopter aeroelasticity, stability and control, stall, and noise. Prerequisite: MAE 530.

MAE 658 - ROTORDYNAMICS

Semester Hours: 3

Torsional and transverse rotor vibration, critical speed and stability analysis, response to unbalance, rotor balancing. Rotordynamic phenomena including: gyroscopic effects, fluid film bearings, annular seals, stiffness asymmetry.

MAE 660 - STRUCTURAL DYNAMICS

Semester Hours: 3

Application of the theory of vibrations to discrete and continuous models of structures. Numerical methods of analysis for both spatial and temporal variables. Modal synthesis and step-by-step time integration methods. Finite element applications; substructuring techniques. (Same as CE 660.).

MAE 661 - ADVANCED DYNAMICS

Semester Hours: 3

Variational methods, optimization, and dynamic stability. Lagrangian and Hamiltonian formulation for dynamical systems and Hamilton-Jacobi methods to orbital mechanics.

MAE 662 - NONLINEAR DYNAM & CHAOS

Semester Hours: 3

Nonlinear and chaotic dynamical systems, phase plane, periodic and strange attractors, stability analysis, critical points, Poincaré exponents, bifurcation points, solitons, logistic maps, Poincaré and Henon iterative maps, fractals, Mandelbrot and Julia sets, chaos in complex dynamical systems.

MAE 663 - ASTRODYNAMICS

Semester Hours: 3

Astronomical coordinates and time systems; the many-body problems and disturbing functions. General perturbation methods, and application of classical mechanics and Hamilton-Jacobi methods to orbital mechanics.

MAE 664 - ROBOTICS I

Semester Hours: 3

This course prepares students to analyze three-dimensional coordinate transforms, three-dimensional kinematic and dynamic modeling of multi-body systems, as applied to robotic manipulators. Topics are: Spatial descriptions and transformations, manipulator kinematics, inverse manipulator kinematics, Jacobians: velocities and static forces, manipulator dynamics, trajectory generation.

MAE 665 - ROBOTICS II

Semester Hours: 3

This course prepares students to analyze advanced robotic systems, as applied to redundant robots (highly flexible robots acting like an elephant trunk), mobile robots (self-driving cars), unmanned surface vessels (boats/ships), and unmanned aerial vehicles (drones). Topics are: Redundant and hyper-redundant manipulators, applied nonlinear control for manipulators, obstacle avoidance and path planning in 2D workspace for mobile robots, kinematics and control of mobile robots, marine robotic surface vessels dynamic modeling and control, aerial robotic vehicles dynamic modeling and control.

MAE 671 - CONTINUUM MECHANICS

Semester Hours: 3

Kinematics and kinetics, various coordinate systems, constitutive equations for continuous media; governing partial differential equations from first and second laws of thermodynamics; applications to solids, liquids, and gases. (Same as CE 671.).

MAE 672 - ELASTICITY

Semester Hours: 3

Formulation of boundary-value problems of classical elasticity. Application to plane problems, prismatic members, and axisymmetric problems. Introduction to three-dimensional problems. (Same as CE 672.).

MAE 673 - PLASTICITY

Semester Hours: 3

Fundamentals of mechanical behavior of metals and nonmetals for stress states greater than the yield stress state. Deformation and flow theories. Stress-strain relations and yield criteria. Solution of boundary value problems with plastic bodies. Limit analysis of structures. (Same as CE 673.).

MAE 674 - FINITE ELEMENT ANALYSIS I

Semester Hours: 3

Finite element theory, variational methods, weighted residuals; applications to linear partial differential equations in continuous media; solution of boundary-value and initial-value problems. (Same as CE 674.).

MAE 676 - VISCOELASTICITY

Semester Hours: 3

Mechanical behavior of materials having time-dependent and temperature-dependent material properties. Creep and relaxation phenomena. Elastic-viscoelastic analogies. Formulation of stress-strain laws. Solution of boundary value problems for viscoelastic bodies. (Same as CE 676.).

MAE 677 - OPTICAL TECH IN SOLID MECH

Semester Hours: 3

Overview of conventional methods for experimental stress analysis. Introduction to applied optics with emphasis on non-destructive, laser-based testing methods, fiber optic recording systems, photoelectronic-numerical data acquisition, and computer aided analysis. (Same as CE 677.).

MAE 678 - MECH COMPOSITE MATERIALS

Semester Hours: 3

Introduction to composite materials, micro- and macro-mechanical behavior of laminae; bending, buckling and vibration of laminated plates. (Same as CE 678.) Prerequisites: MAE 671 and MAE 672.

MAE 680 - PERFORMANCE FLIGHT TESTING

Semester Hours: 3

Fundamentals of rotorcraft test and evaluation. Topics include: test planning, requirements analysis, helicopter performance evaluation, fundamentals of propulsion testing, aviation safety, use of modeling and simulation in flight testing, Department of Defense and Federal Aviation Administration requirements and procedures.

MAE 681 - MISSILE TRAJECTORY ANALYSIS

Semester Hours: 3

Methods for generating trajectories of missiles and projectiles are studied as well as control mechanisms. Point mass approximations are developed using approximations and exact representations of drag and atmospheric conditions. Full six degree-of-freedom models are developed and solved numerically. Aerodynamic models are developed for both slowly spinning missiles and spin stabilized projectiles. Projectile linear theory is developed and used to discuss gyroscopic and dynamic stability and introduce rapid trajectory generation. Prerequisite: MAE 580.

MAE 683 - GRAD SEMINAR MECH ENGR

Semester Hour: 1

Professional activities designed to promote the skills required to organize and deliver oral technical presentations and to broaden the individual's awareness of technical issues. Required for all students pursuing a graduate degree. Students will be graded 'S' (satisfactory) or 'U' (unsatisfactory) based upon their performance and attendance. Students who do not receive an 'S' grade must register for the course until an 'S' is obtained.

MAE 684 - AEROSPACE SYSTEMS SEMINAR

Semester Hour: 1

Seminar course for students in the MSE (Aerospace) Rotorcraft Systems Engineering and Missile Systems Engineering programs of study. Students participate in seminars on specific aspects of rotorcraft and missile systems engineering including system integration, modeling and simulation, operations, and advanced technologies.

MAE 692 - GRAD ENGR ANALYSIS I

Semester Hours: 3

Ordinary differential equations (ODEs), Bessel functions, Legendre polynomials, Laplace transformations, simultaneous differential equations, application of ODEs to mechanical systems, partial differential equations (PDEs) and boundary-value problems, application of PDEs to mechanical systems.

MAE 693 - GRAD ENGR ANALYSIS II

Semester Hours: 3

Green's functions, Fourier series and integrals, linear algebra, vectors, vector analysis and integral theorems, introduction to tensor analysis, analytical functions of a complex variable, Taylor and Laurent expansions, the residue theorem, stability criteria, and Calculus of Variations. Prerequisite: MAE 692.

MAE 695 - SELECTED TOPICS MECH & AERO EG

Semester Hours: 1-9

MAE 696 - GRAD INTERN MECH & AERO ENGR

Semester Hours: 1-9

Active involvement in an engineering project in an engineering enterprise, professional organization, or government agency that has particular interest and relevance to the graduate student. Permission of MAE faculty member required.

MAE 698 - PLAN II MASTER'S PAPER

Semester Hours: 3

Required Plan II paper for a Plan II Masters degree. Completion of 18 semester hours of graduate course work required.

MAE 699 - MASTER'S THESIS

Semester Hours: 1-9

Required each semester in which a student is working and receiving direction on a master's thesis. Minimum of two semesters and 6 hours required for M.S.E. students. A maximum of 9 hours of credit is awarded upon successful completion of master's thesis. Requires thesis advisor permission. The 1 hour option is only available to students who have successfully defended their thesis and submitted it for approval, but do not meet the deadlines for graduation in the semester submitted. Students may only use the 1 hour option once in their career.

MAE 723 - COMPUTATIONAL FLUID DYNA II

Semester Hours: 3

Continuation of Computational Fluid Dynamics I, advanced topics in finite difference, finite element, finite volume, and spectral element methods. Prerequisite: MAE 623.

MAE 724 - COMPUTATIONAL FLUID DYNAMICS III

Semester Hours: 3

Grid generation techniques with structured and unstructured meshes, adaptive meshes, domain decompositions, and parallel processing. Applications of generated meshes to any one of the following problems: turbulence, combustion, acoustics, radiation, multiphase flows, or magnetohydrodynamics.

Prerequisite: MAE 723.

MAE 726 - ROTORCRAFT COMPUTATIONAL FLUID DYNAMICS

Semester Hours: 3

Full potential, Euler, Navier-Stokes approaches, structural and unstructured grids, wake capturing, turbulence, and acoustics.

MAE 740 - AEROTHERMODYNAMICS

Semester Hours: 3

Description of the dynamic and thermal fluid flow environments associated with hypervelocity vehicles and propulsion systems with emphasis on thermochemical nonequilibrium behavior. Topics include thermodynamic basis for internal energies, specific heats and shock strengths in dissociated and ionized gases; formulation of reacting flow conservation equations; and recent experimental advances in aerothermodynamics.

MAE 741 - STATISTICAL THERMODYNAMICS

Semester Hours: 3

Statistical ensembles; Maxwell-Boltzmann, Bose, Einstein, and Fermi-Dirac statistics. Application of statistical mechanics to thermodynamic processes. Information theory and its formalism.

MAE 745 - COMBUSTION II

Semester Hours: 3

Droplet evaporation and burning, introduction to turbulent flow, turbulent diffusion and premixed flames, burning of solids, pollutant emissions, and detonation. Prerequisite: MAE 645.

MAE 746 - CONVECTIVE HEAT TRANSFER

Semester Hours: 3

Advanced theory of convective transport processes in fluids, including transport of momentum and energy in laminar flow, boundary layers and turbulent transport in shear flow. Engineering applications include boiling and two phase processes.

MAE 748 - RADIATIVE TRANSFER

Semester Hours: 3

Physics and modeling of radiative transfer. Scattering, remote sensing, and absorption in participating media. Infrared through optical wave lengths. Computational methods in radiative transfer.

MAE 749 - MASS TRANSPORT

Semester Hours: 3

Mass transfer in solid and fluid systems under steady and transient conditions. Integration of momentum, heat and mass transfer equations with application to reactive, rheological and multicomponent systems.

MAE 751 - BOUNDARY LAYER THEORY

Semester Hours: 3

Development of boundary layers using singular perturbation theory. Curvature and compressible effects and the order of their importance. Modern applications and computational approaches.

MAE 752 - MECHANICS OF RAREFIED GASES

Semester Hours: 3

Application of kinetic theory to rarefied gas-flow problems. Boltzmann statistical distribution; gas-surface interaction, transport properties, free molecule flow; heat-free molecule flow; procedures for non-equilibrium flows. Offered upon demand.

MAE 753 - MAGNETO-GAS DYNAMICS

Semester Hours: 3

Equations of motion for ionized gases with critical analysis of transport properties in steady and varying electric and magnetic fields. MHD shock waves and radiation effects.

MAE 754 - HYPERSONIC FLOW

Semester Hours: 3

Theories for treating the laminar and turbulent boundary layers of reacting fluids, mixtures, related chemical, thermodynamic, and physical phenomena in hypersonic flows. Leading edge bluntness, shock wave interactions, and vorticity effects.

MAE 755 - ADVANCED AERODYNAMICS

Semester Hours: 3

Transonic, supersonic, and hypersonic flows. Application of compressible potential theory, similarity rules, slender body theory and Newtonian flow theory to the analysis of aerodynamics of aircraft, missiles, re-entry vehicles, and other flight vehicles.

MAE 756 - NUM SIM OF MAGNETOHYDRODYNAMIC

Semester Hours: 3

Finite difference methods for simulation of MHD flows. Methods include explicit scheme, FICE methods, LBL, ADI, artificial damping and projected characteristics for multidimensional timedependent flow.

MAE 757 - OPT TECH/FLUID MECHANICS

Semester Hours: 3

Laser sources, molecular interactions with light and diatomic spectroscopy needed fluorescence, Brillouin scattering, four wave mixing, CARS and other applications in optical fluid diagnostics. (Same as CHE 757.).

MAE 758 - TURBULENCE

Semester Hours: 3

Turbulence in gases and liquids; boundary layers, atmospheric phenomena. Prerequisites: MAE 651 and MAE 671.

MAE 760 - ANALY METH NONLIN DYNAM

Semester Hours: 3

Application of averaging methods and perturbation methods to vibrations of nonlinear systems. Analysis of linear systems with periodic coefficients (Floquet theory). Elements of stability theory, Liapunov functions, and Liapunov's direct method. Prerequisites: MAE 660 and MAE 661.

MAE 762 - WAVE MOT/CONT ELAS BODIES

Semester Hours: 3

Elements of stress wave propagation in bounded elastic media. Propagation of elastic waves in infinite and semi-infinite bodies, cylinders, rods and beams. (Same as CE 762.).

MAE 765 - RANDOM VIBR/ELASTIC SYSTEMS

Semester Hours: 3

Dynamic analysis of elastic systems including the response of complex structures to random excitations. Typical excitations include random wind, thermal, earthquake, aerodynamic, and ocean wave phenomena. Probabilistic mechanics methods. Concepts of reliability. Stationary and ergodic processes.

MAE 768 - DYN AEROSPACE VEHICLES

Semester Hours: 3

Elements of advanced rotational kinematics of rigid bodies. Attitude motion of space vehicles in circular and elliptic orbits. Methods of gravitation and spin stabilization of gyrostat.

MAE 772 - THEORY STRUCT STABILITY

Semester Hours: 3

Energy criterion for stability of elastic structure under conservative loading. Stability concept for general continuous systems. Rigorous and approximate methods of analysis. Buckling of structural elements under impulsive and nonconservative loading. Postbuckling behavior. Prerequisite: MAE 671.

MAE 773 - THEORY OF SHELLS

Semester Hours: 3

Analysis of thin plates and shells including higher order approximation theories and transverse shear deformations. Illustration of theories by selected problems. (Same as CE 773.).

MAE 774 - FINITE ELEM ANALY II

Semester Hours: 3

Advanced topics in finite element analysis; application to nonlinear partial differential equations in continuum mechanics; theoretical studies of convergence and stability of solutions. (Same as CE 774.) Prerequisite: MAE 674.

MAE 776 - TH FIN ELAST FIN VISCOEL

Semester Hours: 3

Theory of finite deformation analysis for elastic and viscoelastic materials. Constitutive models are developed for a functional analysis approach leading to models based on the Cauchy-Green Deformation Tensor and the Strain Energy Density Function. Models discussed include: Mooney-Rivlin and Bernstein-Kearsley-Zappas.

MAE 778 - FRACTURE MECHANICS

Semester Hours: 3

Theory of crack propagation, stress intensity factors, mapping techniques, series expansion, asymptotic approximations, field singularities, integral transforms, numerical solutions. (Same as CE 778.) Prerequisite: MAE 672.

MAE 780 - THEORY OF ACOUSTICS

Semester Hours: 3

Simple harmonic oscillators, damped and forced oscillators, 1-D wave equation, vibration of a string, 2-D wave equation, vibration of membranes, the acoustic wave equation, plane waves, cylindrical and spherical waves, reflection and transmission, radiation and reception of acoustic waves, absorption and attenuation of sound, cavities and wave guides, and architectural acoustics. Prerequisite: MAE 692.

MAE 781 - NONLINEAR EFFECTS/PLASMA

Semester Hours: 3

Fundamental physical concepts and methods of estimating various nonlinear interactions in plasmas. Analytical and numerical methods to deal with these problems.

MAE 782 - PLASMA TURBULENCE

Semester Hours: 3

Methodology that deals with plasma turbulence together with current numerical techniques to solve these problems approximately, via super-computing.

MAE 795 - SELECTED TOPICS MECH & AERO EG

Semester Hours: 1-9

MAE 799 - DOCTORAL DISSERTATION

Semester Hours: 3-9

Required each semester student is enrolled and receiving direction on doctoral dissertation.

Aerospace Systems Engineering, PhD

The MAE Department offers a PhD program in Mechanical Engineering.

The following table is an outline of the program of study requirements. Students should consult their dissertation advisor and supervisory committee to develop their program of study.

Program of Study

Code	Title	Semester Hours
Engineering Major		
Minimum of 27 semester hours of graduate coursework from MAE or related departments		27
With approval, a Master's Thesis may be counted 6 semester hours towards this total.		
First Minor		
ISE 627	ENGINEERING SYSTEMS	3
9 semester hours of graduate courses in an approved engineering area of specialization		9
Second Minor		
MAE 692	GRAD ENGR ANALYSIS I	3
6 semester hours of graduate coursework in mathematics (typically MAE 623, MAE 661, MAE 662, MAE 671, MAE 674, MAE 693, MAE 780 or ISE 690)		6
Doctoral Dissertation		
18 hours (minimum) of MAE 799 - Doctoral Dissertation		18
Total Semester Hours		66

With prior approval, up to 9 semester hours of 500 level courses may be taken in fulfillment of the Basic and specific program requirements.

Aerospace Systems Engineering, MSASE

The MAE Department offers two options leading to the Master of Science degree in Aerospace Systems Engineering (MSASE). These are designated:

- Plan I (Thesis),
- Plan II (Non-thesis)

The following sections describe the requirements for each of these options. For both options, the majority of coursework, not including MAE 699, must be from MAE. With prior approval, up to 9 semester hours of 500 level courses may be taken in fulfillment of the Basic and specific program requirements.

Basic MSASE Program of Study

The Basic Program of Study, common to both the Plan I and Plan II (Non-thesis) MSASE options, contains a minimum of 24 semester hours of graduate-level course work that must include:

Code	Title	Semester Hours
Engineering Major		
Select an engineering major consisting of 12 semester hours of graduate courses including supporting engineering courses		12
First Minor		
ISE 627	ENGINEERING SYSTEMS	3
3 semester hour graduate course in an approved engineering area of specialization		3
Second Minor		
MAE 692	GRAD ENGR ANALYSIS I	3
3 semester hours of graduate coursework in mathematics (typically MAE 623, MAE 661, MAE 662, MAE 671, MAE 674, MAE 693, MAE 780 or ISE 690)		3
Total Semester Hours		24

Plan I, Thesis Option

Students selecting this option must:

Code	Title	Semester Hours
Complete Basic Program of Study as described above		24
MAE 699	MASTER'S THESIS	6
Complete an acceptable thesis including a public defense and submit a journal manuscript to the research advisor		
Total Semester Hours		30

Plan II, Non-Thesis Option

Students selecting this option must:

Code	Title	Semester Hours
Complete Basic Program of Study as described above		24
Select 6 semester hours of graduate courses to complete an approved extended program of study		6
Total Semester Hours		30

Mechanical Engineering, PhD

The MAE Department offers a PhD program in Mechanical Engineering.

The following table is an outline of the program of study requirements. Students should consult their dissertation advisor and supervisory committee to develop their program of study.

Program of Study

Code	Title	Semester Hours
Engineering Major		
Minimum of 27 semester hours of graduate coursework from MAE or related departments		27
With approval, a Master's Thesis may be counted 6 semester hours towards this total.		
First Minor		

12 semester hours of graduate courses in an approved engineering area of specialization	12
Second Minor	
MAE 692 GRAD ENGR ANALYSIS I	3
6 semester hours of graduate coursework in mathematics (typically MAE 623, MAE 661, MAE 662, MAE 671, MAE 674, MAE 693, MAE 780 or ISE 690)	6
Doctoral Dissertation	
18 hours (minimum) of MAE 799 - Doctoral Dissertation	18
Total Semester Hours	66

With prior approval, up to 9 semester hours of 500 level courses may be taken in fulfillment of the Basic and specific program requirements.

Mechanical Engineering, MSE

The MAE Department offers two plans leading to the MSE degree for the Mechanical Engineering option. These are designated:

- Plan I (Thesis)
- Plan II (Non-thesis)

The following sections describe the requirements for each of these options. For both options, the majority of coursework, not including MAE 699, must be from MAE. With prior approval, up to 9 semester hours of 500 level courses may be taken in fulfillment of the Basic and specific program requirements.

Basic Program of Study

The Basic Program of Study, common to both the Plan I and Plan II (non-thesis) MSE options, contains a minimum of 24 semester hours of graduate-level course work that must include:

Code	Title	Semester Hours
Engineering Major		
Select an engineering major consisting of 12 semester hours of graduate courses including supporting engineering courses		12
First Minor		
Select a first minor of 6 semester hours of graduate courses in an approved engineering area of specialization		6
Second Minor		
MAE 692 GRAD ENGR ANALYSIS I		3
Select 3 additional semester hours of graduate coursework in mathematics (typically MAE 623, MAE 661, MAE 662, MAE 671, MAE 674, MAE 693, MAE 780 or ISE 690)		3
Total Semester Hours		24

Plan I, Thesis Option

Students selecting this option must:

Code	Title	Semester Hours
Complete Basic Program of Study as described above		24
MAE 699 MASTER'S THESIS		6
Complete an acceptable thesis including a public defense		
Total Semester Hours		30

Plan II, Non-Thesis Option

Students selecting this option must:

Code	Title	Semester Hours
	Complete Basic Program of Study as described above	24
	Select 6 semester hours of graduate courses to complete an approved extended program of study	6
	Total Semester Hours	30

Interdisciplinary Programs

Interdisciplinary Master's Programs

- Cybersecurity, MS Interdisciplinary - Management Track (p. 863)
- Cybersecurity, MS Interdisciplinary - Computer Engineering Track (p. 934)
- Cybersecurity, MS Interdisciplinary - Computer Science Track (p. 935)
- Materials Science, MS (p. 939)

Interdisciplinary Doctoral Programs

- Biotechnology Science and Engineering, PhD (p. 932)
- Materials Science, PhD (p. 940)
- Optical Science and Engineering, PhD (p. 942)

Biotechnology Science and Engineering, PhD

Biotechnology Science & Engineering

Degree

Doctor of Philosophy

Program Coordinator

Joseph D. Ng, Biological Sciences

Materials Science Building, Rm. 221

256.824.3715

Email: ngj@uah.edu (ngj@email.uah.edu)

Program Office

Materials Science Building, Room 206A

256.824.3192

Adjunct Faculty

More than 10 scientists from NASA's Marshall Space Flight Center (Space Science Laboratory) and local biotechnology companies in Huntsville serve as adjunct faculty to the program and have expertise in at least one of the thrust areas of Biotechnology Science and Engineering.

Mission

The Biotechnology Science and Engineering Graduate Program (B.S.E.) is an interdisciplinary program of the University of Alabama in Huntsville concerned with research and scholarly activity in the diverse areas of biotechnology. The program's mission is to provide Ph.D. level graduates who are broadly trained in the areas of science and engineering pertinent to biotechnology and who will benefit the economic, educational, and cultural development of Alabama. Graduates of the program are expected to be able to make significant contributions to biotechnology in academic, governmental, and business settings.

Biotechnology is not a single area of study itself, but is a multidisciplinary field concerned with the practical application of biological organisms and their subcellular components to industrial or service manufacturing, to environmental management and health and medicine. It is, in essence, a series of enabling technologies drawn from the fields of microbiology, cellular biology, molecular biology, genetics, biochemistry, immunology, fermentation technology, environmental science and engineering which allow one to synthesize, breakdown or transform materials to suit human needs. Biotechnology ('Current Trends in Chemical Technology, Business, and Employment,' American Chemical Society, Washington, DC. 1998) can therefore be defined as the safe study and manipulation of biological molecules for development of products or techniques for medical and industrial application. Although biotechnology in the broadest sense is not new, the current ability and demand for manipulating living organisms or their subcellular components to provide useful products, processes or services has reached new heights. Modern biotechnology has resulted from scientific scrutiny of old and familiar processes and from new advances in molecular biology, genetic engineering and fermentation technologies.

The future industrial landscape will continue to include research, development and the manufacturing of products such as proteins and nucleic acids that will be based wholly or in large part on biological processes. The interdisciplinary program in Biotechnology Science and Engineering will provide broad

training in sciences and engineering dealing with the handling and the processing of macromolecules and living systems. Students will receive advanced training in one of three specializations:

1. Structural Biology,
2. Biomolecular Sciences or
3. Bioprocess Engineering.

The principal core of instructors and research advisors are drawn from the Departments of Biological Sciences, Chemistry, and Chemical and Materials Engineering. The program includes significant involvement from local biotechnology companies as well as NASA's Marshall Space Flight Center.

In addition to a set of core courses, the Ph.D. program requires the successful completion of a comprehensive exam, seminar attendance, the preparation of a U.S. National Institutes of Health (NIH) or National Science Foundation style research proposal, oral presentations and defense of a dissertation describing original research. It is the intent of the program to produce internationally competitive graduates who will make significant contributions to the field of biotechnology.

Admission Requirements

Applicants may be unconditionally admitted to the program if they have:

1. A bachelor's degree in science or engineering from an approved college or university;
2. A minimum grade point average (GPA) of 3.0 overall;
3. A combined score of 300 on the verbal, quantitative and analytical sections and at least 3.0 in the writing section of the Graduate Record Examination (GRE).
4. A TOEFL (iBT) score of: all sub-scores equal to or greater than 18 OR IELTS score of: all sub-scores equal to or greater than 6.0 for international students.

Applicants may be admitted conditionally if they do not meet these requirements but indicate the potential for success in the Biotechnology Science and Engineering program. Applicants must have knowledge from coursework in the areas of general biology, cell biology, genetics and molecular biology, general and organic chemistry, physics and calculus to satisfy the prerequisites of calculus-based physical or biophysical chemistry. Students with deficiencies in any of these areas may be admitted only conditionally pending remedy of the deficiencies.

To obtain a Ph.D. in Biotechnology Science and Engineering, the student must satisfy all requirements of the School of Graduate Studies as well as those of the Biotechnology Science and Engineering Program.

The requirements are as follows:

1. Successfully complete the core courses:

Code	Title	Semester Hours
CHE 561	BIOSEPARATIONS RECOMBI TECH/PR	3
CH 561	BIOCHEMISTRY I	3
CH 562	BIOCHEMISTRY II	3
BYS 519	GENE STRUCTURE & FUNCTION	3
BYS 543	MOLECULAR BIOLOGY OF THE CELL	3
Total Semester Hours		15

2. Pass the Preliminary Examination

Each student must pass the preliminary examination which has to be taken at the end of the first summer of residence, and will cover materials from the core courses in the areas of Biochemistry, Cellular and Molecular Genetics and Bioprocessing/Bioseparations. Students will take examinations in all three areas during the first attempt. Students are required to repeat only the part of the exams that they did not pass. Students will have a maximum of two attempts to pass the preliminary examination. Appeals to this policy must be filed with the Director of the Biotechnology Program who will consult with the Graduate Dean and the Deans of the Colleges of Engineering and Science.

3. Choose a dissertation advisor and committee

Students who qualify for the Ph.D. program by passing the preliminary examination will choose a dissertation advisor and a Supervisory Committee during the fall semester of their second year. The committee will meet for the first time with the student to review the initial research goals (Research Start Meeting).

4. Write and defend a research proposal

In consultation with the dissertation advisor and committee, the student will begin working on a research project which will subsequently lead to an NIH or NSF style proposal. This written proposal will be submitted to the committee by the middle of the second summer. By the first semester of the third year, the student will defend this proposal in a seminar, followed by questions from committee members (Annual Research Appraisal I) (ARA-I). Successful completion of the written and oral presentation of the dissertation proposal constitutes the School of Graduate Studies Qualifying Examination.

5. Complete an acceptable program of study

The program of study will consist of at least 48 semester hours of coursework at the graduate level including the core courses required to prepare for the preliminary examinations and courses required to prepare the student to conduct original research in their area of study. Students must register for a total of three semester hours of seminar. A maximum of three seminar semester hours may be considered towards fulfillment of the graduate course requirements. A minimum of 18 semester hours of BSE 799 must be included in the program of study.

6. Complete and defend a research dissertation

During the fall semesters of the next two years, students will meet with their advisors and committee for research appraisals (ARA). Following these annual evaluations, the student will begin writing the dissertation and plan to defend it before the fifth year after passing the preliminary examination. The primary dissertation advisor and the committee have the discretion to allow students to defend the dissertation earlier if the work is of high quality and sufficient progress has been made toward the goals stated in the research proposal.

All requirements for the Ph.D. must be completed in no more than five years after the approval of the Research Proposal (ARA-I).

Cybersecurity, MS Interdisciplinary - Computer Engineering Track

Purpose

The MSCBS degree is a unique program in that it is an interdisciplinary program of study among three colleges, Business, Engineering, and Science.

Program prerequisites are kept to a minimum and the program is designed to meet the needs of students with a wide variety of educational backgrounds. The admission and program requirements are described below.

Admission Requirements

Students must meet the minimum requirements for graduate school admissions as required by the UAH College of Graduate Studies.

Direct admission to the computer engineering track requires that a student hold an ABET-accredited Bachelor's degree in computer science or computer engineering. All potential applicants must demonstrate proficiency in the following foundation coursework.

Code	Title	Semester Hours
CPE 211	INTRO COMPUTER PROG FOR ENGR	3
CPE 212	FUNDAMENTALS SOFTWARE ENGRG	3
CS 214	INTRO DISCRETE STRUCTURE	3
CS 317	INTRO DESIGN/ANALYSIS OF ALG	3
CPE 348	INTRO TO COMPUTER NETWORKS	3
CPE 431	INTRO COMPUTER ARCHITECTURE	3
CPE 434	OPERATING SYSTEMS	3

Applicants for graduate study must apply for admission to the Graduate School. More information about the admissions process may be found on the Graduate School Admission webpage (<https://www.uah.edu/admissions/graduate/>).

Computer Engineering Track

The MS-CBS program with the Computer Engineering Track consists of 30 semester hours of graduate coursework. The coursework includes a three-course core that is required of all students, 15 credit hours of cybersecurity: engineering track required courses and 6 credit hours of electives. The directed elective choices are designed to provide students a broader understanding of multiple cybersecurity functions normally expected in an organization.

CPE 692 is the capstone course and should be taken toward the end of the student's program. Students must earn a grade of B or better in the capstone course.

Code	Title	Semester Hours
Cybersecurity Core Courses		9
IS 550	CYBERSECURITY MANAGEMENT	
CS 580	MOBILE DIGITAL FORENSICS	
CPE 692	CYBERSECURITY CAPSTONE	
Cybersecurity: Engineering Track		15
CPE 549	INTRO TO CYBERSECURITY ENGINRG	
CS 585	INTRO TO COMPUTER SECURITY	
CPE 645	COMPUTER NETWORK SECURITY	
CPE 646	MOBILE & WIRELESS NETWORKS	
CPE 649	ADV CYBERSECURITY ENGINEERING	
Electives		
Select two of the following:		6
CPE 534	OPERATING SYSTEMS	
CPE 647	UBIQUITOUS COMPUTING	
CS 553	CLIENT/SERVER ARCHITECTURES	
CS 617	DES & ANALY OF ALGORITHM	
CPE 646	MOBILE & WIRELESS NETWORKS	
CPE 648	ADVANCED COMPUTER NETWORKS	
CS 565	NETWORK SECURITY	
CS 650	SOFT'W ENGINEERING PROC	
CS 670	COMPUTER NETWORKS	
CS 685	COMPUTER SECURITY	
CS 687	DATA BASE SYSTEMS	
CS 690	ADVANCED OPERATING SYSTEMS	
IS 560	NETWORKING & IT INFRASTRUCTURE	
IS 571	BUSINESS ANALYTICS & AI	
IS 577	NETWORK DEFENSE & SECURITY	
IS 640	DATA MGT AND DATA MINING	
IS 670	BUSINESS CONTINGENCY PLANNING	
IS 691	INFORMATION SYS STRATEGY & APP	
Total Semester Hours		30

Other Requirements

1. Computer Engineering track students should take at least one elective course from CPE courses.
2. Students can take only one course between these courses.
 - a. CS 670 and IS 560
 - b. CS 685 and CPE 645
 - c. CS 670 and CPE 646
 - d. CS 687 and IS 640
3. At least half of the credit hours must be completed in courses numbered 600 or higher.
4. At least half of the credit hours must be CPE courses.

Cybersecurity, MS Interdisciplinary - Computer Science Track

Purpose

The UAH Computer Science department Master of Science in Cybersecurity program (MSCBS—Computer Science track) is designed to educate students to become very knowledgeable cybersecurity professionals. The focus of this program is on technological knowledge at the most in depth levels, so that graduates of this program will be able to address the challenges that are at the forefront of national security and commercial security in the cyber domain.

Graduates of this program will be able to create new software solutions to new cybersecurity problems. They will be able to work to protect government and commercial sites against Advanced Persistent Threats, that is, very capable and well-funded attackers that are supported by foreign governments

and/or organized crime, and in the event of any attack, to trace the attack back to the perpetrators. They will be able to work in digital forensics for law enforcement agencies to find digital evidence of crime and to bring criminals to justice. Also, graduates from this program will be able to work for agencies of the U.S. government to take action against enemies of the U.S., including the creation of zero day exploits (that is, exploiting a previously unknown vulnerability).

Admission Requirements

Admission is granted to students who show high promise for success in graduate studies and who hold baccalaureate degrees in either Computer Science or Computer Engineering. Students from other disciplines will be required to successfully complete the Computer Science breadth requirements.

Breadth Requirements

The breadth requirements can be satisfied in one of the following ways:

- Completion of the course at UAH with a grade of B or better;
- Completion of an equivalent course at another institution with a grade of B or better;
- Testing out of the course, where permitted by departmental policy

Applicants to graduate programs in Computer Science must satisfy the following breadth requirements before admission to the program:

Code	Title	Semester Hours
Mathematics		
MA 171	CALCULUS A	
MA 172	CALCULUS B	
MA 244	INTRO TO LINEAR ALGEBRA	
MA 385	INTRO TO PROBABILITY & STATIST	
Computer Science		
CS 121	COMPUTER SCIENCE I *	
CS 214	INTRO DISCRETE STRUCTURE	
CS 221	COMP SCI II: DATA STRUCTURES *	
CS 309 & 309L	COMPUTER ORG & SWTCHNG THRY and LABORATORY	
CS 317	INTRO DESIGN/ANALYSIS OF ALG	
CS 321	INTRO OBJECT-ORIENTED PROG JAV *	
CS 413 & 413L	INTRO DIGITAL COMP ARCHITECTUR and LABORATORY	
CS 490	INTRO TO OPERATING SYSTEMS	

*An introductory sequence covering Object-Oriented Programming and Data Structures in C/C++/Java.

Degree Requirements and Restrictions

The MS-CBS program consists of 30 semester hours of graduate coursework. The coursework includes a three-course core that is required of all students (9 hours), five computer science track required courses (15 credit hours), and 6 credit hours of electives. The directed elective choices are designed to provide students a broader understanding of multiple cybersecurity functions normally expected in an organization.

Computer Science Track

CS 692 is the capstone course and should be taken toward the end of the student's program. Students must earn a grade of B or better in the capstone course.

Restrictions on Elective Courses

1. Computer Science track students should take two elective courses from the CS or CPE elective courses listed in the table of electives below.
2. At least half of the hours must be completed in courses numbered 600.
3. Management track students require instructor approval before enrolling in a CPE or CS course.
4. Computer science students must select CS 580 instead of IS 663 as the forensics core course.

5. CS 695, CS 696, CS 795, CS 796 require approval from the student's advisor and approval of the course instructor. The course topic must be cybersecurity related.

Code	Title	Semester Hours
Cybersecurity Core Courses		9
IS 550	CYBERSECURITY MANAGEMENT	3
CS 580	MOBILE DIGITAL FORENSICS	3
or IS 663	COMPUTER FORENSICS	
CS 692	CYBERSECURITY CAPSTONE	3
or IS 692	CYBERSECURITY PRACTICUM	
or CPE 692	CYBERSECURITY CAPSTONE	
Cybersecurity: Computer Science Track		15
CPE 549	INTRO TO CYBERSECURITY ENGINRG	3
CS 585	INTRO TO COMPUTER SECURITY	3
CS 565	NETWORK SECURITY	3
CS 670	COMPUTER NETWORKS	3
CS 685	COMPUTER SECURITY	3
Electives		6
Select two of the following:		
CPE 647	UBIQUITOUS COMPUTING	3
CPE 648	ADVANCED COMPUTER NETWORKS	3
CPE 649	ADV CYBERSECURITY ENGINEERING	3
CS 617	DES & ANALY OF ALGORITHM	3
CS 640	MACHINE LEARNING	3
CS 641	DATA MINING	3
CS 650	SOFT'W ENGINEERING PROC	3
CS 687	DATA BASE SYSTEMS	3
CS 690	ADVANCED OPERATING SYSTEMS	3
CS 695	INDEPENDENT STUDY *	3
CS 696	SELECTED TOPICS IN CS *	3
CS 795	INDEPENDENT STUDY *	3
CS 796	ADVANCED SELECTED TOPICS *	3
*Should be cybersecurity related. Requires approval of advisor and course instructor.		

Cybersecurity, MS Interdisciplinary - Management Track

For an overview of the program click here (<https://www.uah.edu/business/grad/degrees/mscbs/>).

Program Prerequisites

Program prerequisites include a bachelor's degree in any field and demonstration of competency in each of the following two areas:

1. Information Systems Competency. Students must demonstrate this competency by successful completion of IS 301 or its equivalent, which will not count towards the requirements of the MS-CBS degree.
2. Computer Programming Competency. Students must demonstrate this competency by successful completion of IS 310 or its equivalent, which will not count towards the requirements of the MS-CBS degree.

Degree Requirements

The MS-CBS program consists of 30 semester hours of graduate coursework. The coursework includes a five-course core that is required of all students, 9 credit hours of management track required courses, and 6 credit hours of electives. The directed elective choices are designed to provide students a broader understanding of multiple cybersecurity functions normally expected in an organization.

IS 692/CPE 692/CS 692 is the capstone course and should be taken toward the end of the student's program. Students must earn a grade of B or better in the capstone course.

Code	Title	Semester Hours
Cybersecurity Core Courses		9
IS 550	CYBERSECURITY MANAGEMENT	
IS 663	COMPUTER FORENSICS	
or CS 580	MOBILE DIGITAL FORENSICS	
IS 692	CYBERSECURITY PRACTICUM	
or CPE 692	CYBERSECURITY CAPSTONE	
or CS 692	CYBERSECURITY CAPSTONE	
Management Track-required Courses		15
IS 501	CYBERSECURITY PRINCIPLES	
IS 560	NETWORKING & IT INFRASTRUCTURE ¹	
IS 577	NETWORK DEFENSE & SECURITY ¹	
IS 650	SELECTED RESEARCH TOPICS ²	
or IS 580	SEMINAR IN MGT INFO SYSTEMS	
IS 670	BUSINESS CONTINGENCY PLANNING	
Elective, select two courses from the following: ³		6
IS 571	BUSINESS ANALYTICS & AI	
IS 640	DATA MGT AND DATA MINING	
IS 691	INFORMATION SYS STRATEGY & APP	
CPE 534	OPERATING SYSTEMS	
CPE 647	UBIQUITOUS COMPUTING	
CPE 648	ADVANCED COMPUTER NETWORKS	
CS 687	DATA BASE SYSTEMS	
CS 553	CLIENT/SERVER ARCHITECTURES	
CS 617	DES & ANALY OF ALGORITHM	
CS 650	SOFT'W ENGINEERING PROC	
CS 670	COMPUTER NETWORKS	
CS 690	ADVANCED OPERATING SYSTEMS	
CPE 649	ADV CYBERSECURITY ENGINEERING	
CPE 645	COMPUTER NETWORK SECURITY	
CPE 646	MOBILE & WIRELESS NETWORKS	
CS 565	NETWORK SECURITY	
CS 685	COMPUTER SECURITY	
Total Semester Hours		30

¹ MS-CBS students whose previous studies include the undergraduate equivalents of IS 560 and IS 577 must substitute a 3-credit-hour graduate-level IS course for each of the latter.

² Students may substitute an IS course approved by the Department Chair.

³ Students are required to satisfy the prerequisites for any elective they choose. Students who wish to substitute some other courses as directed electives may seek prior approval for such a substitution by contacting the Graduate Advisor in the UAH College of Business.

Additional Information

Thesis Option

A thesis option is available. Students interested in this option should contact both the faculty member who the student wants to serve as the thesis advisor, and the Graduate Advisor in the College of Business, before completing 12 hours of graduate study. If selected, the student will register for the IS 699 Master's Thesis course for 6 credit hours in lieu of 6 credit hours of electives.

Transfer Credit

Up to 12 semester hours of graduate credit taken at other AACSB-accredited universities may be transferred to meet MS-CBS degree requirements. Inquiries about the transferability of specific courses should be directed to the Graduate Advisor, who will consult with the faculty to determine whether the content of the class will be accepted for transfer credit.

For more information contact:**Tressa Hillman-Moore**

Graduate Advisor

Business Administration Building Room 102

256.824.6732

g (<http://catalog.uah.edu/grad/colleges-departments/interdisciplinary-programs/cybersecurity-ms-interdisciplinary-management-track/>)
gradbusiness@uah.edu) radbusiness@uah.edu (gradbiz@uah.edu)

Materials Science, MS

Degree: Master of Science

Telephone: 256.824.2596

Email: materials.science@uah.edu

Interim Program Coordinator: Emanuel A. Waddell

Admission Requirements

General requirements of the Graduate School (see Admissions Information section of this catalog) must be satisfied. In addition, students admitted to the graduate Materials Science Program are assumed to have background training in chemistry, mathematics, physics, and possibly biology and engineering, depending upon the student's research interests. Students should realize that if deficiencies exist, some additional undergraduate courses may be required. The time required to complete the degree may then be proportionately increased.

Program Objective

The program objective of the Materials Science program is to educate students in the classroom and laboratory so that their technical skill set and knowledge is enhanced through laboratory research and didactic courses such that graduates have the ability to contribute to organizations that perform research or contribute to the research enterprise through education, policy or manufacturing.

The Materials Science MS Program at The University of Alabama in Huntsville is an interdisciplinary masters program that 'focuses on the general application of mathematical and scientific principles to the analysis and evaluation of the characteristics and behavior of solids, including internal structure, chemical properties, transport and energy flow properties, thermodynamics of solids, stress and failure factors, chemical transformation states and processes, compound materials, and research on industrial applications of specific materials.' The University of Alabama in Huntsville MS in Materials Science is not part of the tri-campus program. Students receiving a master's degree in materials science may be based in one of several departments including chemistry, physics, chemical engineering and mechanical engineering. In the majority of cases, students receive their masters in materials science as part of their doctoral program. Students are encouraged to pursue the thesis option as it enhances the student's technical skill set, exposes them to new research opportunities and makes them more attractive to employers.

Learning Outcomes

Materials Science students will

- Acquire a comprehensive knowledge of materials science at an introductory graduate level
- Perform semi-independent research (M.S. Plan I students)
- Develop project management skills

Research

Research in Materials Science focuses on the fundamental relations that exist between the structure of materials on the one hand, and properties and the methods for synthesizing and processing these materials on the other; otherwise known as the materials triangle. The material may be a metal, a ceramic, or a polymer, and it may be dispersed in the solid, liquid or gaseous state. Depending upon the desired application, the structure of the material may have to be investigated at the nuclear, atomic, molecular, granular, or larger length scales. The property that is determined by the structure may be mechanical, electrical, magnetic, optical, thermal, chemical, or biological. Synthesizing may be done by thermal, mechanical, photochemical, electrochemical, or biological processes. Many basic academic disciplines can be fruitfully applied to the solution of materials science problems. Among them, we note particularly chemistry, physics, biology, and engineering. Faculty members guiding students in the Materials Science Program represent all four of these areas.

Master of Science Degree Requirements

General requirements of the Graduate School under Plan I or Plan II must be satisfied. The M.S. degree is a general degree in materials science. As such, it is based upon a core sequence of courses emphasizing areas of materials science.

Plan I

This plan requires 24 semester hours of graduate coursework, which must include a core consisting of:

Code	Title	Semester Hours
MTS 660	INTRO SOLID ST PHY I	3
MTS 602	PROPERTIES OF MATERIALS	3
CH 640	ADV CHEMICAL THERMODYNAMICS	3
CH 642	ADV CHEMICAL DYNAMICS	3
Select one of the following:		3
CH 521	CHEMICAL INSTRUMENTATION	
MTS 601	NATURE OF MATERIALS	
Select a minimum of 6 additional semester hours of graduate coursework in Materials Science		6
MTS 699	MASTER'S THESIS	6
MTS 780	MATERIALS SCIENCE SEMINAR ¹	1
Total Semester Hours		28

¹ Students should also register for MTS 780 during every semester they are in residence at UAH.

Additional Information

At least 50% of the coursework must be at the 600-level or above. A program of study must be planned in consultation with a member of the materials science faculty serving as a temporary advisor assigned by the program director. After a student following Plan I selects a thesis topic and thesis supervisor, a supervisory committee will be appointed. This committee should consist of three members of the materials science faculty including the thesis supervisor as chair. A student must complete a written thesis and successfully defend it by an oral presentation before the supervisory committee.

Plan II

This plan requires 33 or more semester hours of graduate coursework in Materials Science or a related discipline to include the 15 semester hour Materials Science core:

Code	Title	Semester Hours
MTS 601	NATURE OF MATERIALS	3
MTS 602	PROPERTIES OF MATERIALS	3
MTS 660	INTRO SOLID ST PHY I	3
CH 640	ADV CHEMICAL THERMODYNAMICS	3
CH 642	ADV CHEMICAL DYNAMICS	3
Total Semester Hours		15

Students must also register for MTS 780 during every semester in which they are in residence at UAH. Half of any graduate coursework taken must be at the 600-level or above. A program of study must be planned in consultation with a member of the materials science faculty serving as an advisor assigned by the program director. To fulfill the requirement of a final comprehensive exam, the student must pass one of the three sections of the Materials Science Ph.D. Program Exam I. This plan is typically followed, but not unique to, by students who are in the Ph.D. program.

Materials Science, PhD

The Materials Science Ph.D. program is novel in that the three University of Alabama System (UAS) campuses offer a joint doctoral degree without the existence of a separate Materials Science Department on any campus of the system. Under this program, faculty members from the various departments on each campus constitute the Materials Science faculty. Participating faculty come from the Departments of Chemical & Materials Engineering, Chemistry, Engineering Mechanics, Metallurgical Engineering, Mineral Engineering, and Physics at UA; from the Departments of Biochemistry, Biomedical Engineering, Biomaterials, Chemistry, Materials Engineering, Optometry, Physics, and the School of Medicine at UAB; and from the Departments of Chemical Engineering, Chemistry, Mechanical and Aerospace Engineering, and Physics at UAH. The program is governed by a Tricampus Coordinating Committee consisting of faculty members representing each of the three campuses. The UAH faculty contingent is led by the UAH Materials Science Coordinator. Students successfully completing the program will receive a Ph.D. diploma issued jointly by all three universities.

Although both science and engineering faculty participate, the curriculum stresses the science of materials, placing special emphasis on materials processing, the production of new materials, and on the application of materials to the needs of technology.

Owing to the differences in undergraduate concentration, students will have differing background knowledge in the field of materials science. The multidisciplinary curriculum has been structured to correct for these differences and to provide depth in a specialty area. In providing options for students to pursue, the faculties of each campus build on their individual research strengths. These strengths currently fall into the following general curricular areas which we designate as options for specialization:

1. Materials structure and properties
2. Macromolecular materials
3. Electronic, optical, and magnetic materials
4. Materials processing
5. Biomaterials
6. Mechanical behavior of materials

Admission Requirements

General requirements of the School of Graduate Studies (see Admissions Information section of this catalog) must be satisfied. Students entering the program are expected to have strong, but diverse, undergraduate training. They will typically have bachelor's degrees in chemistry, chemical engineering, materials science, materials engineering, mechanical engineering, or physics. In order to be successful in this program it is recommended that a student have:

1. A bachelor's degree or its equivalent from an approved college or university in engineering or one of the physical sciences;
2. A minimum B level scholarship overall or over the last 60 semester hours of undergraduate credit;
3. A minimum score of 300 on the Graduate Record Examination.

An applicant whose scholastic record reveals a deficiency may be admitted on a conditional basis as provided in the Graduate School regulations. The student must then follow the Graduate School's policies in achieving unconditional admission status before completing Program Examination I.

Program Objective

Materials Science objective is to have our Graduate students attain successful careers and recognition as leaders in industry, government, or academia and in the community within a few years of graduation. Our graduates will demonstrate the ability to create innovative solutions through application of their knowledge base and capacity for critical thinking.

Learning Outcomes

Materials Science students will:

- Acquire comprehensive knowledge, skills, and vision for successful careers in materials science and related fields
- Demonstrate the ability to carry out original scholarly research and to defend the scientific concepts in their research specialty
- Lecture their findings of their work

Program Examination Requirements

Program Examination I is a three-part written examination covering the program's core material and qualifies the student to begin research. The three parts are:

1. Structure and Properties of Materials
2. Characterization and Testing
3. Thermodynamics and Processing

The examination is administered by the Tri Campus Coordinating Committee and is offered simultaneously on all three campuses on pre-announced dates. Students must pass all parts of the examination according to a schedule which is available from the Materials Science Coordinator.

After Program Examination I has been successfully completed, the student ordinarily chooses a faculty member to supervise the research for the dissertation. The supervisor chairs a dissertation supervisory committee consisting of no fewer than four additional members. The committee members will be selected based on the student's academic interest and area of research. At least one of the committee members will be from the student's research area at one of the other cooperating universities and another will be a UAH materials science faculty member from a department other than

that of the dissertation supervisor. The dissertation committee is charged with supervision and approval of the student's research and progress toward the completion of all requirements leading to the awarding of the degree.

Program Examination II is a comprehensive examination covering the subject of the student's proposed dissertation and consists of two parts. In part one, the student answers written questions submitted by the members of the supervisory committee. In part two, the student describes the plan of his dissertation in an oral presentation before the members of the committee.

Program Examination III is administered by the supervisory committee and consists of an oral presentation and defense of the results of the dissertation. Grading of student performance in Program Examinations II and III is the responsibility of dissertation supervisory committee.

Coursework Requirements

A minimum of 48 semester hours of graduate-level coursework plus at least 18 semester hours of MTS 799 are required. A student may transfer up to 24 semester hours of approved graduate coursework toward the 48 semester hour requirement. The student and the dissertation supervisor select courses appropriate to the student's dissertation area and complete a Program of Study. Frequently included in the Program of Study are the five core courses listed under the requirements for the Materials Science M.S. degree that is described above. The Materials Science Ph.D. Program otherwise has no further specific course requirements. Students take courses to prepare for the Program Examination I or to complete their Program of Study as approved by their dissertation advisor.

Candidacy and Dissertation Requirements

Admission to candidacy for the doctoral degree will be contingent upon the successful completion of the qualifying exam, called Program Examination II. Normally, a student will be considered eligible to take Program Examination II when all of the required coursework has been completed. After being admitted to candidacy, the student must then complete the remaining requirements for the degree, with the principal remaining requirement involving the doctoral research and dissertation.

Residence Requirement

The minimum period in which the doctoral degree can be earned is three full academic years of graduate study. The student must spend the last or penultimate academic year in continuous residence as a full-time graduate student at one of the campuses.

Time Limits

The Program Examination I is to be taken at the first September offering immediately after the student enters the program. The Program Examination I is generally to be completed by all full-time students within two years after first entering the program, with exceptions being made for part-time students.

The Program Examination II is to be attempted within a reasonable time after the Program Examination I. In general, it is to be taken no later than one year prior to submitting an application for graduation.

All requirements for the doctoral degree must be completed within a period of five years after the completion of Program Exam II. Credits earned towards an M.S. or Ed.S. degree may be applied to the doctoral degree provided that they are applicable to the area of specialization or to the core. Dated credits may be accepted if recommended by a student's supervisory committee, the UAH Materials Science Coordinator, and approved by the Graduate School. For application toward this degree, the student may be required to demonstrate competence in the dated coursework.

Advisement

Students admitted into the program without having already communicated with a dissertation supervisor will initially be assisted in program planning and other academic matters by a temporary faculty advisor appointed by the Materials Science Coordinator. Also, upon being accepted into the program, students will be assigned to one of the participating departments as their temporary 'home' department. They may apply for an assistantship and, if awarded, the teaching or research duties associated with the assistantship will normally be assigned in that department by the department chair. A student may select a dissertation research project in a participating department other than the temporary home department. If the research project is acceptable to the UAH Materials Science Program Committee, a permanent advisor (normally the research supervisor selected by the student) will be assigned.

Optical Science and Engineering, PhD

Optical Science and Engineering, PhD Degree

Room 201 Optics Building (Physics Department)

Telephone: 256.824.2482

Program Coordinator: Don A. Gregory (<https://www.uah.edu/science/departments/physics/faculty-staff/dr-don-gregory/>), Physics Department

Mission

The mission of the Optical Science and Engineering Doctoral Program is to provide a competitive graduate education and research opportunity in the rapidly advancing and expanding fields of optical science and engineering, to provide students with a unique technical learning environment, to involve students in fundamental and applied research, and to prepare these students for productive and fulfilling optics and optics related careers.

OSE Program

Optics and photonics are major fields in science and technology today, with electro-optic and opto-electronic components being found in practically all modern devices. Through cooperation between the colleges of Engineering and Science and under the direction of the Graduate School, the Optical Science and Engineering (OSE) doctoral program was formally approved at UAH in 1992. This unique program is highly multi-disciplinary and comprises a combination of advanced coursework and research in both fundamental and applied subjects. The OSE faculty is made up of optical scientists and engineers from the departments of Physics, Electrical and Computer Engineering, and the Center for Applied Optics. In addition, the program enlists members of the strong Huntsville optics community for giving seminars and teaching specialty courses.

Degree Requirements

Because students will come into this program with diverse undergraduate and graduate training, the multidisciplinary curriculum has been structured on a common basis for all entering students, but can compensate for individual differences while providing depth in specific areas. A total of 48 semester hours of graduate coursework are required, of which most are in designated optics courses. An additional 18 semester hours must be taken in dissertation research. Students must also satisfy any Seminar class attendance requirements of their home department (typically Physics or one of the Engineering departments). In addition, all general requirements of the School of Graduate Studies must be met in order to remain in good standing.

Admissions Requirement

Applicants may be unconditionally admitted to the program if they have:

1. Applicants may be unconditionally admitted to the program if they have:
2. A bachelor's degree in science or engineering from an approved college or university;
3. A minimum grade point average (GPA) of 3.0 overall;
4. A combined score of 300 on the verbal, quantitative and analytical sections and at least 3.0 in the writing section of the Graduate Record Examination (GRE).
5. For international students, TOEFL (iBT): All sub-scores greater than or equal to 18; Or IELTS: All sub-scores greater than or equal to 6.5.
6. Three letters of reference.

The first step for any potential OSE student is to be accepted into the graduate school of UAH. The applications received by the graduate school will then be evaluated by a subcommittee of the OSE faculty before being recommended for admission to the program. An applicant whose scholastic record reveals a deficiency may, upon recommendation of the Program Director and the approval of the Graduate Dean, be admitted on a conditional basis, as per Graduate School regulations (https://www.uah.edu/images/colleges/graduate-studies/graduate_student_handbook_eighth_edition_-_3.2016.pdf). However, that student must follow the Graduate School's policies in achieving unconditional admission status prior to taking the written OSE Preliminary Examination, normally given at the end of the spring semester.

The student will complete three study phases, punctuated by three program examinations.

Phase I

New full-time students typically come into the OSE program via a one academic year teaching assistantship in the department of physics or in one of the engineering departments. The core phase of instruction consists of 19 semester hours of coursework and lab work in the following classes: Geometrical Optics (PH/OSE 541), Physical Optics (PH/OSE 542), Fourier Optics (PH/OSE 632), Lasers (PH/OSE 645), Radiometry (PH/OSE 546), Optical Testing (OSE 654), and Optical Testing Lab (OSE 653 (<https://catalog.uah.edu/grad/course-descriptions/ose/>)). To complete this phase and become eligible to continue, the student must pass the written Preliminary Examination (typically administered at the end of the spring semester) on the above topics. Only two attempts will be permitted. After successful completion of this phase, the student should have acquired the common optics background necessary for continuing in the doctoral program. It is the student's responsibility to seek out a dissertation advisor during this first year and complete a draft Program of Study. Once the Preliminary Examination has been passed, a graduate committee will be formed and a final Program of Study will be completed and submitted to the OSE Program Director for review. The Program of Study will then be submitted to the Graduate School for final approval.

Phase II

Consists of completing coursework in the Program of Study. Much of this coursework will support the dissertation research to be conducted in Phase III. Credits earned toward a thesis based master's degree (including up to 9 hours of master's thesis) may be applied to the doctoral degree. Phase II is completed when the student has passed the Qualifying Examination which is prepared and administered by the student's graduate committee. This exam consists of both written and oral parts. Written questions are typically drawn from material covered in the courses listed on the Program of Study and may be written by any or all of the committee members. The student will be given a time limit for submitting the solutions (typically a week). The oral part of the exam consists of defending a proposal for dissertation research prepared by the student and distributed to the graduate committee at least two weeks prior to the exam. The proposal will demonstrate that the student is intimately familiar with the research to be done, that published research related to the proposal has been reviewed, and that the student has a clear understanding of how to proceed and can set realistic goals. If the student fails the Qualifying Examination, a second attempt will be scheduled. Only two attempts are allowed.

Phase III

Consists of all experimental and/or theoretical work needed to complete the student's dissertation. These activities will be directly supervised by the student's advisor with input from the supervisory committee obtained during regular meetings. There must be at least two supervisory committee meetings with the student before the dissertation defense. Since the Ph.D. is a research degree, recipients must demonstrate the ability to perform independent original research and to clearly communicate this work both in written and oral formats. A paper on the dissertation research must have been submitted to a recognized refereed technical journal before the Final Examination, which consists of a public, oral presentation and defense of the dissertation.

Advisement

A student admitted to the program will schedule a meeting with the OSE Program Director for initial advisement and it is the student's responsibility to consult with all OSE faculty members in the intended area of specialization in order to arrive at a permanent advisor for dissertation research.

A graduate supervisory committee will be assembled when the student has passed the Preliminary Examination and selected a research project. The committee will include an advisor and at least four other members. At least one of the committee members will be from a department other than the student's home department, which is typically Physics. The fifth member may also be from another university or outside any university as long as approval to serve has been granted by the School of Graduate Studies. The composition of the committee will follow the rules governing such committees as set forth by the graduate school catalog (https://www.uah.edu/images/colleges/graduate-studies/graduate_student_handbook_eighth_edition_-_3.2016.pdf). The graduate committee is charged with supervision and approval of the student's research and course of study leading to the completion of all requirements for the degree.

The following elective optics courses are also available to students in the OSE program. See descriptions under indicated departments

Code	Title	Semester Hours
Electrical Engineering		
EE 532	OPTICAL SYSTEMS DESIGN	3
EE 543	OPTICAL COMM SYS & NETWORKS	3
EE 570	OPT & PHOTONIC SYSTEMS DESIGN	3
EE 604	DIGITAL IMAGE PROCESSING	3
EE 633	ELECTRO-OPTICAL ENGINEER	3
EE 634	OPTICAL COMMUNICATIONS	3
EE 733	NONLINEAR OPTICS APPLICATIONS	3
EE 734	FIBER OPTICS	3
EE 735	STATISTICAL OPTICS	3
EE 738	OPT TRANSF/PATTN RECOGNI	3
Physics		
PH 544	OPTOELECTRONICS	3
PH 570	OPT & PHOTONIC SYSTEMS DESIGN	3
PH 642	OPTICAL PHYSICS	3
PH 651	QUANTUM MECHANICS I	3
PH 652	QUANTUM MECHANICS II	3
PH 733	QUANTUM DEVICES	3
PH 745	LASERS II	3
Mechanical Engineering		

MAE 677	OPTICAL TECH IN SOLID MECH	3
MAE 757	OPT TECH/FLUID MECHANICS	3

College of Nursing

1610 Ben Graves Drive
Telephone: 256.824.6345
Email: nursing@uah.edu

Dean:

Marsha Howell Adams, PhD, RN, CNE, ANEF, FAAN, Professor

Mission

Educate and inspire individuals to become nurse leaders who act with integrity, discover through scientific methods, and advocate for the best health care experiences of people and communities in a complex and evolving health care environment. In collaboration with our university colleagues and community partners, we are committed to excellence through our teaching, scholarship, practice, and service.

Vision

To have a global reputation for transforming health care through innovative nursing practice, education, and research.

Core Values

- Integrity - Resolutely adhering to moral, ethical, and professional standards.
- Inspiration - Encouraging, role-modeling, and mentoring others to pursue their professional dreams.
- Caring - Acting with compassion and respecting all persons by embracing cultural humility, diversity, and person-centered care.
- Excellence - Pursuing and achieving goals of the highest caliber.
- Wellness - Maximizing well-being in different states of health.

Accreditation

The UAH College of Nursing BSN, MSN, and DNP programs are accredited by the Commission on Collegiate Nursing Education (CCNE). The College of Nursing maintains approval status by the Alabama Board of Nursing.

Degrees and Certificates Offered

The College of Nursing offers the Joint Nursing Science PhD, Doctor of Nursing Practice, Master of Science in Nursing, Post-Master's Family Nurse Practitioner Certificate Program, and a Graduate Certificate in Nursing Education.

Joint Nursing Science Ph.D.

The purpose of the Joint Nursing Science Ph.D. program is to prepare nurse scholars who will advance nursing science by generating new knowledge through interprofessional research initiatives and to improve the health of rural and medically underserved populations. It is a joint program between The University of Alabama in Huntsville (UAH) and The University of Alabama (UA).

Joint Nursing Science Ph.D. Program Objectives

- Knowledge Synthesis: As assessed by a comprehensive exam, students will: 1) demonstrate substantive knowledge related to the body of literature and theories about rural and/or medically underserved populations to inform nursing practice; and 2) appraise and synthesize models and theories from previously conducted research.
- Research Conduct: As assessed by a successfully defended dissertation, students will demonstrate the ability to design and conduct ethical and culturally competent nursing research that is theoretically, methodologically, and analytically sound with the potential to influence health outcomes and generate new knowledge.
- Research Dissemination: Students will contribute to nursing science by generating new knowledge and actively disseminating research at national and/or international venues and in respected peer-reviewed journals.
- Collaborative Leadership: Students will demonstrate collaborative leadership as evidenced by serving as lead author on a professional presentation or manuscript by an interprofessional team which has been accepted for publication.

Joint Nursing Science Ph.D. Admission Requirements

Admission to the Joint Ph.D. program is determined by the Joint Ph.D. Oversight Committee who will assess the entire composite of information gained from a variety of sources. Each applicant must meet the following criteria and/or provide:

- An application to the Joint Ph.D. Graduate Program.
- Submit all official transcripts to The University of Alabama in Huntsville Office of Graduate Admissions by mail or an electronic transcript service.
- Evidence of successful completion of a bachelor of science in nursing degree at an accredited program or a master's degree in nursing. Applicants with bachelor's degrees in a closely related health field and master's degrees in nursing also will be considered.
- A minimum graduate Grade Point Average (GPA) of 3.0 on a 4.0 scale. Official transcripts must be sent to the university Graduate College.
- Official evidence of scores on the Graduate Record Examination taken within 5 years of application. GRE information can be obtained online at www.gre.org (<http://www.gre.org/>). The GRE requirement can be waived with a graduate GPA of 3.0 or higher or with 5 years or more of experience in the field or with an advanced degree in the US.
- Resume or curriculum vitae
- Three (3) letters of reference from professionals or professors who can adequately evaluate the applicant and the applicant's previous work or potential for success. Two of the letters are strongly preferred from nurses with doctoral degrees.
- Scientific Writing Sample: This sample of your written work should demonstrate your intellectual ability (such as logic, critical thinking, analysis, or synthesis) and your technical writing skills (composition, grammar, references or citations). For example, you could submit an academic paper, essay, published article, or a professional report written by you. If someone other than you contributed to this document (including editing), explain your contribution and the contributions of others.
- Statement of Purpose: In four double-spaced pages respond to the following:
 - Why do you want to pursue a Ph.D. in Nursing Science?
 - What professional goals do you hope to achieve during and beyond your Ph.D. program?
 - Describe prior experiences that have prepared you for doctoral study (e.g. research, presentations, publications, leadership roles in practice, education, or professional organizations).
 - What are your research interests?
 - How might research in this area advance the science of nursing?
- RN License Requirement
 - Applicants must have an active, unencumbered license as a Registered Nurse in the United States. Applicants who hold an equivalent certification or licensure outside of the U.S. will be considered on a case-by-case basis.
 - Applicants who are not yet licensed will be considered for conditional admission, but proof of licensure must be submitted prior to completing 12 credit hours of Ph.D. coursework.
- Transfer applicants: Evidence of good academic standing at the current institution. Determination of whether or not credits may be transferred will be based on evaluation of comparability of requested transfer course to Ph.D. course and university policy, and is completed after admission.

After the first review of the application and at the request of the Joint Ph.D. Oversight Committee, applicants will be asked to successfully complete personal interviews with Oversight Committee members. Research interests, professional involvement, and motivation for successful completion of doctoral study in the Ph.D. program will be assessed.

Completed applications are reviewed by the Oversight Committee throughout the year for summer enrollment. Applications (with GRE scores, transcripts, etc.) **must be completed by March 15th** if enrollment in the program is desired for that summer. Applicants must register for courses within two (2) years of acceptance into the Ph.D. program, or the acceptance is void.

Doctor of Nursing Practice (DNP)

The purpose of the DNP program is:

- To prepare graduates at the highest level of nursing practice to provide complex hospital and community-based care for patients and families.
- To redesign and evaluate nursing and health care systems.
- To address dire shortages of clinical nursing faculty to mentor and educate new nurses.

The University of Alabama in Huntsville, College of Nursing offers both the Post-Master's to DNP and the Post-Baccalaureate to DNP pathways. The post-baccalaureate to DNP pathway allows a seamless progression from the completion of a baccalaureate degree to advanced practice. Advanced practice specialty training at the doctoral level is needed to address the growing complexity of patient care and health care systems. In addition, expanding accountability of clinical expert nurses in advanced practice roles requires competencies in population-based care, leadership, health policy, health system improvement, and evidence-based practice.

DNP Program Objectives

Upon successful completion of the DNP program, the graduate will be able to:

1. Synthesize scientific evidence for the development of clinical interventions for practice.
2. Evaluate policy, care delivery, and organizational systems for current and future health care needs.
3. Demonstrate intra- and inter-professional collaboration to address health disparities and to improve health care quality across diverse populations and cultures.
4. Incorporate knowledge of current and emerging health technologies to improve care delivery and organizational systems.
5. Translate scientific, theoretical, and ethical principles into health care for individuals, families and populations.
6. Assume complex leadership roles to advance clinical practice and the health care delivery at the organizational and systems level and to improve health outcomes of individuals and populations.
7. Advocate for social justice, equity, and ethical policies in health care.
8. Deliver evidence-based care using clinical reasoning and analysis of complex healthcare issues to improve patient outcomes.

Post MSN to DNP Admission Requirements

1. Graduation from a Commission for Collegiate Nursing Education (CCNE), Accreditation Commission of Nursing Education (ACEN) or Commission on Nursing Education Accreditation (CNEA) accredited baccalaureate program with a major in nursing (for BSN to DNP).
2. Hold a master's degree in advanced practice nursing from an accredited institution (for MSN to DNP).
3. Submit a UAH Application for Graduate Admission.
4. Submit official transcripts from all higher education programs attempted.
5. Submit proof of current/active unencumbered licensure and advanced specialty certification.
6. Submit CV/resume.
7. Submit Professional Statement describing career goals and identified area of clinical practice interest.
8. Meet health and background clearance requirements.

Post BSN to DNP Admission Requirements

1. Apply to the MSN program first (for BSN to DNP applicants).

DNP Progression Requirements

1. Students who receive a 'C' in any DNP course and the student's graduate GPA falls below a 3.0, will be placed on academic probation by the University. The student has an additional 12 semester hours to bring the GPA up to 3.0 in accordance with the UAH School of Graduate Studies policy.
2. Students who receive a 'C' in a DNP course (regardless of graduate GPA) will be reviewed for progression by the DNP Coordinator and faculty of record. These individuals will make a recommendation to the Associate Dean of Graduate Programs for either continuation in the program with repeat of the course or dismissal from the nursing program. The Associate Dean of Graduate Programs will review the recommendation and deliver a final decision.
3. If the recommendation is for the student to continue in the program and repeat the course, he/she may retake the course the next time the course is offered.
4. If the student obtains a 'C' in a nursing course and is allowed to continue, receives a 'C' in the retake of the original course, or makes a 'C' in a second nursing course, this student will not be allowed to progress regardless of graduate GPA, and the student will be dismissed from the DNP program in the College of Nursing. No student will be able to record a grade 'C,' 'D,' or 'F' on their program of study for the DNP program.
5. Courses taken at other universities will be considered for transfer credit only if a grade of 'B' or higher is obtained in the course. The maximum transferable credit hours is 12 for graduate and doctoral programs. Students are responsible for requesting a transfer of credit review from the College of Nursing Director of Graduate Admissions and Advisement and provide documentation.

Master of Science in Nursing (MSN)

Graduate tracks offered through the College of Nursing are focused on preparing advanced practice nurses in direct care provider roles as a family nurse practitioner, adult-gerontology acute care nurse practitioner, or in an indirect care provider role in nursing administration. The Master of Science degree is awarded upon successful completion of one of the three tracks.

Advanced practice nursing is distinguished by autonomy of practice and characterized by both increased complexity in clinical decision making and skills in managing organizations and health care environments.

Comprehensive health assessment skills provide a foundation for the critical thinking used in diagnostic decision making and treatments of complex human responses of diverse individuals, families, and communities to health problems. Advanced practice nursing students are guided in classroom and clinical experiences to formulate clinical decisions to manage common health problems, acute and chronic illness, and promotion of wellness.

Theory and research form a central core of knowledge for all tracks in the master's program. Building on content in these areas, all students integrate education, management, leadership, and consultation into their clinical experiences as they practice in a variety of settings. Practice sites for clinical

courses are individually arranged with the student. Classes are usually offered one day per week and may be offered on campus, or through web-based courses.

Students who successfully complete their program of study are eligible to sit for the national certification examination in their area of expertise in the nurse practitioner program and after work requirements are met in the nursing administration program.

MSN Program Objectives

Upon successful completion of the MSN program, the graduate will be able to:

1. Implement clinical decision-making skills in the delivery and management of diverse populations in a variety of settings.
2. Synthesize theoretical foundations, knowledge of science and humanities, and scholarly inquiry to provide clinical prevention, patient therapy, and system improvement to improve patient outcomes in diverse populations.
3. Analyze healthcare policies and information management systems to affect patient outcomes in diverse populations through organization and systems leadership and inter-professional collaboration.
4. Incorporate human, fiscal, and technological resources in providing and managing advanced care for improvement of patient and population outcomes.
5. Demonstrate an understanding of ethical principles, quality, safety, and equality in healthcare.
6. Assume responsibility for life-long learning by translating and integrating scholarship in practice and preparation for doctoral education in nursing.

MSN Admission Requirements

1. Graduation from a Commission for Collegiate Nursing Education (CCNE), Accreditation Commission of Nursing Education (ACEN) or Commission on Nursing Education Accreditation (CNEA) accredited baccalaureate program with a major in nursing.
2. Overall grade-point average of 3.0 on a 4.0 scale in all baccalaureate coursework or on the last 60 semester hours of baccalaureate coursework completed.
3. Acceptable score on either the Graduate Record Examination (GRE) or the Miller Analogies Test (MAT) taken within the last five years. The minimum score on the MAT is 410. The minimum scores for the GRE are 150 Verbal, 150 Quantitative, and 3.0 Analytical Writing. (Students with an overall GPA of 3.0 may waive #3).
4. Submit a UAH Application for Graduate Admission.
5. Submit official transcripts from all higher education programs attempted.
6. Submit CV/resume.
7. Three completed College of Nursing Graduate Recommendation Forms from individuals familiar with applicant's academic and clinical abilities. Forms are available in the College of Nursing Office of Graduate Programs.
8. Current unencumbered registered nurse license. If a student is permitted to meet course clinical requirements in a state other than Alabama, the student must be licensed in that state. Students will not be allowed to continue in the track if any license is placed on probation, suspended, or revoked. Licensure must be maintained throughout the program.
9. A minimum of one year of clinical experience as a Registered Nurse (RN) is required to be eligible for admission as a full-time student in the Family Nurse Practitioner track (FNP). Students admitted for part time study in the FNP track with less than one year of clinical experience as a RN must maintain employment as a RN to obtain additional clinical experience throughout their enrollment.
10. A minimum of one year of clinical experience as a Registered Nurse (RN) in a critical care area (intensive care unit or emergency department) is required to be eligible for admission as a full-time student in the Adult-Gerontology Acute Care Nurse Practitioner (AGACNP) track. Students admitted for part time study in the AGACNP track with less than one year of clinical experience as a RN must maintain employment as a RN in critical care to obtain additional clinical experience throughout their enrollment.

MSN Degree Requirements

In addition to the graduate degree requirements of the UAH Graduate Program, a student is required to complete a minimum of 30-42 semester hours of graduate coursework in one of the following tracks:

- Adult-Gerontology Acute Care Nurse Practitioner
- Family Nurse Practitioner
- Nursing Administration

Please note that curricular changes may be made in the coming year. Please contact the College of Nursing Office of Graduate Programs for the most current information.

MSN Synthesis Requirement

The MSN student is expected to complete a synthesis requirement as part of the graduate program in nursing. The purpose of this synthesis requirement is to demonstrate development of the knowledge base, values, and skills related to the particular program of study as a prerequisite for graduation. There are two options in which the MSN student may meet the synthesis requirement:

Completion of a capstone course and one of the following:

1. Completion of a traditional research thesis under the guidance of a committee of graduate nursing faculty within the College of Nursing. This option requires that the students enroll in a **minimum of 6 semester hours of thesis credit** (not necessarily in the same semester). Oral defense serves as the final comprehensive examination for students completing the thesis or scholarly project option. This oral examination must follow policies outlined in the UAH Graduate Catalog.
2. Completion of two graduate level electives. Graduate level electives are designed to offer in depth study of areas on interest to graduate level nursing students. Examples include:
 - Diabetes and Dyslipidemia
 - Business Development in Advanced Practice
 - Abuse Throughout the Lifespan

MSN Progression Requirements

The University grading system is described elsewhere in the *UAH Graduate Catalog*. Grade point average (GPA) is calculated by dividing the total number of quality points earned by the total number of semester hours attempted. At the completion of each semester, students access their grades in Banner.

As stated in the *Graduate School Handbook*, students with a cumulative grade point average less than 3.0 at the end of each semester will have registration holds automatically placed on them for the next semester by the Graduate School. In addition, the College of Nursing requires all graduate courses to be passed with a grade of "B" or higher. Courses taken at other universities will be considered for transfer credit only if a grade of 'B' or higher is obtained in the course.

Students who receive less than a "B" will be reviewed for progression the Admission and Progression Committee, which is composed of faculty from their track. The student will be required to submit a request to continue in the MSN program using the form found in the *MSN Student Handbook*. This Committee will recommend either continuation in the program with a repeat of the course or dismissal from the MSN program. The Committee will make recommendations to the Associate Dean of Graduate Programs. If the student has a hold on registration by the Dean of the Graduate School, the form and the recommendation from the Admission and Progression Committee will be forwarded to the Graduate School. The student will be given a specified period of time to remedy the grade point average to 3.0. Failure to remedy the grade point average within the time period specified in the plan will lead to dismissal from the Graduate School, as described in the published policy in the *Graduate Catalog*. If a student makes a "C," "D," or "F" in the repeated course or in a second course, he or she will be dismissed from the MSN program by the Associate Dean of Graduate Programs.

Students who are dismissed from the MSN program may apply for readmission within one year of that action by completing the readmission form found in the *MSN Student Handbook* and sending it to the Director of Graduate Admissions and Advisement. An Admission and Progression Committee will review the application for readmission and all relevant information about student performance in class, clinical, or lab. The Committee will recommend readmission or deny readmission to the Associate Dean for Graduate Programs. If readmission is recommended by the Committee, the Associate Dean will consider the availability of space in the next cohort and will communicate a date for reentry to the student. At a minimum, students who are readmitted be restricted from enrollment for one semester to resolve problems that contributed to poor academic performance. Students who are readmitted and subsequently earn another grade below 'B' in any nursing course will be permanently dismissed from the MSN program.

Nurse Practitioner

The nurse practitioner is a skilled health care provider who uses expert clinical judgment and decision making in conducting comprehensive health assessments, making differential diagnoses, and prescribing of pharmacologic and non-pharmacologic interventions in the direct treatment of health problems. Nurse practitioners function as care providers, case managers, researchers, consultants, and educators. Two nurse practitioner tracks are offered at the college:

- Family Nurse Practitioner
- Adult-Gerontology Acute Care Nurse Practitioner

Although both are advanced practice nurses, family nurse practitioners function as primary care providers focusing on common health care problems across the lifespan. Family nurse practitioners establish collaborative practices with primary care physicians to deliver culturally sensitive care to clients. Adult-gerontology acute care nurse practitioners focus on the care of adults and older adults with acute illnesses and may practice in the hospital, home, or clinic setting. Adult-gerontology acute care nurse practitioners provide expert interventions focused on health promotion, illness prevention, and health care management.

Nursing Administration

This track prepares nurses who will influence the future of health care through visionary nursing leadership. Competencies include communication, financial skills, information technology, leading and managing change, policy analysis, and empowerment for professional practice. Graduates are prepared to assume positions in education, administration, management, or specialty area roles in a variety of care delivery sites.

Post-Master's Family Nurse Practitioner Certificate

Students already possessing a master's degree in nursing have the opportunity to pursue a family nurse practitioner certificate. Students are admitted to the family nurse practitioner certificate program on a to complete the requirements in four semesters.

Graduate Certificate Program in Nursing Education

Students who are currently enrolled in graduate education or those possessing a master's degree have the opportunity to continue their education and obtain a certificate in nursing education. Classes for this program are arranged in a manner to allow for full-time employment or continued study in the master's program. The program is composed of six courses, and requirements for the certificate program may be completed in one calendar year.

More detailed information about opportunities for students seeking graduate degrees and certification may be obtained from the College of Nursing Office of Graduate Programs 256.824.6669.

Online Learning

Online courses are offered by the College of Nursing to improve access to higher education. The College of Nursing offers the Joint Nursing Science PhD, DNP and the MSN in Nursing Administration program completely online. The nurse practitioner programs include hybrid courses allowing the student maximum flexibility. All courses contain web-based enhancement.

Courses offered completely online or those with a hybrid of on-campus/online are delivered in *Canvas*, the official course management system for UAH. Faculty in the College of Nursing use a common template to organize courses for student ease of navigation. Other educational technologies such as Screencast-o-matic, Turnitin, wiki pages, chats, etc. are used to enhance student interaction, learning, and enjoyment.

Facilities

The College of Nursing utilizes the facilities and resources of the entire university, the community, and affiliated health care agencies. The college is housed in a four-story building centrally located on the UAH campus. Classrooms equipped with current educational technology as well as the Learning and Technology Resource Center (LTRC) with a state-of-the-art simulation to assist students to learn in multiple ways.

The College of Nursing maintains contracts with over 1300 health-related agencies to offer a wide range of clinical sites for student educational experiences. Agencies in the local area include the Huntsville Hospital Health System, Crestwood Medical Center, local Public Health Departments, skilled nursing homes, home health agencies, and the University of Alabama at Birmingham Medical Clinics--Huntsville Campus. Other hospitals, clinics, physicians' offices, and rural health clinics across Alabama and southern Tennessee are also used for student experiences.

Transportation

Clinical learning experiences are varied in settings and are located within Huntsville and surrounding communities. Students are expected to travel to and from all clinical experiences. Students are responsible for providing their own transportation and carrying appropriate insurance. The College of Nursing is not liable for any traffic violations or auto mishaps during student commutes.

Advising and Assistance

The focus of advising in the College of Nursing is to assist students to successfully progress toward their educational objectives. Advising is designed to provide assistance where desired and appropriate. All pre-admission graduate students are advised in the College of Nursing Office of Graduate Programs located on the second floor of the Nursing Building.

Students admitted to the graduate program work with the academic advisor who assists them throughout the remainder of the academic program. Program coordinators assist students in completing a program of study for the track to which they have been admitted as well as providing guidance for future employment or educational endeavors.

Requirements for Enrollment and Admitted Students

1. Documentation of professional liability insurance must be provided to the College of Nursing Office of Graduate Programs or third-party designee prior to enrollment in a nursing class. The insurance must be a minimum of one million/three million of coverage and renewed annually while enrolled in the program. NP students are required to have 'NP Student' coverage. Liability coverage can be obtained from Nurses Services Organization (NSO) at www.nso
2. Documentation of cardiopulmonary resuscitation (CPR) training must be provided to the College of Nursing Office of Graduate Programs prior to enrolling in a nursing class. CPR certification must be maintained throughout the program. Students entering the adult-gerontology acute care nurse practitioner tracks must obtain and maintain Advanced Cardiac Life Support certification (ACLS) prior to enrolling in a clinical nursing class.

3. Students are required to undergo drug testing and a criminal background check prior to enrollment in nursing courses, annually thereafter, and for cause at other points. Information and procedures are provided upon admission. If the College deems the drug testing and/or background check information to be unsatisfactory, acceptance or enrollment into the College may be denied or an offer of acceptance rescinded. If a student's acceptance or enrollment is denied or rescinded based on the information obtained from a criminal background check report, the student will be advised of the name and address of the consumer reporting agency that furnished the report, and of the right to dispute the accuracy and completeness of any information contained in the report by contacting the consumer reporting agency directly. If the College decides, based upon the individual's written description, explanation and documentation about information obtained in the criminal background check, that the results of the check are deemed to be satisfactory, the individual shall be informed that the College's positive decision is not a guarantee that every clinical facility will permit the student to participate in educational clinical experiences at that facility or that any state will accept the individual as a candidate for registration, permit or licensure. Convictions of pleas of guilty of, pleas of nolo contendere (no contest) to, any criminal charges, or any pending criminal charges are ground for dismissal from the College of Nursing. Any crimes involving violence against the person including but not limited to murder, manslaughter, use of deadly force, assault and battery (other than simple), sex crimes, abuse of children or the elderly, abduction, or robbery at any time prohibit a student from admission or progression in the Nursing Program. The Associate Dean will inform any disqualified student, and the student will not be allowed to continue in any Nursing Program.
4. Students may also be required to have additional drug screens and/or criminal background checks prior to attending selected clinical agencies. All requirements for clinical placement at agencies must be met by the student in order to be placed at that location.
5. Documentation of current license to practice as a registered nurse must be provided to the College of Nursing Office of Graduate Programs prior to enrollment in a nursing class. Registered nurse students must submit proof of an active, unencumbered current license. If a student is permitted to meet course clinical requirements in a state other than Alabama, the student must be licensed in that state. Registered nurse students will not be allowed to continue in the program if any nursing license is placed on probation, suspended, or revoked. Licensure must be maintained throughout the program.
6. Completion of three modules in 'Culturally Competent Nursing Care: A Cornerstone of Caring' found at <https://ccnm.thinkculturalhealth.hhs.gov/default.asp>
7. OSHA Certification: Students can access the OSHA training requirement through their Canvas Student Portal and once complete, students must submit a copy of their OSHA certificate.
8. HIPAA Certification: Students can access the HIPAA training requirement through their Canvas Student Portal and once complete, students must submit a copy of their HIPAA certificate
9. Essential functions define selected attributes and behaviors necessary for students to demonstrate in order to successfully complete their education and subsequently enter nursing practice. These essential functions are determined to be required for initial and continued enrollment in the College of Nursing. Students must be able to perform each of the following essential functions with or without reasonable accommodations:
 - a. Critical thinking ability sufficient for clinical judgment. Examples (not all inclusive) of necessary activities include identifying cause-effect relationships in clinical and classroom situations; and developing nursing care plans.
 - b. Interpersonal abilities sufficient to interact with individuals, families, and groups from various social, emotional, cultural and intellectual backgrounds. Examples (not all inclusive) include the ability to establish rapport with patients/clients and colleagues.
 - c. Communication abilities sufficient for verbal and written interaction with others. Examples (not all inclusive) include explaining treatment procedures, initiating health teaching, and documenting and interpreting nursing actions and patient/ client responses.
 - d. Mobility abilities sufficient to move from room to room and maneuver in small spaces. Examples (not all inclusive) include moving around in clients' rooms, work spaces and treatment areas; and administering cardiopulmonary procedures;
 - e. Gross and fine motor abilities sufficient for providing safe, effective nursing care. Examples (not all inclusive) include completing examinations/ evaluations by writing, typing or demonstration; calibrating and using equipment; and positioning clients.
 - f. Auditory ability sufficient to monitor and assess health needs. Examples (not all inclusive) include hearing basic conversation; monitoring alarms, emergency signals and auscultatory sounds; and hearing cries for help.
 - g. Visual abilities sufficient for observation and assessment necessary in nursing care. Examples (not all inclusive) include reading documents such as patient charts and laboratory reports; reading calibrations on syringes, sphygmomanometers, and thermometers, and equipment outputs such as waves, printouts, and digital readings; and accurately observing client behaviors such as color changes and nonverbal communication.
 - h. Tactile abilities sufficient for physical assessment. Examples (not all inclusive) include performing palpation, percussion, temperature changes, complete physical examinations and other activities related to therapeutic interventions.
 - i. Behavioral/Social abilities sufficient to demonstrate emotional stability, maintenance of composure under stress, development of mature, empathetic and effective nurse-patient relationships and use of sound and unimpaired judgment in classroom and clinical activities.

These essential functions are not intended to be a complete listing of all nursing behaviors, but they are a sampling of the types of abilities needed by nursing students to meet program objectives and requirements. The College or its affiliated agencies may identify additional critical behaviors or abilities. The identified essential functions are adopted from the Americans with Disabilities Act: Implications for Nursing Education by the Southern Regional Education Board and the Council on Collegiate Education.

Health Requirements

The clinical experiences of graduate nursing students require a health screening program. The following steps are required as part of admission to and enrollment in the graduate program:

1. Each student is required to have a health examination by a physician or a certified nurse practitioner. Reports of the results of this examination must be submitted on forms provided by the College of Nursing and must be received by the College of Nursing Office of Graduate Programs by published deadlines. Individual clinical agencies may require additional documentation for specific health requirements which must be met by students;
2. Each student must be immunized for Hepatitis B. For initial enrollment, certification that the series of three injections has begun or results of a recent titer must be received by the College of Nursing Office of Graduate Programs by published deadlines. Documentation of the completed series is required for continued enrollment and must be received by the College by published deadlines. Immunizations and titers are at the expense of the student;
3. Each student is required to be immunized against measles, mumps, rubella, and rubeola with a two-dose series or have a titer showing immunity. If the titer shows non-immunity or equivocal results, the student must take the two-dose immunization.
4. Each student is required to be immunized against varicella with a two-dose series or have a titer showing immunity. If the titer shows non-immunity or equivocal results, the student must take the two-dose immunization.
5. Annual influenza vaccinations are required by the end of October.
6. The CDC does require a 2 step TB skin test initially, however, if you have had initial testing and annual screening through your employer, documentation of a single step will be sufficient. Annual single PPD skin test update required OR T-Spot OR QuantiFERON TB Gold Blood draw annual update is required. *If a TB skin test is positive, a chest x-ray must have been completed within the last 5 years (annual symptom evaluation must be completed and uploaded).
7. Tetanus Diphtheria, Pertussis (Tdap) booster required every 10 years after initial Tdap. The Tdap immunization must never be more than 10 years old during matriculation.
8. Documentation of current immunization, healthcare provider's statement, or copy of recent titer results must be received by the College of Nursing Office of Graduate Programs by the published deadlines. Immunizations and titers are at the expense of the student.
9. Documentation of current health insurance must be received by the College of Nursing Office of Graduate Programs by published deadlines. Hospitals and health agencies provide emergency treatment to students for injury or illness occurring in the course of program requirements in their agencies. Such treatment will be at the expense of the student. Students are required to maintain health insurance throughout the program.
10. Each student must complete a certified background check and a drug screen before starting the program and annually thereafter.
11. All health requirements must be completed prior to the first day of class in the semester. Students who fail to meet this requirement will not be allowed to start classes until all health requirements are met.

Student Financial Services

Student Financial Services, located in the Student Services Building, provides financial aid information and assists students in meeting individual needs. Financial aid for graduate students in the College of Nursing comes primarily from the following sources:

1. Alabama Board of Nursing Scholarships. Fifteen scholarships are granted each year to graduate students attending schools in Alabama. Funding is \$3,800 for full-time study for one year. Students must make application directly to the Alabama Board of Nursing. Contact the Alabama Board of Nursing for further information.
2. Alabama Board of Nursing Loan Repayment plan.
3. Elizabeth M. Fisher Memorial Scholarship.
4. Joan Williamson NANPA Scholarship.
5. Graduate Teaching Assistantships.
6. Graduate Tuition Scholarships.
7. Nurse Faculty Loan Program

Course Load

The usual course load for a full-time graduate student in nursing is from 9 to 12 semester hours. Students may choose to complete a degree in full-time or part-time study with the exception of the post-master's students.

Joint Nursing Science PhD Program

- Nursing, Joint Nursing Science PhD (p. 961)

Doctor of Nursing Practice

- Nursing, MSN to DNP (p. 962)
- Nursing, BSN to DNP (p. 962)

Master of Science in Nursing

- Nursing, MSN - Adult-Gerontology Acute Care Nursing Practitioner (p. 963)
- Nursing, MSN - Family Nurse Practitioner (p. 963)
- Nursing, MSN - Nursing Administration (p. 964)

Certificates in Nursing

- Nursing Education (<http://catalog.uah.edu/grad/colleges-departments/nursing/nursing-education-graduate-certificate/>)
- Post-Master's Family Nurse Practitioner Program (p. 964)

NUR 500 - SPECIAL TOPICS

Semester Hours: 2-4

Advanced study of selected area of interest in nursing.

NUR 518 - GLOBAL HEALTH: INTERN'L STUDY

Semester Hours: 3

This course will focus on a selected international health care system. The international system will be compared with the US Health Care System in relation to economic, social, cultural, policy, and environmental influences. Culmination of the course will center on international experiences with health care facilities, policy making bodies, historical, and cultural introductions in another country.

NUR 524 - HEALTH CARE AND THE LAW

Semester Hours: 3

Introduction to basic health law in the context of application to nursing practice. Content relates to involvement with legal principles in nursing and healthcare. Federal, state and local aspects of law are included. (Cross listed with NUR 424).

NUR 525 - HUMAN SEXUALITY

Semester Hours: 3

Theory and issues related to human sexuality in health and illness. Emphasis on theory and values, clarification of human sexuality needs. Elective, open to all university students. (Cross listed with NUR 425).

NUR 527 - INTRO TO FORENSICS IN NURSING

Semester Hours: 3

This course is designed to provide basic theoretical knowledge related to nursing care of the donor/transplantation client and their families. Course content focuses on historical and current issues in donor/transplantation nursing including the impact of legal, ethical, political, economic, and socio-cultural issues. Students will examine the roles of the professional nurse and the interdisciplinary team in the management of care for the donor/transplant client and their families. Topics of future research and critical thinking will be discussed.

NUR 528 - GERONTOLOGICAL NURSING

Semester Hours: 3

Nursing care of older adults in multiple settings. Issues and trends are incorporated.

NUR 534 - PALLIATIVE CARE

Semester Hours: 3

Palliative care is when there is no longer a medical treatment or cure for a physical problem. This palliative care course includes meeting the physical, emotional, social, cultural, and spiritual needs of individual and their families. A course focus will be on coping, grief, bereavement, pain relief and managing living implications for individuals with life-threatening illnesses. There will be recognition of the importance of individuality, vulnerability, and resilience in the quality of living during the dying process.

NUR 537 - NURSING AS A POLITICAL FORCE

Semester Hours: 3

The course explores the historical, current, and future impact of nursing on the political process. Local, state, national, and international aspects of nursing as a political force are analyzed. Emphasis is on political systems, regulatory processes, and organizational issues influencing health care delivery. Elective, open to all university students.

NUR 539 - NURSING MEDICAL MISSIONS

Semester Hours: 3

This course will focus on global health and humanitarian concepts and issues, and the nursing care needed to impact those issues. These issues will be examined and analyzed in relation to the mission country's economic, social, cultural, policy, and environmental influences. Culmination of the course will center on international experiences with supervised nursing care for a medical mission in another country. This course is an accepted elective in the Nursing Program. Additional work is required for graduate credit.

NUR 540 - ONCOLOGY NURSING

Semester Hours: 3

This course provides a holistic approach to the nursing care of people with cancer. The nursing process is used as the basis for promoting health and facilitating adaptation in the person with cancer. The course includes clinical experiences in selected agencies.

NUR 550 - ISSUES IN TRANSPLANTATION

Semester Hours: 3

This course is designed to provide basic theoretical knowledge related to nursing care of the donor/transplantation client and their families. Course content focuses on historical and current issues in donor/transplantation nursing including the impact of legal, ethical, political, economic, and socio-cultural issues. Students will examine the roles of the professional nurse and the interdisciplinary team in the management of care for the donor/transplant client and their families. Topics of future research and critical thinking will be discussed.

NUR 602 - SCHOLARLY INQ ADV NUR PRAC

Semester Hours: 3

This course explores research methods, evidence-based practice, ethical research and frameworks to guide scholarly inquiry. The learner will analyze quality improvement studies, clinical practice guidelines, and research studies. Synthesis of learning will involve developing a clinical question, evaluating evidence, and disseminating an interprofessional scholarly product with practice recommendations.

NUR 605 - ADVANCED HLTH ASSESSMENT

Semester Hours: 3

This course provides an opportunity for the advanced practice nurse to utilize theoretical and evidence-based clinical practice guidelines to conduct a comprehensive and systematic assessment as a foundation for decision making in caring for clients across the lifespan.

NUR 605L - CLINICAL

Semester Hours: 0

NUR 606 - ADV PATHOPHYSIOLOGY

Semester Hours: 3

Expands upon previous knowledge of anatomy, physiology, and developmental disease processes. Anticipated physiological alterations are discussed as they affect individuals throughout the lifespan.

NUR 607 - PHARMACOLOGY IN ADV PRAC

Semester Hours: 3

This course is designed to provide the advanced practice nursing student with clinical reasoning skills necessary to analyze data obtained from findings of the patient health history, advanced physical and pharmacological assessment of patients across the lifespan. The student will utilize the findings to determine the appropriate treatment regimen based on the individual needs of the patient.

NUR 610 - FAMILY NURSE PRACTITIONER I

Semester Hours: 6

This clinical course introduces the roles of the advanced practice nurse in direct and indirect health services for assessment, health promotion, illness prevention, and health management of patients across the lifespan. Prerequisite with concurrency: NUR 605, NUR 606 and NUR 607.

NUR 610L - CLINICAL EXPERIENCE

Semester Hours: 0

NUR 611 - FAM NURS PRACTITIONER II

Semester Hours: 6

This course encourages the advanced practice nurse to integrate principles of advanced practice nursing into broad organized, culturally appropriate planning, delivery, management, and evaluation in prevention and services of health through the lifespan/identified populations. Prerequisite: NUR 610.

NUR 611L - CLINICAL

Semester Hours: 0

NUR 612 - FAMILY NUR PRACTITIONER III

Semester Hours: 6

This course encourages the advanced practice nurse to define principles of advanced practice nursing including interventions that influence favorable health outcomes for common conditions through the lifespan/identified populations in collaboration with other health professionals. Prerequisites: NUR 611.

NUR 612L - CLINICAL EXPERIENCE

Semester Hours: 0

NUR 613 - FAM NURS PRACTITIONER IV

Semester Hours: 6

This is the culminating primary care clinical course in which the advanced practice student initiates and maintains effective working relationships, appraises policy development and systems organization, establishes respectful communication within inter-professional groups with skills and care coordination, delegation and conflict resolution. Prerequisite: NUR 612.

NUR 613L - CLINICAL EXPERIENCE

Semester Hours: 0

NUR 620 - ADLT GER ACUTE CR NUR PRACT I

Semester Hours: 6

Clinical course that introduces advanced nursing skills necessary for the assessment, health promotion, disease prevention, and health management of the complex, acute, critically and chronically ill patient across the entire spectrum of adulthood. Prerequisites with concurrency: NUR 602, NUR 605, NUR 606, NUR 607.

NUR 620L - CLINICAL EXPERIENCE

Semester Hours: 0

NUR 621 - ADLT GER ACUTE CR NUR PRACT II

Semester Hours: 6

This course allows the advanced practice nurse to refine principles of advanced practice nursing into the delivery of broad, organized, culturally appropriate planning, delivery, management, and evaluation of evidence based care of complex, acute critically and chronically ill diverse patients across the entire spectrum of adulthood. Prerequisites NUR 620.

NUR 621L - CLINICAL EXPERIENCE

Semester Hours: 0

NUR 622 - ADLT GER ACUTE CR NUR PRAC III

Semester Hours: 6

Establish competency and proficiency in the delivery of advanced practice nursing including comprehensive system and role integration. Prerequisites: NUR 621.

NUR 622L - CLINICAL EXPERIENCE

Semester Hours: 0

NUR 623 - ADLT GER ACUTE CR NUR PRAC IV

Semester Hours: 6

This is the culminating adult-gerontology acute care clinical course in which the advanced practice student initiates and maintains effective working relationships, establishes respectful communication within inter-professional groups with skills and care coordination, delegation and conflict resolution. Prerequisite: NUR 622.

NUR 623L - CLINICAL EXPERIENCE

Semester Hours: 0

NUR 629 - US HEALTHCARE SYSTEM

Semester Hours: 3

The focus of this course is to explore the structure and complexity of the US health care system. Content will include underlying values, major historical developments, reimbursement methods, stakeholders, and issues driving reform. Prerequisite w/ concurrency: NUR 630.

NUR 630 - FND CONCEPTS NURSING ADMINATOR

Semester Hours: 3

This course focuses on the Nurse Administrator's relationships and roles in a variety of health care systems. Theories of management and organization are analyzed from the perspective of structure, communication, dynamics, trends, and key management, responsibilities, and functions in health care delivery systems.

NUR 631 - LEADERSHIP HUMAN RESRC MGMT

Semester Hours: 3

This course focuses on the role of the nurse leader in resource allocation and management in health care systems and related organizations. Content related to human resource management includes workforce development, the healthcare workforce, recruitment, selection, retention, development, and labor relations.

NUR 632 - ECONOMIC AND POLICY IMPLICATIONS FOR LEADERS IN HEALTH CARE SYSTEMS

Semester Hours: 3

This course focuses on economic and financial implications for nurse administrators with emphasis on executive level budget management and business planning skills. The course is designed to assist nurse administrators in gaining conceptual knowledge regarding budgeting in health systems and policy factors impacting cost, quality and access to healthcare.

NUR 634 - INTERNSHIP IN NURS LEADERSHIP

Semester Hours: 3

This is the culminating course that provides opportunities to synthesize leadership learning, administrative theory, and operational skills in budgeting and finance, and resource management. This knowledge is applied through the identified nurse executive competencies in selected health care related organizations. Course objectives reflect the AONE competencies and QSEN standards. Clinical hours 3, Contact hours 135.

NUR 634L - CLINICAL EXPERIENCE

Semester Hours: 0

NUR 638 - INFORMATICS NRSE ADMINISTRATOR

Semester Hours: 1-6

The focus of this course is on the structuring and processing of health information for making decisions in health care.

NUR 640 - CURRICULUM DEV IN NURSING

Semester Hours: 3

Principles and concepts of curriculum development are examined with respect to their application to development of both the theoretical and clinical components of nursing programs. Includes principle regarding theories of learning, the changing nature of knowledge and societal needs as basic considerations directing curricular planning and revision.

NUR 641 - TEACHING/LEARNING IN NURSING

Semester Hours: 3

Emphasis is on the development of classroom and clinical laboratory teaching skills and includes a critical appraisal of specific teaching strategies. The student is provided the opportunity to acquire knowledge in the use and design of common and innovative teaching methods including web-based and interactive delivery systems.

NUR 642 - TESTING & EVALUATION IN NURS

Semester Hours: 3

Major emphasis on the development of classroom and clinical skills in appraisal and evaluation methods of student performance. The student is provided with the opportunity to acquire skills in constructing various types of testing and evaluation (formative and summative) procedures as they relate to nursing education.

NUR 643 - FACULTY ROLE DEV IN NURSING

Semester Hours: 3

Role theory serves as the basis for the discussion and practice in developing teaching, service and research role of a faculty member in a nursing program. Discussion on legislative and professional agencies issues and policies impinging on the teaching role.

NUR 644 - PRACTICUM IN TEACHING

Semester Hours: 3

Opportunities to do practice teaching with nursing students in various phases of their basic educational programs. Learning activities will be planned on an individual basis and based on the specific teaching responsibilities of their primary course assignment. Selected baccalaureate degree and/or associate degree programs will be used as practice sites. Prerequisites with concurrency: NUR 640, NUR 641, NUR 642.

NUR 645 - CAPSTONE NURS EDUC CERTIF CRS

Semester Hours: 3

The major emphasis of this capstone education course is the development of the professional teaching role within an institutional setting. The focus is on the student's ability to function as a professional leader utilizing knowledge gained to promote change, engage in professional activities; promote continuous improvement; and serve as a mentor in an educational environment. Prerequisites: NUR 640, NUR 641, NUR 642, NUR 643, NUR 644.

NUR 646 - INSTRUC TECH NURSING EDUC

Semester Hours: 3

The appropriate use of educational technology can afford faculty an opportunity to engage learners and bring concepts to life while supporting formative and summative assessment. This course will examine instructional technology, the design and integration of educational strategies, and methodological tools to engage learners to meet course and curriculum goals.

NUR 647 - STRATEGIC PLANNING

Semester Hours: 3

The focus of this course is to prepare Nursing Administration graduate students to comprehend and actively engage in organizational strategic planning. Emphasis is on the development of organizational blueprints, tracking current trends, forecasting, and innovative strategies in healthcare to achieve an organization's mission and vision, thus remaining competitive in the healthcare industry. Prerequisite w/ concurrency: NUR 630.

NUR 648 - CONCEPTS OF HLTH ASSMNT & PROM

Semester Hours: 3

This course focuses on concepts in health assessment and health promotion for individuals and populations. This course is designed for nurses preparing for leadership roles in health care organizations. Prerequisite w/ concurrency: NUR 630.

NUR 649 - QUALITY, SAFETY, & RISK MGMT

Semester Hours: 3

This course focuses on the quality, safety, and risk management concepts for nurse leaders. Content includes the use of quality tools and use of data to evaluate and promote quality outcomes. Prerequisite w/ concurrency: NUR 630.

NUR 650 - INDEPENDENT STUDY

Semester Hours: 2-4

Planning, implementation, and evaluation of related phenomena of special interest observed in nursing practice.

NUR 670 - HUMAN FACTORS HEALTHCARE COMPU

Semester Hours: 3

Overview of epidemiologic methods with discussion of application to diagnosis and choice of therapy. Concepts and mechanisms related to transmission, acquisition of disease, trends and distribution of patterns of disease discussed. The application of epidemiology to human health problems and rural settings is emphasized. Prerequisite: NUR 638.

NUR 671 - USABILITY EVAL HEALTHCARE I.T.

Semester Hours: 3

This course examines usability methods for the design and testing of healthcare information technology including health information websites, electronic health records, clinical decision support systems, and medical equipment with an emphasis on the user experience. The iterative nature of user-centered design and usability testing of health IT will be emphasized. Prerequisite: NUR 679.

NUR 698 - PLAN II: OTHER RES ACTIVITIES

Semester Hours: 1-4

Application of activities appropriate to student program of study. Intended to expand student knowledge and enhance track specific content.

NUR 699 - PLAN I: THESIS

Semester Hours: 1-4

Independent research investigation related to practice of nursing under faculty guidance. Minimum of six hours required. Prerequisite: NUR 602.

NUR 700 - CLINICAL DATA MGT & ANALYSIS

Semester Hours: 3

This course provides students with the knowledge to understand, collect, manage, and measure clinical data. Students will explore data collection and management processes, level of measurement, basic statistics, and measurement for improvement in order to effectively use clinical data. Data entry exercises employed through analytical tools and statistical software packages will allow the students practice and apply the basic data management and analysis skills needed for the evaluation of clinical data and evidence-based practice.

NUR 701 - WRITING FOR PUBLICATION

Semester Hours: 3

This course concerns the development of skills in writing, editing, and preparing manuscripts for publication from initial idea to submission of a publishable manuscript. The course emphasizes a writing process that encourages productivity and collegial peer review. Legal and ethical aspects of authorship prepare students for responsible practices expected of scholars. Students should have mastered basic writing skills, e.g. grammar, syntax, and computer skills, prior to enrolling in this course.

NUR 729 - EVID BASED PRACT DESGN & TRANS

Semester Hours: 3

The purpose of this course is to provide students with models for evidence-based practice (EBP) design and improvement science. Students learn to formulate clinical questions in answerable format and search for and identify best research evidence. The focus of the course is to evaluate and critically appraise evidence for rigor and applicability to a clinical problem and the impact on the improvement of clinical outcomes. Students will translate evidence into practice environments for safe, quality care. Students will gain access to information that will support optimal clinical decision-making. All content and assignments are applied by the student to begin development of the DNP Project. Prerequisite: NUR 700.

NUR 731 - PHIL/THEOR/CONC FOUN FOR APN

Semester Hours: 3

This course assists students to use theory and conceptual models to guide the advanced nursing practice and scholarship at the doctoral level. The content is derived from the philosophical and scientific underpinnings of nursing, natural and psycho-social sciences. Prerequisite: NUR 701.

NUR 733 - INFORMATICS FOR APN

Semester Hours: 3

This course focuses on the collection, organization, and analysis of information in nursing and health care. Students are introduced to the speciality of nursing informatics, the information system life-cycle, telemedicine, and the use of technology to enhance nursing care delivery and patient safety. Students will also learn how to manipulate large and small patient databases for the analysis of patient outcomes. Prerequisite with concurrency: NUR 729.

NUR 734 - ADVANCED EXPERIENTIAL CLINICAL

Semester Hours: 1-7

This course is designed to validate Master's level competencies in clinical and organizational leadership. The course is required for post-master's DNP students who are graduates of Master of Science in Nursing program with less than 500 clinical hours.

NUR 735 - POPULATION HEALTH IN APN

Semester Hours: 3

This course prepares students to implement population-based health promotion and disease prevention activities. The course applies an epidemiologic framework and focuses on a spectrum of issues affecting health which includes emerging infectious diseases, emergency preparedness, disparities in health and healthcare services, and the impact of exposomics on population health. Prerequisite with concurrency: NUR 729.

NUR 737 - INTDIS LDRSH/ROLE DEV PRA EXC

Semester Hours: 3

This course focuses on organizational and systems leadership and skills critical to role development in independent and interprofessional practice. Content includes communication, conflict resolution, collaboration and negotiation, leadership, and team functioning to enhance the experience and outcomes of patient care and to reduce the cost of care.

NUR 738 - DNP PROJECT DEVELOPMENT

Semester Hours: 3

This course is designed to assist the student in finalizing the DNP project plan and developing an application to the Institutional Review Board (IRB) for the protection of human subjects. The student will document previously acquired abilities and competencies in a professional portfolio. Students will participate in the seminar sessions to obtain guidance and receive peer suggestions about the portfolio and project plans. Prerequisites: NUR 734, NUR 742 and NUR 743.

NUR 739 - DNP PROJECT

Semester Hours: 1-7

The DNP project is planned, implemented, and evaluated by the DNP student in consultation with the DNP committee. The student writes a manuscript suitable for publication and makes a scholarly presentation of findings to peers and faculty. A minimum of seven credit hours for this course are distributed across several semesters as determined by the chair. Prerequisite with concurrency: NUR 738.

NUR 740 - HLH POLIC/POLIT:IMPLICATION HC

Semester Hours: 3

This course focuses on the unique challenges of engaging and influencing health care policy at local, state, national or international levels. It is designed to develop skills, techniques, and approaches to the critical analysis of health policy proposals, health policies, and to identify stakeholders in policy development. The health policy framework is analyzed from a governmental, institutional, and organizational perspective. Prerequisite: NUR 729.

NUR 742 - PROGRAM EVAL & METHODS

Semester Hours: 3

The purpose of this course is to synthesize knowledge related to translation/implementation science models and strategies to improve health outcomes. The emphasis in the course is the use of program evaluation as a tool to achieve positive changes in health status, initiate and manage quality improvement, engage in risk anticipation, and facilitate organizational and system level changes. Prerequisite with concurrency: NUR 729.

NUR 743 - EVID BASED PRACT STRATEGIES

Semester Hours: 3

This course expands on evidence-based design to refine a problem statement a clinical question. Content includes conducting a systematic review of the literature to guide the selection of methods, strategies, tools and metrics needed to complete a successful DNP project. Students will develop and have approved a proposed DNP project plan. Prerequisite: NUR 742.

NUS 750 - PHILOSOPHY OF SCIENCE

Semester Hours: 3

The purpose of this course is to explore the evolution of philosophy and science. Epistemology, knowledge generation, knowledge acquisition, and ways of knowing will be examined. Scientific inquiry will include reasoning, logic, and persuasive argument development.

NUS 752 - INFORMATICS HEALTHCARE SCH INQ

Semester Hours: 3

The purpose of this course is to prepare nurse scientists to use informatics, electronic tools, and healthcare technologies for the purposes of nursing research. The course will focus on the use of informatics in the data management of individuals, groups and organizations as the nurse scientist plans and executes a program of research.

NUS 754 - ETHICAL CONDUCT LGL RESEARCH

Semester Hours: 3

The purpose of this course is to introduce the student to doctoral scholarship in support of beginning a program of responsible conduct of research. This course explores current ethical and legal issues in the science of nursing research. The course will delve into best practices in research design with regard to ethics, authorship, data management and record keeping, intellectual property and ownership of data, and human subjects research. In addition, the course will cover conflicts of interest, mentoring, collaborations, peer review, research misconduct, and current ethical issues in research.

NUS 756 - APPL OF THEORETICAL MODELS

Semester Hours: 3

The purpose of this course is to provide students a foundation for contributing to theory development processes, analyzing and critiquing theoretical foundations of research, and applying theoretical models to nursing research. This course addresses the relationship between theory and research and provides an understanding of the use of theoretical models and conceptual foundations to guide nursing research and practice. Prerequisites: NUS 750.

NUS 758 - QUANTITATIVE RESEARCH METHODS

Semester Hours: 3

This course provides students with foundational knowledge and skills in the development of experimental and nonexperimental quantitative designs. Topics will include training in the choice of research questions/aims/hypotheses and a responsive approach; the development of an ethical, strategic design; the implementation of a strategic sampling plan; the choice of suitable measurements (reliable and valid) and analytic plans; issues in research such as treatment fidelity; and the drafting of research proposals. Additional content will briefly introduce more advanced concepts such as mixed methods research or community-based participatory research. Special emphasis will be placed on clinical nursing designs, such as repeated-measures intervention studies. Prerequisites: NUS 750.

NUS 760 - STATISTICS I

Semester Hours: 3

The purpose of this course is to provide the student with the skills to conduct and interpret statistical data. Emphasis will be placed on describing types of variables, testing hypotheses, selecting appropriate parametric and nonparametric statistical tests, analyzing data, and interpreting results. Prerequisite: NUS 758.

NUS 762 - HLTH POLICY UNDERSERVED POPUL

Semester Hours: 3

The purpose of this course is to explore the policy environment that influences and shapes public health and health care service delivery, including rural and medically underserved communities. Students will develop skills, techniques, and approaches to identify gaps, critically analyze and research health related issues. Utilization and delivery of data to promote and impact healthcare policy changes will be an important measure of outcome. Students will develop the ability and confidence to critically assess current health policy issues in a thoughtful, comprehensive and rigorous manner and to engage in the policy process.

NUS 764 - SCIENTIFIC WRITING

Semester Hours: 3

The purpose of this course is to develop writing skills to produce scientific writing that is clear, concise, and logical. This course will also explore the publication to include abstract and manuscript development and the submission process. Additional pathways to dissemination of nursing content will be explored as well.

NUS 766 - EPIDEMIOLOGY RURAL POP

Semester Hours: 3

The purpose of this course is to introduce epidemiological methods for measuring population health, designing and implementing observational and experimental studies, critically reading the public health literature, and applying research findings to global and community health. Prerequisite: NUS 760.

NUS 768 - STATISTICS II

Semester Hours: 3

This course provides advanced coursework in applied statistical approaches to data management and analysis. With an emphasis on multivariate statistical approaches, the purpose of the course is to help nursing students to develop improved skills in conceptualizing, executing, analyzing, and interpreting advanced analytic strategies and to enhance their ability to propose strong, tailored analytic approaches for specific study designs and research aims. Students will also gain proficiency in using R software, a freely available and power statistical package. They will enhance their knowledge of regression, OMANOCOVE, MANOVA/MANCOVA, discriminant analysis, exploratory and confirmatory factor analysis, structural equation modeling, multilevel modeling, and advanced categorical approaches. Understanding the mathematics, logic, application of these techniques is emphasized. Prerequisite: NUS 760.

NUS 770 - GRANT WRITING

Semester Hours: 3

The purpose of this course is to prepare students in the foundations of writing grants for federal external funding. This course will help students identify a step-wise process to develop a grant proposal through federal funding sources. Strategies for successful grant writing include identifying funding sources for the topic, writing a competitive grant application, developing a collaborative team of researchers for the project, and understanding the review process. Prerequisite: NUS 764.

NUS 772 - QUALITATIVE RESEARCH METHODS

Semester Hours: 3

The purpose of this course is to assist the student in using selected qualitative research methods. Learning modules will explore qualitative approaches, sampling, data collection, data analysis and dissemination. The course will review and explore the use of technology to assist the qualitative researcher. Prerequisites: NUS 750, NUS 756, and NUS 758.

NUS 776 - ADVANCED RESEARCH METHODS

Semester Hours: 3

The purpose of this course is to assist the student in developing the knowledge and skills to design a mixed methods study. The course will explore a nursing phenomenon using both quantitative and qualitative research methods. The student will utilize prior work developed in the previous research methods courses. This course will culminate in a developed prospectus that will be presented to a dissertation committee. Prerequisites: NUS 752, NUS 758, NUS 760, NUS 768, and NUS 772.

NUS 780 - INTRODUCTION TO OMICS

Semester Hours: 3

The purpose of this course is to introduce the revolution of omics and discuss the role nurse scientists can play in precision health development. Nurse scientists are in a position to provide a unique contribution to person-centered health approaches by broadening their understanding of molecular advances to improve health outcomes. A variety of different omics will be explored and the practical advantages, limitations, and challenges in individualized health promotion will be discussed.

NUS 781 - OMICS IN NURSING RESEARCH

Semester Hours: 3

The purpose of this course is to provide an overview of advanced concepts of omics research by utilizing a biobehavioral systems approach in nursing science. The National Institute of Nursing Research's strategic plan for Genomic Nursing Science is used as the framework for integrating omics and nursing research. Practical application in omics theories, methodologies, technology, bioinformatics, and responsible conduct of research is discussed. Additionally, resources in building capacity for the next generation of omics scientists are review. Prerequisite: NUS 780.

NUS 782 - CURRIC DEV PROG EVL FOR NUR ED

Semester Hours: 3

The purpose of this course is to examine the procedures for designing, implementing, and evaluating nursing education curriculum. The process will be examined beginning with the program mission. Educational theories, philosophy, concepts, and program evaluation will be explored. The nurse educator's role in curriculum design and program evaluation is assessed.

NUS 783 - INSTR MTHD ASSESS IN NURS ED

Semester Hours: 3

The purpose of this course is to discover teaching styles and implement instructional technologies to promote learning in diverse populations of students. Throughout the semester, students will explore didactic and clinical learning activities and evaluation strategies to demonstrate transfer of learning. Prerequisite: NUS 782.

NUS 784 - DATA SCIENCE EMERGING TECH HLT

Semester Hours: 3

The purpose of this course is to apply concepts associated with data analytic methods and the use of burgeoning technologies in healthcare. The course prepares the nurse scientist to engage with other researchers in the areas of data analytics, simulation, telehealth, and robotics. The appropriate integration of health care technologies to support nursing research will be emphasized.

NUS 785 - R&D INNOV HEALTHCARE TECH

Semester Hours: 3

The purpose of this course is to develop the scientific skills to move an idea from concept to product following a research and development (R&D) process. The course prepares the nurse scientist to engage with researchers inside and outside health care fields, solicit input from end-users early and often, create patentable intellectual property, and fund the development of products with federal grants or investors. Prerequisite: NUS 784 or permission of professor.

NUS 798 - COMPETENCY ASSESSMENT

Semester Hours: 0

NUS 799 - DOCTORAL DISSERTATION

Semester Hours: 1-9

Joint Nursing Science, PhD

The purpose of the Joint Nursing Science Ph.D. program is to prepare nurse scholars who will advance nursing science by generating new knowledge through interprofessional research initiatives and to improve the health of rural and medically underserved populations. It is a joint program between The University of Alabama in Huntsville (UAH) and The University of Alabama (UA).

Code	Title	Semester Hours
Core Requirments		
NUS 750	PHILOSOPHY OF SCIENCE	3
NUS 752	INFORMATICS HEALTHCARE SCH INQ	3
NUS 754	ETHICAL CONDUCT LGL RESEARCH	3
NUS 756	APPL OF THEORETICAL MODELS	3
NUS 758	QUANTITATIVE RESEARCH METHODS	3
NUS 760	STATISTICS I	3
NUS 762	HLTH POLICY UNDERSERVED POPUL	3
NUS 764	SCIENTIFIC WRITING	3
NUS 766	EPIDEMIOLOGY RURAL POP	3
NUS 772	QUALITATIVE RESEARCH METHODS	3
NUS 768	STATISTICS II	3
NUS 770	GRANT WRITING	3

NUS 776	ADVANCED RESEARCH METHODS	3
NUS 798	COMPETENCY ASSESSMENT	0
NUS 799	DOCTORAL DISSERTATION (DISSERTATION)	24
Cognates		
NUS 780	INTRODUCTION TO OMICS	3
NUS 781	OMICS IN NURSING RESEARCH	3
NUS 782	CURRIC DEV PROG EVL FOR NURS ED	3
NUS 783	INSTR MTHD ASSESS IN NURS ED	3
NUS 784	DATA SCIENCE EMERGING TECH HLT	3
NUS 785	R&D INNOV HEALTHCARE TECH	3

Nursing - MSN to DNP

In addition to the graduate degree requirements of the Graduate School, a student is required to complete a minimum of 40 semester hours of coursework in the Doctor of Nursing Practice (DNP) program. The DNP degree is distinguished by the completion of a DNP Project that demonstrates synthesis of the student's coursework and lays the groundwork for future scholarship. Because the DNP is focused on mastery of advanced practice in a specialty area, the DNP Project should demonstrate the achievement of that mastery. The practice doctorate focuses heavily on practice that is innovative and evidence-based, reflecting the application of credible research findings, through an integrative practice experience. The DNP Project is evidence that the student can independently identify a problem of contemporary significance through familiarity with the current literature in the major field, organize, design, implement, and evaluate a project that addresses the problem and present the project in cogent, well written exposition. The DNP Project documents the outcomes of the student's doctoral education experience, providing a measurable medium for evaluating the mastery of and growth in knowledge and clinical expertise.

The project will be completed under the direction of a chair and supervising committee. The project has several approval points including a proposal review, Institutional Review Board (IRB) review, and final evaluation. The final evaluation of the DNP Project must be scheduled through the College of Nursing at least two weeks in advance of the proposed evaluation date taking into account the expected date of graduation and the deadlines set by the Graduate School. Results of the DNP Project are expected to be manuscript-ready in preparation for submission as a refereed scholarly publication.

DNP Courses

Code	Title	Semester Hours
NUR 700	CLINICAL DATA MGT & ANALYSIS	3
NUR 701	WRITING FOR PUBLICATION	3
NUR 729	EVID BASED PRACT DESGN & TRANS	3
NUR 731	PHIL/THEOR/CONC FOUN FOR APN	3
NUR 733	INFORMATICS FOR APN	3
NUR 734	ADVANCED EXPERIENTIAL CLINICAL (if needed)	1-7
NUR 735	POPULATION HEALTH IN APN	3
NUR 737	INTDIS LDRSHP/ROLE DEV PRA EXC	3
NUR 738	DNP PROJECT DEVELOPMENT	3
NUR 739	DNP PROJECT	7
NUR 740	HLH POLIC/POLIT:IMPLICATION HC	3
NUR 742	PROGRAM EVAL & METHODS	3
NUR 743	EVID BASED PRACT STRATEGIES	3
Total Semester Hours		40-47

Nursing - BSN to DNP

In addition to the Post-Master's of Science in Nursing (MSN) to DNP program, the College of Nursing offers the Post-Bachelor of Science in Nursing (BSN) to DNP pathway. The post-baccalaureate to DNP pathway is for nurses with a BSN degree entering directly into the DNP Program without first earning an MSN degree.

The added content in the post-baccalaureate to DNP pathway will allow a seamless progression from the completion of a baccalaureate degree to advanced practice. Advanced practice specialty training at the doctoral level is needed to address the growing complexity of patient care and health care systems. In addition, expanding accountability of clinical expert nurses in advanced practice roles requires competencies in population-based care, leadership, health policy, health system improvement, research and evidence-based practice.

Note:

Programs of Study will be individualized based on semester started and full-time or part-time status.

The post-baccalaureate to DNP Nursing Administration track is all online (1 required visit after completion of the MSN portion).

The post-baccalaureate to DNP (FNP and AGACNP) tracks are hybrid programs during the MSN portion with students attending class on campus for one day every other week each semester.

Nursing, MSN - Adult Gerontology Acute Care Nursing Practitioner Track

Adult-Gerontology Acute Care Nurse Practitioner

Graduates of the Adult-Gerontology Acute Care Nurse Practitioner (AGACNP) track are eligible to sit for national certification. The AGACNP focus on the care of adults with acute illnesses and may practice in the hospital, home, or clinic setting to provide expert interventions focused on health promotion, illness prevention, and health care management. They make rounds with and without their collaborative physician, write progress notes and orders, do discharge teaching, and follow up with patient referrals and continuing care. Some see patients in the office setting managing the full spectrum of care.

Code	Title	Semester Hours
Core Requirements		
NUR 602	SCHOLARLY INQ ADV NUR PRAC	3
NUR 699	PLAN I: THESIS	6
or two NUR Electives 500 level or above		
Track		
NUR 605	ADVANCED HLTH ASSESSMENT	3
NUR 606	ADV PATHOPHYSIOLOGY	3
NUR 607	PHARMACOLOGY IN ADV PRAC	3
NUR 620	ADLT GER ACUTE CR NUR PRACT I	6
NUR 621	ADLT GER ACUTE CR NUR PRACT II	6
NUR 622	ADLT GER ACUTE CR NUR PRAC III	6
NUR 623	ADLT GER ACUTE CR NUR PRAC IV	6
Total Semester Hours		42

Nursing, MSN - Family Nurse Practitioner Track

Family Nurse Practitioner

Family nurse practitioners are advanced practice nurses who function as primary care providers to clients of any age, focusing on common health care problems. These skilled health care providers use expert clinical judgment and decision making in the performance of comprehensive health assessments, differential diagnoses, and prescribing of pharmacologic and non-pharmacologic interventions in the direct treatment of health problems. These work in collaborative practices with primary care physicians to deliver culturally sensitive care to clients.

Code	Title	Semester Hours
Core Requirements		
NUR 602	SCHOLARLY INQ ADV NUR PRAC	3
NUR 699	PLAN I: THESIS	6
or two NUR Electives 500 level or above		
Track		
NUR 605	ADVANCED HLTH ASSESSMENT	3
NUR 606	ADV PATHOPHYSIOLOGY	3
NUR 607	PHARMACOLOGY IN ADV PRAC	3
NUR 610	FAMILY NURSE PRACTITIONER I	6
NUR 611	FAM NURS PRACTITIONER II	6
NUR 612	FAMILY NUR PRACTITIONER III	6

NUR 613	FAM NURS PRACTITIONER IV	6
Total Semester Hours		42

Nursing, MSN - Nursing Administration Track

Nursing Administration

This track prepares nurses who will influence the future of health care through visionary nursing leadership. Competencies include communication, financial skills, information technology, leading and managing change, policy analysis, and empowerment for professional practice. Graduates are prepared to assume positions in education, administration, management, or specialty area roles in a variety of care delivery sites.

Code	Title	Semester Hours
Core Requirements		
NUR 602	SCHOLARLY INQ ADV NUR PRAC	3
NUR 629	US HEALTHCARE SYSTEM	3
Track		
NUR 630	FND CONCEPTS NURSING ADMINATOR	3
NUR 631	LEADERSHIP HUMAN RESRC MGMT	3
NUR 632	ECONOMIC AND POLICY IMPLICATIONS FOR LEADERS IN HEALTH CARE SYSTEMS	3
NUR 634	INTERNSHIP IN NURS LEADERSHIP	3
NUR 638	INFORMATICS NRSE ADMINISTRATOR	3
NUR 647	STRATEGIC PLANNING	3
NUR 648	CONCEPTS OF HLTH ASSMNT & PROM	3
NUR 649	QUALITY, SAFETY, & RISK MGMT	3
Total Semester Hours		30

Post-Master's Family Nurse Practitioner Program

The Post-Master's Family Nurse Practitioner (FNP) Program is designed for individuals who have already earned a master's degree in Nursing, but who desire additional preparation for FNP Certification. Students must be formally admitted to the program to enroll and must meet identical academic standards as students enrolled in the master's program. In order to facilitate this certificate of study, a variety of teaching and communications methods are used. Graduates from this program are eligible to sit for the FNP national certification examination.

Students admitted to the Post-Master's FNP certificate must have already completed Advanced Health Assessment, Advanced Pharmacology, and Advanced Pathophysiology at UAH or another institution within the last 2 years or take the courses at UAH while enrolled in courses leading to an FNP certificate.

Program prerequisites or co-requisites:

Code	Title	Semester Hours
NUR 605	ADVANCED HLTH ASSESSMENT	3
or transfer equivalent taken within last 2 years		
NUR 606	ADV PATHOPHYSIOLOGY	3
or transfer equivalent taken within last 2 years		
NUR 607	PHARMACOLOGY IN ADV PRAC (or transfer equivalent taken in the last 2 years)	3

The program of study is as follows:

Code	Title	Semester Hours
NUR 610	FAMILY NURSE PRACTITIONER I (Post Master's)	6
NUR 611	FAM NURS PRACTITIONER II (Post Master's)	6
NUR 612	FAMILY NUR PRACTITIONER III (Post Master's)	6
NUR 613	FAM NURS PRACTITIONER IV (Post Master's)	6
Total Semester Hours		24

College of Science

C207 and C206 Materials Science Building
Telephone: 256.824.6605

Mission

The College of Science provides quality education with leading-edge research opportunities through interdisciplinary programs administered by seven departments and vibrant collaborations across campus and community. Faculty bring their innovative research into the classroom, equipping students with advanced knowledge, skills, and abilities, and preparing leaders for this generation and beyond.

Departments

The College of Science consists of seven academic departments:

- Atmospheric and Earth Science
- Biological Sciences
- Chemistry
- Computer Science
- Mathematical Sciences
- Physics
- Space Science

Faculty in the College collaborate with several UAH research centers including the Center for Applied Optics, Earth System Science Center, Information Technology and Systems Center, Center for Microgravity and Materials Research, and the Center for Space Plasma and Aeronomic Research. The College benefits from its strategic location in the midst of high technology-oriented companies and federal organizations such as NASA and NOAA. Unique opportunities are available for original research at the forefront of science and technology, including projects that are of direct interest to industry and academia.

Degrees and Programs

The College of Science offers the following graduate degree programs:

Applied Mathematics	Ph.D.
Atmospheric Science	M.S., Ph.D.
Biology	M.S.
Chemistry	M.S.
Computer Science	M.S., M.S.S.E., Ph.D.
Earth System Science	M.S.
Mathematics	M.A., M.S.
Physics	M.S., Ph.D.
Space Science	M.S., Ph.D.
Software Engineering	M.S.
Interdisciplinary programs include:	
Biotechnology Science and Engineering*	Ph.D.
Cybersecurity*	M.S.
Materials Science*	M.S., Ph.D.
Optical Science and Engineering*	Ph.D.

* These programs are described in the Interdisciplinary Programs (p. 932).

In addition, certificate programs are available in Software Engineering and Information Assurance.

All first time graduate students should consult with a departmental advisor before registration.

Master's Degrees in Science

- Atmospheric Science, MS (p. 972)
- Biological Sciences, MS (p. 977)
- Chemistry, MS (p. 981)

- Computer Science, MS (p. 991)
- Computer Science, MSSE (p. 992)
- Earth System Science, MS (p. 996)
- Mathematical Sciences, MA (p. 1004)
- Mathematical Sciences, MS (p. 1004)
- Physics, MS (p. 1013)
- Space Science, MS (p. 1018)

Doctoral Degrees in Science

- Applied Mathematics, PhD (p. 1003)
- Atmospheric Science, PhD (p. 971)
- Computer Science, PhD (p. 990)
- Physics, PhD (p. 1011)
- Space Science, PhD (p. 1020)

Certificates in Science

- Information Assurance (<http://catalog.uah.edu/grad/colleges-departments/science/computer-science/information-assurance-certificate/>)
- Software Engineering (<http://catalog.uah.edu/grad/colleges-departments/science/computer-science/software-engineering-certificate/>)

Atmospheric Science

National Space Science and Technology Center
Room 4044
Telephone: 256.961.7877
Email: aes@uah.edu

Chair: Dr. John Mecikalski, Professor (<https://www.uah.edu/science/departments/atmospheric-science/faculty-staff/john-mecikalski/>)

The Atmospheric and Earth Science department offers the following graduate degree programs:

Master of Science - Atmospheric Science (p. 972)
Master of Science - Earth Systems Science (p. 996)
Doctor of Philosophy - Atmospheric Science (p. 971)

Admission Requirements

Refer to the appropriate section of the Graduate Catalog for general admission and degree requirements. The applicant should have training through a calculus sequence (including the calculus of vector-valued functions), a course in linear algebra, and courses in ordinary and partial differential equations. He or she should also have completed at least two semesters of chemistry, two semesters of calculus-based physics, and have demonstrable computer proficiency in at least one high-level programming language.

Program Objective

The Atmospheric Science Department's first objective is to produce graduates who are successful in writing scientific research papers in peer-reviewed scientific journals and in making presentations at national or international scientific conferences and workshops. Our second objective is to produce graduates who successfully obtain employment as research scientists in a research center, government lab, or corporation, or in academic positions at a university.

Learning Outcomes

Students will demonstrate:

- Knowledge of the reviewed literature in the atmospheric science that is relevant to their specific research
- Proficiency in scientific methodology, while successfully carrying out a research project from concept to completion
- Effective oral communication skills in reporting the results of their scientific research

Master's Programs in Atmospheric Science

- Atmospheric Science, MS (p. 972)
- Earth System Science, MS (p. 996)

Doctoral Program in Atmospheric Science

- Atmospheric Science, PhD (p. 971)

ATS 501 - SURVEY OF ATMOSPHERIC SCIENCE

Semester Hours: 3

General survey of the field of atmospheric science includes thermodynamics, atmospheric dynamics, cloud physics, and atmospheric radiation. Quantitative examination of atmospheric properties including atmospheric composition, structure and dynamics.

ATS 509 - APPL COMPUTERS IN METEOROLOGY

Semester Hours: 3

Survey of scientific programming techniques used in atmospheric sciences. Various data types, control statements, and programming design using object oriented techniques are discussed, emphasizing efficient programming. Course prepares students for graduate work and research in atmospheric science.

ATS 510 - OPERATIONAL WEATHER FORECAST'G

Semester Hours: 3

Subjective & objective methods of atmospheric prognosis. Forecasting critical weather elements. Interpretation, use & systematic errors of computer-generated products, human factors, & application of meteorological theory in an operational setting.

ATS 513 - GIS & REMOTE SENSING

Semester Hours: 3

Hands-on approach to GIS and satellite remote sensing. Popular satellite data sets such as LANDSAT and AVHRR are coupled with GIS data sets to increase understanding of the earth system. Topics include satellite sensors, basic radiative transfer, orbits, raster formats, atmospheric correction, distortion, image corrections, rotations and mapping, spatial resolution, image interpretation, radiometric and geometric enhancement, multispectral transformations, and classifications. (Same as ATS 413, ES 413, ES 513.) Spring. Prerequisite: ATS 511 or ESS 511.

ATS 515 - ADVANCED TOPICS IN GIS

Semester Hours: 3

Advanced special topics: visualization of GIS and remote sensing data, landscape characterization (pattern vs. process), multitemporal analysis, aggregation of data types, developing an integrated GIS environment for performing complex space-time modeling analyses, and land-atmosphere interactions. (Same as ATS 415, ES 415, ES 515.) Spring.

ATS 520 - INTRO ATMOS CHEM & AIR POLLUTI

Semester Hours: 3

An introduction designed to provide students with the basics of atmospheric chemistry and air pollution concepts. Topics include air pollutants, air-pollution meteorology, atmospheric gases and aerosols, and atmospheric processes.

ATS 522 - AIR POLLU:METEOROLOGY CONCEPTS

Semester Hours: 3

ATS 541 - ATM THERMODYN & CLOUD PHYSICS

Semester Hours: 3

Thermodynamic & cloud physical processes in the atmosphere. Atmospheric statics & stability. Role of aerosols in nucleation of cloud and ice particles. Physical processes that produce the growth of hydrometeors in cold and warm clouds. Applicable measurement techniques.

ATS 551 - ATMOS FLUID DYNAMICS I

Semester Hours: 3

Fluid dynamics in the atmosphere. Coriolis acceleration, scale analysis and appropriate approximations of the complete governing equations. Numerical analysis and interpretation of weather phenomena.

ATS 553 - ATS RADIATN/REMOTE SENSING

Semester Hours: 3

ATS 554 - FORECASTING MESOSCALE PROC

Semester Hours: 3

Detection and forecasting of atmospheric mesoscale phenomena including the structure and evolution of clouds, precipitation (including floods) thunderstorms and severe weather. Includes basics of instruments used to detect mesoscale phenomena, most notably satellite and radar.

Prerequisites: ATS 551.

ATS 561 - ATMOSPHERIC RADIATION I

Semester Hours: 3

Fundamentals of terrestrial atmospheric radiation. Topics include: basic concepts, radiative transfer equation, gaseous absorption, scattering by molecules and particles, band models, transmittance along an inhomogeneous path.

ATS 571 - INTRO TO RADAR METEOROLOGY

Semester Hours: 3

Introduction to principles of radar meteorology, including radar operations, hardware, interpretation and analysis. Doppler, dual-polarization and dual-wavelength radar theory, methods and applications are covered. Prerequisite: ATS 541.

ATS 572 - SATELLITE METEOROLOGY

Semester Hours: 3

The goal for this course is to provide students in undergraduate and graduate level Earth and Atmospheric Science a background in satellite meteorology. During all components of the course there will be a heavy emphasis on practical meteorological satellite interpretation with respect to land surface and especially atmospheric features. Prerequisites: ESS 508 or ATS 509.

ATS 581 - ATS THERMODYNAMICS & CHEM

Semester Hours: 3

ATS 590 - SPECIAL TOPICS

Semester Hours: 1-3

Selected topics of interest not included in other courses.

ATS 603 - CLIMATE DYNAMICS

Semester Hours: 3

Origin and evolution of the climate system including underlying causes for past climates such as occurred during the ice ages. Statistical processing of various time series to extract climatic signals in the data. Determination of global-scale forcing mechanisms, which impact climate. Prerequisites: ATS 541 and ATS 551.

ATS 606 - DATA ANALY ATMOSPHERIC SCNTS

Semester Hours: 3

A theoretical and practical introduction to various data analysis methods commonly used in atmospheric science. Topics include forecasting techniques to generate models to fit data, assess models using parametric tests, probability theory and Monte Carlo methods to solve a variety of problems.

Prerequisites: ATS 509.

ATS 620 - ATMOSPHERIC CHEMISTRY & AEROSI

Semester Hours: 3

Primary processes, thermodynamics, photochemistry, kinetics, models, and measurements applied to troposphere and stratosphere; natural and anthropogenic; chlorine, nitrogen, hydrogen, and oxygen catalytic cycles; ground- and satellite-based observations of trace species. Prerequisites: ATS 520.

ATS 622 - AIR POLLUTION MODELING

Semester Hours: 3

Air pollution Lagrangian and Eulerian modeling concepts and methods from micro to synoptic scales; plume, large eddy simulations and urban-regional models in research and regulatory applications; transport, dispersion, chemistry, clouds, aerosols, and wet/dry deposition. Prerequisites: ATS 520 and ATS 551.

ATS 630 - PHYSICAL CLIMATOLOGY

Semester Hours: 3

This course examines the physical aspects of the global climate system, including the global energy balance, surface energy balance, hydrologic cycle, climate classification, ocean change and other selected topics such as climate sensitivity. Prerequisites: ATS 501 or ATS 541.

ATS 635 - GENERAL CIRCULATION

Semester Hours: 3

Detailed examination of the observed dynamic, thermodynamic and chemical structure of the atmosphere, including mid-latitude baroclinic systems, tropical systems, global-scale energy, mass and momentum budgets and the fundamental climatology of the atmosphere. Prerequisites: ATS 541 and ATS 551.

ATS 642 - PRECIP PHYSICS FOR RADAR

Semester Hours: 3

Cloud microphysics theory, models, in-situ and radar observations of hydrometers will be utilized together to explore advanced concepts in precipitation physics and their connection to radar meteorology, including coalescence, break-up, freezing, size sorting, aggregation, riming and melting. Prerequisite: ATS 531 and ATS 571.

ATS 651 - ATMOS FLUID DYNAMICS II

Semester Hours: 3

Wave motions in the atmosphere with emphasis of Rossby, Kelvin and gravity waves. Systematic scaling of primitive equations to develop quasi-geostrophic and Ekman-layer theory. Shallow water theory, stratified flows, and barotropic and baroclinic instability. Prerequisites: ATS 551.

ATS 652 - ADV SYNOPTIC METEOROLOGY

Semester Hours: 3

Analysis, interpretation and forecasting synoptic-scale and mesoscale phenomena, including air masses, frontal systems, cyclones, anti-cyclones and waves toward understanding process dynamics. Emphasize the use of observational, satellite and numerical model data, including radars and profilers. Prerequisites: ATS 541 and ATS 551.

ATS 654 - FORECASTING MESOSCALE PROCESSE

Semester Hours: 3

ATS 655 - BOUNDARY LAYER METEOROLOGY

Semester Hours: 3

Survey of atmospheric boundary layer (ABL) properties. Review of turbulence, convective and stable boundary layers, surface forcing, boundary layer discontinuities, and singular phenomena within the ABL. Atmospheric field measurements are used to enhance understanding of ABL process. Prerequisites: ATS 541 and ATS 551.

ATS 656 - TROPICAL METEOROLOGY

Semester Hours: 3

Overview concepts of the dynamics and climatology of the tropics and of significant tropical precipitation systems. Topics also include Kelvin waves, equatorial flows, convective scale dynamics, island meteorology, tropical cyclones, ENSO, radiative-convective equilibrium, gregarious cloud systems. Prerequisites: ATS 541 and ATS 551.

ATS 657 - NOWCASTING THEORY METHODS

Semester Hours: 3

Theory, methods and applications of 0-6 hour weather and ecological prediction, which is a forecast time period when numerical prediction models have low skill. Topics include predictability, data assimilation, statistical methods, and algorithms using Earth and atmospheric science observations.

ATS 670 - SATELLITE REMOTE SENSING I

Semester Hours: 3

Using a hands-on approach, this course covers a broad range of topics concerning digital image processing applied to the remote sensing of atmospheric, cloud and surface properties using various satellite data sets. Prerequisites: ATS 509.

ATS 671 - GROUND BASED REMOTE SENSING

Semester Hours: 3

Principles and measurement capabilities of active and passive ground-based remote sensing systems: radar, wind profiler, lidar, sodar, and passive radiometer systems. Integration of remote sensing measurements to retrieve properties of atmospheric phenomena. Hands on usage and field measurements. Prerequisites: ATS 541.

ATS 672 - DUAL POLARIZATION RADAR MTRLGY

Semester Hours: 3

Theory, analysis and interpretation of dual polarization radar for meteorological applications. Course covers dual polarization radar system hardware; the basic theory underlying polarimetric radar data and methodology; analysis, interpretation and application of polarimetric radar variables; and dual meteorological and convective weather applications; specifically, precipitation measurement and hydrometeor identification. Example applications include rain rate estimation, drop size determination, hail identification, tornado detection, snow vs rain delineation, and cloud electrification studies.

Prerequisites: ATS 571.

ATS 673 - LIGHTNING

Semester Hours: 3

An introduction to lightning. Topics include qualitative and quantitative description of lightning discharges; electrification of thunderstorms; temporal and spatial variation of lightning on multiple scales; various types of lightning; basic lightning models; current methods of measuring lightning. Prerequisites: ATS 509.

ATS 675 - ATMOSPHERIC DATA ASSIMILATION

Semester Hours: 3

Data assimilation methods and concepts including objective analysis and initialization as relevant to numerical weather prediction. Emphasis on variational methods, successive correction, optimal interpolation, adjoint and gradient concepts, singular vectors, Kalman filters and nudging.

Prerequisites: ATS 541 and ATS 551.

ATS 681 - NUMERICAL ATMOS MODELING

Semester Hours: 3

Introduction to numerical methods applied to simulation of the atmosphere. Basic numerical solution techniques, along with filtering, radiative parameterizations, thermodynamics, turbulent parameterization, initialization and coordinate transformation. Prerequisites: ATS 551.

ATS 690 - SEL TOPICS IN ATMOS SCI

Semester Hours: 1-4

Selected topics of interest not included under other courses.

ATS 699 - MASTER'S THESIS

Semester Hours: 1-6

Required each semester a student is enrolled and receiving direction on a master's thesis.

ATS 740 - CLOUD PROCESSES

Semester Hours: 3

Theory and observations of the bulk microphysics and kinematic structures of clouds. Topics include: interactions among dynamical, microphysical and thermodynamic processes within cloud systems, the dynamics of organized convective systems, and remote sensing of clouds and precipitation features. Prerequisites: ATS 541 and ATS 551.

ATS 761 - ATMOSPHERIC RADIATION II

Semester Hours: 3

Advanced topics in atmospheric radiative transfer. Specific topics include Maxwell equations, Mie theory, polarization and radiative transfer in a scattering atmosphere. Prerequisites: ATS 561.

ATS 762 - MICROPARTICLE OPT & RADIOMETRY

Semester Hours: 3

Propagation of electromagnetic radiation. Maxwells equations, Kramers-Kronig analysis, Mueller matrices, Stokes vectors, Rayleigh theory, scattering & absorption by single & multi sphere, near & internal fields, geometric optics, discrete dipole approximation, & T-matrices. Prerequisites: ATS 561.

ATS 770 - SATELLITE REMOTE SENSING

Semester Hours: 3

Using various satellite data sets and radiative transfer models, this course will train students to calculate and study cloud, aerosol, ocean and land surface properties to assess the radiative energy budget of the earth-atmosphere system. Prerequisites: ATS 670.

ATS 780 - ATMOSPHERIC SCIENCE SEMINAR

Semester Hour: 1

Speakers are invited to report on research relevant to the field of atmospheric science. Students are expected to attend at least twelve seminars and to write short descriptions of the presentations.

ATS 781 - STUDENT SEMINAR

Semester Hour: 1

Guest speakers report on research relevant to the fields of Atmospheric and Earth System Science. Students are expected to attend weekly seminars, submit a paper based on at least ten talks, and make a 15-minute conference type presentation on a research topic in atmospheric science selected in agreement with their advisor. Prerequisites: ATS/ESS 780.

ATS 782 - PROFESSIONAL DEVELOPMENT

Semester Hour: 1

Topics concerning professional ethics, writing scientific journal articles, proposals and resumes, preparing budgets, networking, time management, conference presentations, research administration, funding agencies, stress and burnout will be discussed. Selected topics of interest not included under other courses.

ATS 790 - SEL TOPICS IN ATMOS SCI

Semester Hours: 1-4

Selected topics of interest not included under other courses.

ATS 799 - DOCTORAL DISSERTATION

Semester Hours: 3-9

Required each semester student is enrolled and receiving direction on a doctoral dissertation.

Atmospheric Science, PhD

The Doctor of Philosophy degree is a research-oriented degree awarded upon the demonstration of scholarly competence. To obtain the Ph.D. degree in Atmospheric Science, each student must satisfy all requirements of the Graduate School, as well as those of the Atmospheric Science Program. Admission to the Ph.D. program in Atmospheric Science is dependent upon satisfactory performance on the Preliminary Examination, which is administered twice a year. Students entering UAH with an M.S. degree or previous graduate training in Atmospheric Science must pass the Preliminary Examination at an early opportunity. Students are permitted two attempts to pass the Preliminary Examination.

In summary, the five major requirements for the Ph.D. degree in Atmospheric Science are the following:

1. Take the core courses and pass the preliminary examination

Each student must pass the **Preliminary Examination** covering material in the three core courses plus three other ATS courses as outlined in the Ph.D. Preliminary Exam policies. The core courses are:

Code	Title	Semester Hours
ATS 541	ATM THERMODYN & CLOUD PHYSICS	3
ATS 551	ATMOS FLUID DYNAMICS I	3
ATS 561	ATMOSPHERIC RADIATION I	3

It is anticipated that a student will take the exam during the second year of graduate study, but those with a strong background in Atmospheric Science may take the exam within the first year. The Preliminary Examination may be taken only twice. The student must pass all six sections in order to continue toward Ph.D. candidacy.

Supervisory Committee

After a student has passed the Preliminary Examination, a Supervisory Committee will be formed. The committee will consist of the student's academic advisor plus at least four other members. Three of the Committee Members, including the Committee Chair, must be tenured or tenure-track members of the ATS faculty. The committee must be approved by the Graduate Dean. The committee will later administer the Qualifying Examination, and with consent of the Graduate Dean, give approval to all aspects of requirements 2-5.

2. Satisfy the residence requirement

According to graduate school policy, residence may be established through either:

1. being enrolled as a full-time student (at least 9 graduate semester hours) either for one continuous academic year, or for Spring and Fall semesters in the same calendar year, or
2. being enrolled in at least 6 semester hours of graduate course work in at least three of four consecutive semesters.

3. Complete an acceptable Program of Study (POS).

Students must formulate an appropriate Program of Study, in consultation with a faculty advisor and chair, before the end of the second semester. Each Program of Study, individualized to meet the student's needs and requirements of the program, will stress breadth, depth, and research competence, and relate the major area to its applications. Any prerequisites for courses on the POS must be fulfilled before attempting the courses.

- Minimum degree requirements of this Program of Study will include at least 48 semester hours of graduate level **course work**. These include the core courses needed to prepare for the Preliminary Examination and courses required in a major area of concentration that will prepare the student to conduct original research. While required, supporting courses, ATS 509, ATS 780, ATS 781, ATS 782, are not included in the minimum degree requirements of 48 semester hours.
- Students can transfer up to 24 semester hours of **course work** from their M.S. program.
- Students can transfer an additional 6 semester hours of **course work**, including, with approval, special topics courses but **not** including thesis semester hours.
- 50% of the minimum degree requirements (48 semester hours) must be from 600 level or higher courses.
- A minimum of 18 semester hours of doctoral dissertation (ATS 799) is required.
- Students must register for a total of 3 semester hours of Seminar and Professional Development. (ATS 780, ATS 781, ATS 782)
- Students must maintain a cumulative GPA of at least 3.0.

4. Pass the Qualifying Examination

Once the Program of Study has been submitted and the Ph.D. Student Advisory Committee (SAC) has been formed, the next steps are to submit a written dissertation proposal to the SAC and then make an oral presentation (usually 2-3 weeks later). This will be followed by the Qualifying Examination, which will cover the major areas of study and the student's proposal for the dissertation topic. It will have both written and oral components and will be prepared and graded by the SAC. This examination may be taken at most twice.

5. Complete and defend a research dissertation

Each student must complete and successfully defend a research dissertation, the results of which are publishable in a nationally recognized journal. The dissertation, which must comply with the regulations set forth in the Graduate School's Thesis and Dissertation Manual, must be approved by the student's supervisory committee, the chair of the Atmospheric Science Department, the Dean of the College of Science, and the Dean of the Graduate School. A significant portion of the dissertation must be submitted for publication in an approved journal.

Additional Information

All requirements for the Ph.D. must be completed in no more than five years after the student has passed the qualifying examination.

The atmospheric science program does not require knowledge of a foreign language, but it does require proficiency in both spoken and written english.

Atmospheric Science, MS

- To obtain the M.S. degree in Atmospheric Science, each student must satisfy all requirements of the School of Graduate Studies, as well as those of the Atmospheric Science Program.
- Students must formulate an appropriate Program of Study (POS), in consultation with a faculty advisor and chair, **before the end of the second semester**.
- Students must maintain a cumulative GPA of at least 3.0.

Option 1 - Thesis

Minimum degree requirements under this plan include completion of at least 24 credit hours of graduate course work and at least 6 credit hours of thesis research. At least 50% of the required 24 semester hours must be from 600 level (or higher) courses. Students are also required to take 6 credit hours of supporting courses. The supporting courses do not count toward the minimum degree requirements.

Code	Title	Semester Hours
Required Core Courses ^{1,2}		
ATS 541	ATM THERMODYN & CLOUD PHYSICS	3
ATS 551	ATMOS FLUID DYNAMICS I	3
ATS 561	ATMOSPHERIC RADIATION I	3
Elective Courses		
Select 12 semester hours from 600 level (or higher) courses		12
Select 3 semester hours from 500 or 600 level courses and may be outside of ATS only with advisor's approval		3
Required Supporting Courses		
ATS 509	APPL COMPUTERS IN METEOROLOGY ³	3

ATS 780	ATMOSPHERIC SCIENCE SEMINAR	1
ATS 781	STUDENT SEMINAR	1
ATS 782	PROFESSIONAL DEVELOPMENT	1
Thesis Credits		
ATS 699	MASTER'S THESIS	6
Total Semester Hours		36

- ¹ Students must earn a B or above in core courses.
- ² Students who have earned a B or better in the undergraduate equivalent ATS 541, ATS 551, ATS 561 at UAH do not have to re-take the course at the graduate level. However, their Program of Study must include alternative semester hours at the appropriate level approved by their advisor and chair of the department.
- ³ Students who have earned a B or better in the undergraduate equivalent of ATS 509 at UAH have fulfilled the requirement.

Additional Information

In Option 1, the student must write and defend a thesis. The thesis must show evidence of the student's capability for research, independent thought and analysis in atmospheric science and must be written in fluent, acceptable English. During the second semester, the student, with the guidance of their advisor, should form a supervisory committee. Student must submit a 5 page thesis proposal to be approved by the advisor and committee by the **end of the third full semester**.

Option 2 - Non-Thesis

Minimum degree requirements under this plan include completion of at least 33 credit hours of graduate course work. At least 50% of the required 33 semester hours must be from 600 level (or higher) courses. In addition, all M.S. students are required to take 6 credit hours of supporting courses. The supporting courses do not count toward the minimum degree requirements.

Code	Title	Semester Hours
Required Core Courses ^{1,2}		
ATS 541	ATM THERMODYN & CLOUD PHYSICS	3
ATS 551	ATMOS FLUID DYNAMICS I	3
ATS 561	ATMOSPHERIC RADIATION I	3
Elective Courses		
Select 18 semester hours from 600 level (or higher) courses		18
Select 6 semester hours from 500 or 600 level courses and may be outside of ATS only with advisor's approval		6
Required Supporting Courses		
ATS 509	APPL COMPUTERS IN METEOROLOGY ³	3
ATS 780	ATMOSPHERIC SCIENCE SEMINAR	1
ATS 781	STUDENT SEMINAR	1
ATS 782	PROFESSIONAL DEVELOPMENT	1
Total Semester Hours		39

- ¹ Students must earn a B or above in core courses.
- ² Students who have earned a B or better in the undergraduate equivalent ATS 541, ATS 551, ATS 561 at UAH do not have to re-take the course at the graduate level. However, their Program of Study must include alternative semester hours at the appropriate level approved by their advisor and chair of the department.
- ³ Students who have earned a B or better in the undergraduate equivalent of ATS 509 at UAH have fulfilled the requirement.

Comprehensive Examination/Thesis Defense

A final comprehensive examination is required of all candidates for a master's degree; this examination may be written or oral, or both. In accordance with the Graduate Studies Dates & Deadlines, a written notice of the time and place of the examination/defense must be sent to the Graduate Dean. After approval by the Graduate Dean, the Department Chair sends a copy of the written *Notification of Oral Examination/Defense* to the candidate and each member of the committee. A student may take the Comprehensive Examination only twice.

- **Thesis** candidates will be examined *primarily* on the thesis by a committee of at least three faculty members appointed by the Department Chair and approved by the Graduate Dean.
- **Non-Thesis** candidates will be examined on course work. Three weeks before the exam, the advisor/chair will email two 'lead-in' questions about the student's course work from each committee member. This will be the starting point for the oral exam. The committee members may also

question further during the exam. Students who pass all sections of the Ph.D. Preliminary Exam are not required to take the M.S. Comprehensive Exam.

M.S. Supervisory Committee

The committee must consist of a minimum of three members and be approved by the Department Chair. Two of the three members, including the Committee Chair, must be full-time, tenured or tenure-earning faculty members in the department. The other member may be nominated to the Affiliate Graduate Faculty or be a current faculty member from another UAH department.

Paperwork

- Students must formulate an appropriate Program of Study (POS), in consultation with a faculty advisor and chair, before the end of the second semester.
- Application for graduate degree according to the Graduate Studies *Dates & Deadlines*.
- Notification of Oral Examination/Defense according to the Graduate Studies *Dates & Deadlines*.

Biological Sciences

369A Shelby Center
Telephone: 256.824.6260
Email: biology.admin@uah.edu

Chair: Dr. Paul Wolf, Professor (<https://www.uah.edu/science/departments/biology/faculty-staff/paul-wolf/>)

The Biological Sciences department offers the following graduate degree program:

Master of Science - Biological Sciences (p. 977)

Admission Requirements

In addition to fulfilling admission requirements set by the Graduate School, applicants must also:

1. Have taken the general GRE exam and TOEFL when applicable
2. Have a Biology degree or related course work
3. Have at least one of either an advanced (upper division): biochemistry, cell biology, ecology, evolution, genetics, molecular biology or physiology course
4. Have a minimum cumulative GPA of 3.0 as well as in the major area of concentration

Applicants demonstrating potential for graduate study in the biological sciences, but having some deficiencies in their previous academic work, may be admitted on a conditional basis. See the Biological Sciences (<http://www.uah.edu/science/departments/biology/>) web page for application information.

Program Objective

Faculty members of the Master of Science (M.S.) Graduate Program in the Department of Biological Sciences seek outstanding students to train, mentor, and assist in reaching their full potential as scientists and future leaders in science and society. Graduates have enjoyed exciting and fulfilling careers in academia and industry, including both government and the private sector. The M.S. Graduate Program in Biological Sciences offers three plans of study with emphases in cell biology, genetics, genomics, molecular biology, microbiology, physiology, ecology, and evolutionary biology. Graduate research and coursework are tailored to each individual student. Formal coursework involves traditional lectures, laboratories, discussions, seminars, and field studies. Graduate students also have access to several additional courses in other departments and at Alabama A & M University to further develop skill sets that complement their research and career interests.

Learning Outcomes

Students will demonstrate their ability to:

- Utilize the scientific method to resolve biological problems
- Write a scholarly document
- Prepare and deliver an effective oral scientific presentation

Master's Program in Biological Sciences

- Biological Sciences, MS (p. 977)

BYS 505 - PSYCHOPHARMACOLOGY

Semester Hours: 3

Introduction to drug classification and action with emphasis on physiological and psychological interactions. Same as PY 505.

BYS 519 - GENE STRUCTURE & FUNCTION

Semester Hours: 3

Advanced studies of macromolecular structure and biological function of proteins and nucleic acids involved in the passage of genetic information and cellular response. Structural significance of viruses and molecular evolution included.

BYS 523 - PRINCIPLES OF VIROLOGY/A&M

Semester Hours: 3

Course offered jointly by Alabama A&M University and UAH but which is taught on the A&M campus. Principles of viral infectivity, multiplication, and chemical constitution; laboratory techniques for their isolation, cultivation, identification, and enumeration.

BYS 524 - MYCOLOGY/A&M

Semester Hours: 3

Course offered jointly by Alabama A&M University and UAH but which is taught on the A&M campus. Lines of phycomycetes using representative species; various series of actinomycetes; representative pathogenic (crop and vegetative pathogens) and nonpathogenic heterobasidiomycetideae organisms; order and families of homobasidiomycetidae. Ontogenetics, cellular, and structural study applied to all divisions, classes, series, orders and families.

BYS 526 - MICROBIAL ECOLOGY

Semester Hours: 4

Course offered jointly by Alabama A&M University and UAH but which is taught on the A&M campus. Relationship of soil and aquatic microorganisms and their importance in ammonification, nitrification, and other biological processes.

BYS 529 - BIostatISTICS/AL A&M

Semester Hours: 4

BYS 530 - APP. OF GEostatISTICS/AL A&M

Semester Hours: 4

BYS 531 - BIOLOGICAL DATA SKILLS

Semester Hours: 3

This course covers a range of computational skills needed specifically for biologists who do not have any training in computer science. The course focuses on command line tools, basic programming in Python, and various aspects of data handling including, data curation, organization, storage, querying, and archiving. The course will include a project that ties together skills that are useful for individual students.

BYS 532 - MEDICAL PHYSIOLOGY

Semester Hours: 4

Detailed study of physiology, covering membrane transport, muscle, nerve, heart, lung, gastrointestinal and renal function. Emphasis will be on homeostasis, genetic disease and pharmacological therapy.

BYS 532L - LABORATORY

Semester Hours: 0

BYS 534 - MEDICAL PHYSIOLOGY II

Semester Hours: 3

Course offered jointly by Alabama A&M University and UAH but which is taught on the A&M campus. Continuation of mammalian physiology with consideration of kidney function, respiratory, digestive, reproductive, and endocrine systems.

BYS 535 - ADVANCED MICROBIOLOGY

Semester Hours: 3

Aspects of microbial behavior, development, morphogenesis or physiology.

BYS 537 - PSYCHOBIOLOGY STRESS & ILLNESS

Semester Hours: 3

Overview of physiological stress responses and their influence on health, behavior, and illness. Same as PY 536.

BYS 542 - NUTRITIONAL PHYSIOLOGY

Semester Hours: 3

Course offered jointly by Alabama A&M University and UAH but which is taught on the A&M campus. Advanced laboratory dealing with modern techniques of molecular biology and biochemistry.

BYS 543 - MOLECULAR BIOLOGY OF THE CELL

Semester Hours: 3

Advanced study of cell structure and function of macromolecules (lipids, proteins, carbohydrates and nucleotides). In depth literature readings on subcellular organelles, metabolic pathways, cell cycle, cancer, and cell differentiation.

BYS 547 - BIOCHEMISTRY I

Semester Hours: 3

Structural chemistry and function of biomolecules, mechanisms of biochemical reactions, and enzyme kinetics. Same as: CH 561.

BYS 548 - BIOCHEMISTRY II

Semester Hours: 3

Energy transduction, metabolism, biosynthesis of macromolecular precursors, storage, transmission, and expression of genetic information. Same as CH 562. Prerequisites: BYS 547 or CH 561.

BYS 556 - ADV MOLECULAR TECHNIQUES

Semester Hours: 3

Laboratory techniques in molecular biology including current methodology in genomics, proteomics and RNA analysis. Prerequisites: BYS 519 with concurrency.

BYS 560 - ENVIRONMENTAL BIOLOGY/A&M

Semester Hours: 3

Course offered jointly by Alabama A&M University and UAH but which is taught on the A&M campus. Principles of interaction between living systems and their resources. Current problems in management of natural resources including new approaches in management of pest populations.

BYS 561 - HERPETOLOGY

Semester Hours: 4

Classification, diversity, anatomy function, ecology, behavior, and evolution of amphibians and reptiles. Laboratory and field trips devoted to anatomy and identification, with an emphasis on Alabama and southeastern U.S. species.

BYS 562 - COMMUNITY ECOLOGY

Semester Hours: 4

Detailed consideration of ecological principles and concepts, as well as biotic and abiotic factors relevant to development of communities and ecosystems. Field trips required.

BYS 563 - POPULATION ECOLOGY

Semester Hours: 4

Distribution, population dynamics and behavior of populations in relation to environmental factors. Field trips required.

BYS 564 - LIMNOLOGY

Semester Hours: 3

Fresh-water environments and organisms exemplified by lakes, ponds, and streams in North Alabama.

BYS 601 - BIOINFORMATICS I

Semester Hours: 3

Practical use in Bioinformatics and X-ray crystallography.

BYS 602 - BIOINFORMATICS II

Semester Hours: 3

Practical use in Bioinformatics and applied Genomics.

BYS 619 - MICROBIAL GENETICS

Semester Hours: 3

Transmission, expression, and evolution of genes in microorganisms. Studies of chromosomes, plasmids, transposons, bacteriophages and other genetic elements.

BYS 630 - IMMUNOLOGY

Semester Hours: 4

Innate, humoral and cell-mediated immunity. Immune deficiencies and hyper sensitivities. Autoimmunity, transplantation and tumor immunology.

BYS 631 - MEDICAL PHARMACOLOGY/A&M

Semester Hours: 3

Course offered jointly by Alabama A&M University and UAH but which is taught on the A&M campus. Drug-receptor interaction, kinetics of drug absorption, distribution and elimination, and discussion of drugs affecting different systems. Pharmacogenetics, toxicity, mutagenesis, teratogenesis, carcinogenesis, and drug interactions. Mechanism of action of drugs, in relation to their use as therapeutic agents in medicine.

BYS 690 - SEMINAR

Semester Hour: 1

Student reports on current journal articles, research, or assigned readings. Graduate students should attend whether enrolled for credit or not. May be taken up to three times for credit.

BYS 691 - SPECIAL TOPICS

Semester Hours: 1-4

Directed readings and/or written reports on topics of individual student interest carried out under the supervision of an instructor. Prerequisite: permission of instructor required before registration.

BYS 692 - RESEARCH

Semester Hours: 2-4

Individual investigations of biological problems under supervision of a graduate faculty member. Permission of instructor required before registration.

BYS 699 - MASTER'S THESIS

Semester Hours: 1-6

Required each semester student is working on and receiving direction on master's thesis. Minimum of six hours required for M.S. thesis students.

Biological Sciences, MS

Program Requirements

General requirements of the Graduate School under Plan I, Plan II, or Plan III must be satisfied.

Plan I – Master of Science with Thesis

Students will complete coursework (24 credit hours) and perform original research (a minimum of 6 thesis research credit hours) that will be described in their research thesis under the direction of a research advisor. There are no required courses in the Plan I track. The program of study (i.e., coursework) will be developed with your research advisor to meet your education and specific career goals. Students will prepare and defend a thesis proposal within their first year in the graduate program. Students will complete a written thesis then an open seminar followed by defense to their committee typically by the end of their second year in the graduate program.

Plan II – Master of Science without Thesis

Students will complete an approved program of coursework (minimum of 33 credit hours), complete a written proposal and write a Master's report under the direction of an advisor. There are no required courses in the Plan II track. The report is usually in the form of a literature review or survey about a topic agreed upon with the advisor. The presentation is not open to the UAH community, but presented only to a supervisory committee.

Plan III – Master of Science with Education (Two Programs Available)

1. **Traditional Program** - Students with existing Alabama Class B certification will complete an approved program of coursework without specialization in the Department of Biological Sciences (24 credit hours) and in the College of Education (12 credit hours), complete a written comprehensive final examination, and write and present a Master's report under the direction of an advisor. There are no required courses in this Plan III track. The report is usually in the form of a literature review or survey about a topic agreed upon with the advisor. The presentation is not open to the UAH community, but only presented to a supervisory committee. The written examination is comprehensive in nature with questions based on coursework taken in the graduate program. Graduates will be recommended for Alabama Class A teaching certification.

2. **Nontraditional Fifth Year Program** - Students with an accredited baccalaureate degree other than teacher education seeking initial certification (those that do not have a Class B – baccalaureate level teaching certification) will complete coursework in the Department of Biological Sciences (24 credit hours) and in the College of Education (27 hours, including an internship), complete a written comprehensive final examination, and write and present a Master's report under the direction of an advisor. There are no required courses in this Plan III track. The report is usually in the form of a literature review or survey about a topic agreed upon with the advisor. The presentation is not open to the UAH community, but only presented to a supervisory committee. The written examination is comprehensive in nature with questions based on coursework taken in the graduate program. Students will also be required to take a one-hour course, 'Introduction to Education,' prior to admission to the Teacher Education Program. Graduates will be recommended for Alabama Class A teaching certification.

Chemistry

203-C Materials Science Building

Telephone: 256.824.6153

Email: chem.admin (chem.admin@uah.edu)@uah.edu (%20jeffrey.champoux@uah.edu)

Chair: John Foster, Professor (<https://www.uah.edu/science/departments/chemistry/chemistry-faculty-staff/john-foster/>)

The Chemistry department offers the following graduate degree program:

Masters of Science - Chemistry (p. 981)

Admission Requirements

General requirements of the Graduate School must be satisfied. In addition, students admitted to the graduate chemistry program are assumed to have training equivalent to the chemistry B.S. degree recommended by the American Chemical Society. The degree includes lecture and laboratory work in organic chemistry, physical chemistry, inorganic chemistry, analytical chemistry, biochemistry, polymer chemistry, and materials chemistry. Graduation from an undergraduate program not adhering to ACS standards does not preclude entrance into the UAH program. Students should realize, however, that if deficiencies exist, some additional undergraduate courses might be required. The time required to complete the M.S. degree may then be proportionately increased.

Program Objective

The Department of Chemistry is to provide high-quality education in all aspects of chemistry. Graduates of the Master of Science program will present their work in well-respected journals with significant impact. Our second objective is to educate our students in chemistry to obtain either satisfactory employment or enrollment in a graduate or professional degree program.

Learning Outcomes

Students will demonstrate:

- Ability to effectively present chemical knowledge in writing
- Ability to deliver an effective oral presentation of their research
- An excellent understanding of the basic concepts, methods, terminology, and theories of modern chemistry related to their research interests

Master's Program in Chemistry

- Chemistry, MS (p. 981)

CH 500 - TOPICS IN CHEMISTRY

Semester Hours: 1-3

Advanced laboratory research in one of the departmental research groups. The student works on an independent or group research project. Completion of the course requires an appropriate written and oral report. Prerequisites: Approval of instructor.

CH 521 - CHEMICAL INSTRUMENTATION

Semester Hours: 4

Use of basic instrumentation in NMR, mass spectrometric, chromatographic, and spectrophotometric analysis.

CH 540 - POLYMER SYNTHESIS & CHARACTERIZATION

Semester Hours: 3

Same as MTS 649.

CH 549 - SPECTROSCOPY & MOLEC STR

Semester Hours: 3

Intermediate level treatment of principles of spectroscopy and their application to determination of molecular structure.

CH 553 - INTRO QUANTUM MECH I

Semester Hours: 3

Waves and particles; Bohr's model; de Broglie waves, wave-packets, uncertainty principle; quantum mechanics postulates; Schroedinger equation; systems in 1, 2 & 3 dimensions; hydrogen atom. Same as PH 551, OSE 555, and MTS 651.

CH 554 - INTRO QUANTUM MECH II

Semester Hours: 3

Angular momentum and spin; atomic structure and spectrum; time-independent perturbation theory, variational methods; time-dependent perturbation theory and interactions of light with matter; scattering theory; electronic structure of solids; relativistic quantum mechanics. Same as: PH 552, MTS 652. Prerequisite: PH 551 or CH 553.

CH 561 - BIOCHEMISTRY I

Semester Hours: 3

Structural chemistry and function of biomolecules, mechanisms of biochemical reactions, enzyme kinetics, and energy transfer. Same as: BYS 547.

CH 562 - BIOCHEMISTRY II

Semester Hours: 3

Metabolism, biosynthesis of macromolecular precursors, storage, transmission, and expression of genetic information, and molecular physiology. Same as BYS 548. Prerequisites: CH 561 or BYS 547.

CH 600 - ADV INORGANIC CHEMISTRY

Semester Hours: 3

Survey with emphasis on structure and reactivity of inorganic compounds.

CH 602 - CHEM COORD COMPOUNDS

Semester Hours: 3

Modern bonding theory and stereo chemistry of coordination compounds.

CH 621 - METHODS OF CHEMICAL ANALYSIS

Semester Hours: 3

Literature, seminar course. Theory and methodology of various techniques of chemical analysis.

CH 631 - SYNTHETIC ORGANIC CHEMISTRY

Semester Hours: 3

Survey of certain reactions that enjoy widespread application to the synthesis of organic compounds.

CH 632 - PHYSICAL ORGANIC CHEMISTRY

Semester Hours: 3

Reactive intermediates, structure-activity relationships, reaction mechanisms and techniques used to determine them.

CH 633 - ORGANIC STRUCTURE DETERMINAT'N

Semester Hours: 3

Structure determination of organic molecules using spectroscopic methods, especially NMR, IR, and MS. Emphasis on the theory and interpretation of many NMR methods useful in chemistry research.

CH 634 - MOLECULAR MODELING

Semester Hours: 4

Molecular modeling methods, including molecular mechanics, molecular docking, molecular orbital theory, and density functional theory, will be used to investigate conformational properties of organic compounds, molecular interactions between biological macromolecules and organic ligands, electronic structure of organic and inorganic compounds, frontier molecular orbitals, pericyclic reactions, and reactive intermediates. Extensive computational laboratory work included.

CH 635 - CHEMICAL TOXICOLOGY

Semester Hours: 3

An introduction to the principles of chemical toxicology, including the effects of drugs, environmental pollutants, natural toxins and venoms and other potentially hazardous chemicals at the physiological, cellular, and molecular level.

CH 640 - ADV CHEMICAL THERMODYNAMICS

Semester Hours: 3

First, second, and third laws of thermodynamics. Thermodynamic functions. Applications to thermal properties of gases, liquids, solids, and solutions. Chemical reactions, phase transitions, and electrochemistry.

CH 641 - STATIST THERMODYNAMICS

Semester Hours: 3

Principles leading to the development of Maxwell-Boltzmann, Bose-Einstein, and Fermi-Dirac statistics. Thermodynamic properties calculated from partition functions.

CH 642 - ADV CHEMICAL DYNAMICS

Semester Hours: 3

Non-equilibrium thermodynamics, macroscopic and microscopic theories of diffusion, chemical reaction rate laws and mechanisms, transition state theory, gas phase molecular dynamics, electrical conduction in electrolyte solutions, electrode kinetics. Prerequisite: CH 640.

CH 643 - QUANTUM CHEMISTRY

Semester Hours: 3

Application of quantum theory to the chemical bond.

CH 644 - CHEM ELECTRODYNAMICS

Semester Hours: 3

Maxwell's equations applied to electrodynamic problems in chemistry. Theory of dielectrics, dipole moments, Beer's law, Landolt's rule, light scattering, magnetic properties, quantum theory of radiation.

CH 645 - POLYMER PHYSICAL CHEMISTRY

Semester Hours: 3

Introduction to structure, properties and processing of polymers. Physical behavior of polymers, structure-property relationships, polymer characterization, thermodynamics of polymer solutions and melts, mechanical evaluation of polymers. Same as MTS 747. Prerequisite: CH 540.

CH 646 - THERMODYNAMICS OF MATRLS

Semester Hours: 3

Fundamental thermodynamic review, phase equilibrium, chemical reaction equilibrium, free energy, binary and ternary phase transformations, solution models and selected topics. Same as CHE 646 and MTS 646.

CH 647 - ADV BIOPHYSICAL CHEMISTRY I

Semester Hours: 3

Topics include: computer data analysis & simulation, first & second laws of thermodynamics, free energy & equilibrium, calorimetry, protein stability, binding & interactions, solution thermodynamics, electrolytes. Students who have completed CH 347 cannot earn credit for CH 647.

CH 648 - ADV BIOPHYSICAL CHEMISTRY II

Semester Hours: 3

Advanced biophysical chemistry, including biochemical reaction kinetics, enzyme catalysis, quantum mechanics, statistical thermodynamics, spectroscopy, including UV-VIS, fluorescence, circular dichroism, NMR, and Structure determinations. An emphasis is placed on the current research literature. Prerequisite: CH 647 Students who have completed CH 348 cannot earn credit for CH 648.

CH 650 - PRINC LIQUID/SOLID INTER

Semester Hours: 3

Applies principles in thermodynamics & kinetics to characterize surfaces & surface phenomena. Fundamental properties of gas-liquid, liquid-liquid, solid-liquid and solid-gas interfaces and phenomena at these interfaces. Same as MTS 650 and CHE 650.

CH 699 - MASTER'S THESIS

Semester Hours: 3-6

Required each semester a student is enrolled and receiving direction on a masters thesis. Minimum of two terms is required. (A maximum of six hours may be applied towards the degree).

CH 700 - CURRENT TOPICS IN CHEMISTRY

Semester Hours: 1-3

Advanced laboratory research in one of the departmental research groups. The student works on an independent or group research project. Completion of the course requires a written and an oral report. Prerequisite: approval of instructor.

CH 705 - SEL TOP IN INORGANIC CHEM

Semester Hours: 3

Prerequisites: CH 600 and approval of instructor.

CH 721 - SP TOP IN ANALYTICAL CHEMISTRY

Semester Hours: 3

Prerequisites: CH 621 and approval of instructor.

CH 735 - SEL TOP IN ORGANIC CHEM

Semester Hours: 3

Prerequisites: CH 632 and approval of instructor.

CH 745 - SEL TOP IN PHYSICAL CHEM

Semester Hours: 3

CH 746 - SOLID STATE CHEMISTRY

Semester Hours: 3

Chemical properties of solids. Includes phase equilibria, chemical bonding in ionic and covalent crystals, thermodynamics of atomic defects, ionic conductivity in solids, corrosion, & introduction to surfaces and adsorption.

CH 765 - SEL TOPICS IN BIOCHEM

Semester Hours: 3

Prerequisites: CH 560 and approval of instructor.

CH 780 - CHEMISTRY SEMINAR

Semester Hour: 1

Required during each semester of residence.

CH 799 - DOCTORAL DISSERTATION

Semester Hours: 3-9

Chemistry, MS

General requirements of the Graduate School under Plan I or Plan II must be satisfied.

Plan I – Master of Science with Thesis

Up to 12 semester hours of the course requirements may be accepted as transfer credits from graduate work done in other Chemistry programs.

Code	Title	Semester Hours
Fields		
Select one course from each of the following fields:		12
Analytical:		
CH 521	CHEMICAL INSTRUMENTATION	
CH 549	SPECTROSCOPY & MOLEC STR	
CH 621	METHODS OF CHEMICAL ANALYSIS	
CH 633	ORGANIC STRUCTURE DETERMINAT'N ¹	
Inorganic:		
CH 600	ADV INORGANIC CHEMISTRY	
Organic:		
CH 631	SYNTHETIC ORGANIC CHEMISTRY	
CH 632	PHYSICAL ORGANIC CHEMISTRY	
CH 633	ORGANIC STRUCTURE DETERMINAT'N ¹	
CH 634	MOLECULAR MODELING	
Physical Chemistry:		
CH 640	ADV CHEMICAL THERMODYNAMICS	
CH 641	STATIST THERMODYNAMICS	
CH 642	ADV CHEMICAL DYNAMICS	

CH 643	QUANTUM CHEMISTRY	
CH 646	THERMODYNAMICS OF MATRLS	
CH 647	ADV BIOPHYSICAL CHEMISTRY I	
CH 648	ADV BIOPHYSICAL CHEMISTRY II	
Select one course from one of the following fields:		3
Biochemistry:		
CH 561	BIOCHEMISTRY I	
CH 562	BIOCHEMISTRY II	
Polymer:		
CH 540	POLYMER SYNTHESIS & CHARACTERI	
CH 645	POLYMER PHYSICAL CHEMISTRY	
Select one course from your field of study		3
Select two additional courses of choice		6
Total Semester Hours		24

¹ CH 633 can only be applied to one area: Organic or Analytical Chemistry

Plan II – Master of Science without Thesis

Graduate students entering Plan II must qualify by meeting one of the following preliminary examination requirements:

- Passing ACS exams in biochemistry, inorganic chemistry, organic chemistry or physical chemistry.
- Having previously passed at least two sections of the Materials Science Program Exam I.
- Having previously passed the Biotechnology Science and Engineering Preliminary Exam.

Code	Title	Semester Hours
Fields		
Select one course from each of the following fields:		12
Analytical:		
CH 521	CHEMICAL INSTRUMENTATION	
CH 549	SPECTROSCOPY & MOLEC STR	
CH 621	METHODS OF CHEMICAL ANALYSIS	
CH 633	ORGANIC STRUCTURE DETERMINAT'N ¹	
Inorganic:		
CH 600	ADV INORGANIC CHEMISTRY	
Organic:		
CH 631	SYNTHETIC ORGANIC CHEMISTRY	
CH 632	PHYSICAL ORGANIC CHEMISTRY	
CH 633	ORGANIC STRUCTURE DETERMINAT'N ¹	
CH 634	MOLECULAR MODELING	
Physical Chemistry:		
CH 640	ADV CHEMICAL THERMODYNAMICS	
CH 641	STATIST THERMODYNAMICS	
CH 642	ADV CHEMICAL DYNAMICS	
CH 643	QUANTUM CHEMISTRY	
CH 646	THERMODYNAMICS OF MATRLS	
CH 647	ADV BIOPHYSICAL CHEMISTRY I	
CH 648	ADV BIOPHYSICAL CHEMISTRY II	
Select one course from one of the following fields:		3
Biochemistry:		
CH 561	BIOCHEMISTRY I	
CH 562	BIOCHEMISTRY II	
Polymer:		

CH 540	POLYMER SYNTHESIS & CHARACTERI	
CH 645	POLYMER PHYSICAL CHEMISTRY	
Select at least 18 semester hours in graduate coursework in chemistry or related fields		18
Total Semester Hours		33

¹ CH 633 can only be applied to one area: Organic or Analytical Chemistry

At least 18 semester hours out of the 33 total semester hours must be in Chemistry.

Plan II requires a program of study drawn up by the student and the Chemistry M.S. degree program advisor. Students must also complete two credit hours of CH 780. Plan II is not recommended for students seeking employment as industrial laboratory chemists because it does not require any experimental work.

Non-Traditional Fifth-Year Program Leading to the M.S. in Chemistry Plus a Class A Alabama High School Teacher's Certificate

Those who have a B.A. or B.S. degree with a major or its equivalent in Chemistry as determined by the Department of Chemistry, who have not taken more than twelve semester hours in teacher education (graduate or undergraduate), and who are interested in obtaining Class A (master's level) certification for secondary school teaching, should consider the Non-Traditional Fifth-Year Program. Contact the College of Education for preliminary advisement on admission and general program requirements. See the description in the Education section for more details.

Computer Science

N300 Olin B King Technology Hall

Telephone: 256.824.6088

Email: info@cs.uah.edu

Chair: Dr. Heggere S. Ranganath, Professor (<https://www.uah.edu/science/departments/computer-science/faculty-staff/heggere-ranganath/>)

The Computer Science department offers the following graduate degree programs:

- Master of Science in Computer Science (p. 991)
- Master of Science in Software Engineering (p. 992) (interdisciplinary)
- Master of Science in Cybersecurity (interdisciplinary) (p. 935)
- Ph.D. in Computer Science (p. 990)

The Computer Science department offers the following graduate certificates:

- Modeling and Simulation (<http://catalog.uah.edu/grad/colleges-departments/science/computer-science/modeling-simulation-certificate/>)
- Software Engineering (<http://catalog.uah.edu/grad/colleges-departments/science/computer-science/software-engineering-certificate/>)

Learning Outcomes

- Graduates will have advanced knowledge of computer systems.
- Graduates will be proficient in the development and usage of software systems and tools.
- Graduates are able to develop solutions based on advanced algorithmic principles.

General Requirements

Prospective students should apply well in advance (at least eight weeks for US residents and six months for international students) of the date of proposed entrance.

All applicants for graduate programs in Computer Science must apply through the Graduate School. Visit the Graduate School for more information. All applicants are also subject to the additional requirements below.

Admission Requirements

Requirements for admission to the computer science graduate degree program are in addition to those of the School of Graduate Studies. Scores from the GRE basic test are required for admission to the program. Transcripts will be reviewed and deficiencies in computer science background may result in the need to take one or more broadening courses. The MAT or GMAT is not an acceptable substitute for the GRE.

Requirements for admission to a graduate certificate program are the same as requirements for admission to the Computer Science M.S. program. Students must also satisfy the breadth requirements described below. Students in a certificate program are required to maintain a 3.0 GPA.

Students applying for the master's program are expected to have an undergraduate background in Computer Science. Those students who do not have such a background must satisfy the breadth requirements described below. In particular, students in the MS in Computer Science program who have not had an undergraduate course in programming languages must take CS 424 or CS 524.

The admission policies for the Ph.D. program in computer science follow the general policies of the School of Graduate Studies and Computer Science Department as described above. An applicant's admission request will be reviewed in light of preparatory coursework, GRE scores, any supporting information, and general expectation of completing the degree. Students requiring a large amount of prerequisite coursework will not normally be admitted to the program until the courses have been completed. Graduate admission requests for the Ph.D. program will be reviewed once per semester by a departmental admissions committee. Applicants are required to submit supporting recommendation letters and an indication of research interests and study plans. Specific requirements are available from the Computer Science Department office. Requests for admission will be evaluated according to the following guidelines.

Unconditional Admission

Students applying to the M.S. program will be given unconditional admission if they meet all the requirements of the School of Graduate Studies and of the Computer Science Department including the breadth requirements listed below.

Unconditional admission to the Ph.D. program will be given to applicants who meet all of the requirements of the School of Graduate Studies and Computer Science Department. Students showing exceptional promise who desire to pursue the Ph.D. full-time may be admitted to the program after completing a bachelor's degree in Computer Science.

Conditional Admission

Conditional admission will be recommended for applicants who do not meet all of the requirements of the School of Graduate Studies and the Computer Science Department, but show high potential for completing the degree requirements.

Breadth Requirements

The breadth requirements can be satisfied in one of the following ways:

- Completion of the course at UAH with a grade of B or better;
- Completion of an equivalent course at another institution with a grade of B or better;
- Testing out of the course, where permitted by departmental policy

Applicants to graduate programs in Computer Science must satisfy the following breadth requirements before admission to the program:

Code	Title	Semester Hours
Mathematics		
MA 171	CALCULUS A	4
MA 172	CALCULUS B	4
MA 244	INTRO TO LINEAR ALGEBRA	3
MA 385	INTRO TO PROBABILITY & STATIST	3
Computer Science		
CS 121	COMPUTER SCIENCE I *	3
CS 214	INTRO DISCRETE STRUCTURE	3
CS 221	COMP SCI II: DATA STRUCTURES *	3
CS 309	COMPUTER ORG & SWTCHNG THRY	3
CS 317	INTRO DESIGN/ANALYSIS OF ALG	3
CS 321	INTRO OBJECT-ORIENTED PROG JAV *	3
CS 413	INTRO DIGITAL COMP ARCHITECTUR	3
CS 490	INTRO TO OPERATING SYSTEMS	3
Total Semester Hours		38

* An introductory sequence covering Object-Oriented Programming and Data Structures in C/C++/Java.

Master's Programs in Computer Science

- Computer Science, MS (p. 991)
- Computer Science, MSSE (p. 992)
- Computer Science, MSCBS (p. 935)

Doctoral Program in Computer Science

- Computer Science, PhD (p. 990)

Certificates in Computer Science

- Modeling and Simulation Certificate (<http://catalog.uah.edu/grad/colleges-departments/science/computer-science/modeling-simulation-certificate/>)
- Software Engineering Certificate (<http://catalog.uah.edu/grad/colleges-departments/science/computer-science/software-engineering-certificate/>)

CS 513 - INTRO TO COMP ARCHITECT

Semester Hours: 3

Combinational and sequential logic design, register transfer concepts, logic design of memory, arithmetic units, control units, and I/O system of simple computers. Machine and Assembly Language Programming. Architectural Tradeoffs. Same as CS 309 plus CS 413. No credit for CS graduate students. Prerequisites: (CS 221 or CPE 212 or CS 517) and (MA 113 or MA 115).

CS 517 - DATA ORG ANALYSIS OF ALGORIT

Semester Hours: 3

Basic data structures: stacks, queues, lists, etc. Algorithm complexity analysis. Basic algorithm techniques: divide & conquer, dynamic programming, backtracking. Classification of problems: tractable, NP, intractable, unsolvable. Same as CS 221 plus CS 317. No credit for CS graduate students. Prerequisites: (CS 121 or CPE 211) and (MA 113 or MA 115).

CS 524 - PRINCIPLES PROGRAMMING LANG

Semester Hours: 3

Comparison of principles and paradigms of modern programming languages. How different programming languages implement lexical, syntax, and semantic analysis, including the design of compilers. Formal grammars, BNF notation, parse trees, abstract data types. No credit for student who have taken CS 424. Prerequisite: CS 317 or CS 517.

CS 526 - PROG TRANS & COMPILER CONSTR

Semester Hours: 3

Language representation; grammar classification; lexical analysis technique and tools; parsing technique and tools; compile-time and run-time symbol table design; code generation and optimization; error diagnostics. Compiler writing tools. Prerequisite: CS 317 or CS 517; (CS 424 or CS 524 and CS 403 recommended).

CS 530 - SURVEY ARTIFICIAL INTELLIGENCE

Semester Hours: 3

Survey of Artificial Intelligence (AI). AI crosses many disciplines, to make computational systems behave intelligently. This course provides a broad intro of AI sub-domains, including search, knowledge representation, reasoning, & machine learning. No credit for students who have taken CS 430. Prerequisite: CS 317 or CS 517; (CS 424 or CS 524 recommended).

CS 537 - INTRO TO NEURAL NETWORKS

Semester Hours: 3

Introduction to artificial neural networks, covering the most prominent models. Neural networks solutions to classification, clustering, data compression, and constrained optimization applications. Experience with neural networks through projects. Prerequisites: (CS 317 or CS 517) and MA 244.

CS 543 - INTRO TO MULTIMEDIA SYSTEMS

Semester Hours: 3

Multimedia authoring, color models for image and video, introduction to image and video compression, digital audio, multimedia networks, multimedia synchronization, multimedia retrieval. Students may not receive credit for both CS 443 and CS 543. Prerequisite: CS 317 or CS 517; (CS 490 recommended).

CS 545 - INTRO COMPUTER GRAPHICS

Semester Hours: 3

Introduces underlying theory and mechanics of interactive computer graphics. Basic modeling, rasterization, 2D/3D transformations, and viewing. 3D graphics rudiments. Some hardware and historical perspectives. Many programs. No credit for students who have taken CS 445 Prerequisites: (CS 221 or CS 517) and MA 244.

CS 546 - ADVANCED COMPUTER GRAPHICS

Semester Hours: 3

High resolution 3D graphics, including advanced topics in viewing, vertex processing, fragment processing, local and global illumination and shading, 3D modeling (including curve and surface representation), texture mapping, and some coverage of solid modeling and color theory. Game production pipeline. Hierarchical issues, visibility, and 3D processing algorithms may also be covered. A significant number of programming projects are involved, with some different program requirements and additional theoretical expectations for CS 546 students. (Same as CS 456; no credit for both).

Prerequisite: CS 445 or CS 545.

CS 547 - GAME ENGINES & LEVEL DEV

Semester Hours: 3

(Same as CS 447) This course provides the opportunity for students to produce fully functional games from beginning to end with team members. Along the way, students work on homework/projects involving design document creation, prototyping and gameplay/implementation. Also, game software as artistic content has led to collaborations between engineers and artists. In this course, students focus on not only game engineering development but also art asset generation and management. Considers a 3D game design and development using game engines focusing on the fundamental components for developing cross-platform games. The course focus includes design, development, and distribution of computer games. Emphasis also is on user interface and menus, scripting for game programming, game physics, terrain generation, asset management, animation management, special effects, and cross platform game development. Students may not receive credit for both CS 447 and CS 547. Prerequisites: CS 330 and (CS 445 or CS 545).

CS 548 - HUMAN-COMPUTER INTERACTION

Semester Hours: 3

Introduces underlying theory and mechanics of interactive computer graphics. Basic modeling, rasterization, 2D/3D transformations, and viewing. 3D graphics rudiments. Some hardware and historical perspectives. Many programs. Introduction to human-computer interaction and principles of graphical user interface design. Includes examination of interactive environments including windowing systems development tools, multimedia, and visual programming interfaces. Prerequisite: CS 445 or CS 545.

CS 553 - CLIENT/SERVER ARCHITECTURES

Semester Hours: 3

Client/server distributed computing. Web based applications. Students will practice concepts in programs involving leading edge technologies such as AJAX, RESTful and WS-* web services, Enterprise Java Beans, .NET. No credit for students who have taken CS 453 Prerequisite: (CS 307 or CS 321) (CS 370 recommended).

CS 554 - INTRO TO CLOUD COMPUTING

Semester Hours: 3

Different cloud computing paradigms: IaaS, SaaS, PaaS. Open Source cloud software (for ex., OpenStack, CloudStack). RESTful interfaces, AWS interface. Cloud security. Students may not receive credit for both CS 454 and CS 554. Prerequisites: (CS 307 or CS 321) (CS 370 recommended) (CS 390 or CS 590 recommended).

CS 565 - NETWORK SECURITY

Semester Hours: 3

Fundamentals of network security and cryptography. Examines security at different network layers. Wireless security. Firewalls. Intrusion detection and penetration analysis. Students may not receive credit for both 465 and 565. Prerequisites: CS 221 or CPE 212.

CS 571 - MOBILE COMPUTING SFTWR ARC&DEV

Semester Hours: 3

Considers application design for the mobile space, focusing on the fundamental requirements for mobile applications that target mobile devices. The course focus includes development, testing, distribution of mobile applications in a cross-platform environment. Emphasis also is on multimedia and entertainment computing and games. This course will also cover various issues in mobile computing from the readings from research literature such as software engineering practices, analysis of social media and general mobile analytics. Prerequisites: CS 221 or CPE 212.

CS 580 - MOBILE DIGITAL FORENSICS

Semester Hours: 3

This course examines digital forensics of mobile devices such as smart phones and tablets in a law enforcement context. Mobile device characteristics that make forensics examinations difficult are discussed. Various forensics tools are critically examined with an eye toward improved tool development. Prerequisites: CS 413 or CS 513 or CPE 323.

CS 581 - MODELING & SIMULATION I

Semester Hours: 3

Discrete event simulation from a computer science perspective. Mathematics of probability distributions applied to simulation. Design, implementation, and application of discrete event simulation software. Application to computer and network system design. Prerequisites: CS 221 and either MA 385 or MA 585 OR ISE 390 or ISE 690.

CS 582 - MODELING & SIMULATION II

Semester Hours: 3

Advanced modeling methods, including Monte Carlo simulation, agent-based modeling, and mathematical modeling, from a Computer Science perspective. Emphasis on implementation, execution, and validation of working computer models using different modeling methods. Prerequisites: CS 481 or CS 581.

CS 585 - INTRO TO COMPUTER SECURITY

Semester Hours: 3

This course examines the issues related to security policies, models and mechanisms applicable to providing security for computer-based systems including operating systems, database management systems, and networks. No credit for students who have taken CS 485 Prerequisites: CS 221 or CPE 212 or IS 310 AND either CS 470 or CS 570 or CPE 348 or IS 460 or IS 560.

CS 588 - INTRO TO BIG DATA COMPUTING

Semester Hours: 3

Provides big data concepts and characteristics; big data architectural concepts; big data ecosystem. Includes MapReduce framework and programming and coverage of big data applications. No credit for students who have taken CS 488 Prerequisites: CS 317 or CS 517.

CS 590 - PROGRAMMING ENVIRON W/UNIX

Semester Hours: 3

Strategies for design and development of systems and programs in the UNIX environment. Emphasis: automated tool and system development using UNIX tools. Advanced shell concepts including control flow and interrupt handling. Process and inter-process communication. Prerequisites: CS 221; (CS 390 recommended).

CS 595 - INDEPENDENT STUDY

Semester Hours: 3

Individual directed study under the supervision of an instructor. Must have approval of the instructor.

CS 596 - SPECIAL TOPICS

Semester Hours: 3

Individual directed study under the supervision of an instructor. Must have approval of the instructor.

CS 597 - SPECIAL TOPICS

Semester Hours: 3

Course offered by an instructor in a specialized area of computer science. Must have approval of instructor.

CS 598 - SPECIAL TOPICS

Semester Hours: 3

Course offered by an instructor in a specialized area of computer science. Must have approval of instructor.

CS 600 - INTERNSHIP IN COMPUTER SCIENCE

Semester Hour: 1

Work experience in Computer Science or a related field in a business or government agency; conducted under the direction of the agency supervisor and approved by a member of the CS faculty. A substantial report must be produced and approved by the supervisor and the faculty member.

CS 603 - FORMAL LANG/AUTOMAT THRY

Semester Hours: 3

Formal definition of programming languages. Formal grammars: regular, context-free, context sensitive, and phrase-structure. Automata: finite-state, pushdown, linear-bounded automata, Turing Machines. Relationship between formal languages and automata. Prerequisite: CS 617.

CS 613 - COMPUTER ARCHITECTURES

Semester Hours: 3

Organization, operation, and analysis of advanced computer architectures. Topics include advanced pipelining approaches, multi-processor architectures, instruction set architectures, memory hierarchy design, hardware and software-based performance optimization, and system performance measurement. Prerequisite: CS 513.

CS 617 - DES & ANALY OF ALGORITHM

Semester Hours: 3

Strategies of algorithm synthesis and analysis. Classical algorithm categories such as: divide-and-conquer, greedy method, dynamic programming, search and traversal. Computational complexity; theoretical results from lower- and upper-bound studies, NP-hard, and NP-complete problems.

Prerequisite: CS 517.

CS 630 - ARTIFICIAL INTELLIGENCE I

Semester Hours: 3

Comparing and evaluating different approaches to the architecture and development of intelligent systems. Computationally efficient solutions for intelligent systems. Prerequisite: CS 530.

CS 635 - COMPUTAT MODEL COGNITION

Semester Hours: 3

Computational models of human information processing covering topics of current interest to both artificial intelligence and cognitive psychology. Use of computer simulations to test psychological theories. Application of psychological research to building AI systems. Prerequisite: CS 630.

CS 637 - DEEP LEARNING

Semester Hours: 3

Deep learning, a branch of machine learning focuses on modern neural networks. Deep learning extracts layered data representations to maximize task performance. Requires advanced algorithm and programming knowledge and a strong mathematical background in calculus, linear algebra, and probability & statistics. Several programming projects. Prerequisites: CS 617.

CS 640 - MACHINE LEARNING

Semester Hours: 3

Discriminant analysis, maximum likelihood decisions, deterministic and nondeterministic approaches for trainable classifiers, preprocessing and feature extraction, clustering, syntactic pattern recognition. Pattern recognition in image analysis. Prerequisite: CS 617; (MA 544 and MA 585 recommended).

CS 641 - DATA MINING

Semester Hours: 3

Data preprocessing, distance measures, classification with decision trees, Bayesian classifiers, neural networks, support vector machines, frequent item set analysis, association rule generation, clustering methods. Prerequisite: CS 617 (MA 544 and MA 585 recommended).

CS 642 - COMP PROC/DIGITAL IMAGES

Semester Hours: 3

Introduction to image processing systems; sensing, sampling and quantization; image transforms; image enhancement and restoration; image segmentation, and description; image correlation; image sequence analysis; practical applications of image processing. Prerequisites: CS 617 (MA 544 and MA 585 recommended).

CS 643 - DATA COMPRESSION

Semester Hours: 3

Lossless and lossy compression algorithms, Huffman coding, Arithmetic coding, Dictionary-based compression, quantization techniques, differential encoding, transform coding, wavelet-based coding; image compression, video compression, audio compression, applications of compression algorithms to audio, image, and video compression standards. Prerequisite: CS 617.

CS 646 - COMPUTER GEOMETRY MODELING

Semester Hours: 3

Numerical and computer rep. of curves and surfaces. Solid geometry modeling. Geometric data management. Curve and surface design, incl. cubic-B-splines, esp. Bezier curves/surfaces. Interpolation methods. Graph-based and Boolean models. Apps. to robotics, graphics, CAD. Prerequisite: CS 545.

CS 650 - SOFT'W ENGINEERING PROC

Semester Hours: 3

The process of developing complex software products. Includes software life cycles, phases of development and disciplines such as CM, QA, V&V, and T&E. Issues of professionalism and the ethical use of computers. Background in algorithms and programming languages assumed. Prerequisite: CS 517.

CS 652 - OBJECT-ORIENTED DESIGN

Semester Hours: 3

A survey of formal and informal techniques and methodologies for software analysis, requirements, architecture and design. Emphasis is on effective development processes. Comparison of different approaches, considering their advantages and disadvantages. Prerequisite: CS 650.

CS 655 - FORMAL METHODS IN SOFTWARE ENG

Semester Hours: 3

Formal mechanisms to specify, validate, and verify software systems. Propositional and predicate calculi. Program verification through Dijkstra's weakest preconditions and Hoare's method. Formal specification via algebraic specifications and abstract model specifications. Prerequisites: CS 617 and CS 650.

CS 656 - SOFTWARE TESTING

Semester Hours: 3

Advanced software testing techniques, including white box, black box, integration testing, and system testing. Other topics may include test data adequacy, test data selection, and output oracle, including functional, structural, and fault-based testing methods. Prerequisite: CS 650.

CS 658 - SOFTWARE PROC & PROD IMPROVEMT

Semester Hours: 3

Software quality assurance as an umbrella activity. Use of process, project, quality and product metrics to gain insight into the software development activity. Use of metrics to drive incremental process improvement techniques. Examination of CASE tools and how they affect the software process. Prerequisite: CS 650.

CS 670 - COMPUTER NETWORKS

Semester Hours: 3

Detailed analysis of the organization and operation of computer networks, focusing on algorithms and organizations for the Transport Layer, Network Layer and Data Link Layer protocols of wired and wireless systems. Prerequisite: CS 513.

CS 685 - COMPUTER SECURITY

Semester Hours: 3

Advanced topics in security policies, models and mechanisms applicable to providing security for computer based systems, including operating systems, database management systems, and networks. Prerequisite: CS 617.

CS 686 - INFORMATION ASSURANCE

Semester Hours: 3

CS 687 - DATA BASE SYSTEMS

Semester Hours: 3

Basic concepts of database systems. Use of semantic models in database design. Data models with an major focus on the relational and object-oriented models. Relational query languages and normal forms. Database management system design issues. Security and integrity issues. Prerequisite: CS 617.

CS 690 - ADVANCED OPERATING SYSTEMS

Semester Hours: 3

Issues related to shared memory multiprocessors, multicore computers, clusters, grids and clouds. Concurrency and distributed process coordination. Introduction to network communication issues and systems such as client-server, peer-to-peer, transaction based. Prerequisite: CS 513.

CS 692 - CYBERSECURITY CAPSTONE

Semester Hours: 3

CS 695 - INDEPENDENT STUDY

Semester Hours: 3

Individual directed study under the supervision of an instructor. Must have instructor approval.

CS 696 - SELECTED TOPICS IN CS

Semester Hours: 3

Course offered by an instructor in a specialized area of computer science. Must have instructor approval.

CS 699 - MASTER'S THESIS

Semester Hours: 3-6

Course offered by an instructor in a specialized area of computer science. Must have instructor approval. Required each semester a student is working and receiving direction on master's thesis. Prerequisite: instructor approval.

CS 703 - THEORY OF PROG LANGUAGES

Semester Hours: 3

Syntactic analysis and semantic interpretation of programming languages based on research and results in formal languages and associated compiler techniques. Identification of research directions and potential research projects in programming languages. Prerequisite: CS 603.

CS 717 - ADV ALGORITHM DES/ANALYSIS

Semester Hours: 3

Parallel algorithms, combinatorial algorithms, approximation algorithms for NP-complete problems, computational complexity. Distribution of algorithms across complex architectures. Prerequisite: CS 617.

CS 742 - IMAGE PROC ALGO/ARCHITEC

Semester Hours: 3

Algorithms and data structures for image enhancement, segmentation, object recognition and image sequence analysis; real-time versus non real-time image processing; computer architectures for fast image processing; cellular logic array processors, distributed, systolic and binary array processors. Prerequisite: CS 613 and CS 642.

CS 790 - OPERATING SYSTEMS SEMINAR

Semester Hours: 3

Advanced research topics in operating system theory and practice. Students will read and discuss classic and current papers in the literature. Each student will present reports in class and prepare a substantial research paper. Prerequisite: CS 690.

CS 795 - INDEPENDENT STUDY

Semester Hours: 3

Individual directed study under the supervision of an instructor. Must have instructor approval.

CS 796 - ADVANCED SELECTED TOPICS

Semester Hours: 3

Course offered by an instructor in a specialized area of computer science. Must have instructor approval.

CS 799 - DOCTORAL DISSERTATION

Semester Hours: 3-9

Required each semester student is enrolled and receiving direction on doctoral dissertation. Maximum of 18 hours credit toward degree.

Computer Science, PhD

Degree Requirements and Restrictions

The general requirements for the Ph.D. degree comply with those of the School of Graduate School. The requirements include a preliminary examination, completion of coursework, a qualifying examination, completion of significant research documented in a dissertation and the dissertation defense.

Major/Minor Subjects

A minimum of 54 hours of graduate course credit plus a minimum of 18 dissertation credit hours is required for the Ph.D. in computer science. The program of study will be approved by the student's Supervisory Committee. Coursework grade requirements are the same as for the M.S. degree. Coursework taken as part of a graduate degree program at another institution may be applied to the degree with permission of the student's Supervisory Committee.

The program must include the below courses and must have a coherent area of emphasis, of which at least 6 semester hours must be at the 700 level. At least 9 semester hours of graduate level mathematics must also be included in the program.

Code	Title	Semester Hours
CS 524	PRINCIPLES PROGRAMMING LANG	3
CS 603	FORMAL LANG/AUTOMAT THRY	3
CS 613	COMPUTER ARCHITECTURES	3
CS 617	DES & ANALY OF ALGORITHM	3
CS 650	SOFT'W ENGINEERING PROC	3
CS 690	ADVANCED OPERATING SYSTEMS	3
Total Semester Hours		18

Additional Information

Preliminary Examination

Ph.D. students will be required to take a preliminary examination, consisting of (1) a written test covering fundamental concepts in Computer Science and (2) an evaluation by the graduate faculty of the student's overall academic potential.

The examination must be taken within a year after admission to the Ph.D. program, or at the earliest opportunity upon completion of the core coursework. Successful completion of the examination will provide evidence of the student's ability to continue in pursuit of the Ph.D. degree. The examination can be taken no more than twice.

Admission to Candidacy

To be admitted to candidacy for the Ph.D. degree, students must first pass the qualifying examination. The qualifying examination can cover any aspect of the student's program and is taken after completion of the student's coursework and upon recommendation of the student's supervisory committee. It is designed to test students' fitness for pursuing research projects in their chosen areas and to test their general knowledge of computer science. As part of the qualifying examination, each student will present a research proposal to the supervisory committee.

Residency Requirements

According to graduate school policy, residence may be established through either (i) being enrolled as a full-time student (at least 9 graduate semester hours) either for one continuous academic year, or for Spring and Fall semesters in the same calendar year, or (ii) being enrolled in at least 6 hours of graduate course work in at least three of four consecutive semesters.

Other Requirements for the PhD Degree

- The program must be completed within five years after admission to candidacy.
- The Qualifying Examination may be taken no more than twice.
- CS 799 is required each semester a student is receiving direction on the doctoral dissertation.

For additional requirements, consult the Academic Information (p. 829) Section of this Graduate Catalog.

Dissertation

A public defense of the dissertation is required. Three conference papers or one journal article related to the dissertation work must be published or accepted prior to scheduling the dissertation defense.

Computer Science, MS

Degree Requirements and Restrictions

The Master of Science degree is conferred under Plan I or Plan II.

Plan I

A minimum of 24 semester hours of coursework and the writing of an acceptable thesis is required. At least six hours of thesis credit (CS 699) must be earned. A student must present his/her thesis and pass an oral examination based on the thesis and related coursework. Plan I students must register for CS 699 each term they receive supervision from their advisor.

Plan II - Master of Science without Thesis

A minimum of 33 semester hours of coursework is required.

Course Requirements

The following requirements and restrictions apply to a student in either plan.

All MS students must take three core courses from the options below:

Code	Title	Semester Hours
CS 617	DES & ANALY OF ALGORITHM	3
CS 613	COMPUTER ARCHITECTURES	3
or CS 690	ADVANCED OPERATING SYSTEMS	
CS 650	SOFT'W ENGINEERING PROC	3
or CS 687	DATA BASE SYSTEMS	

If a student has not had an undergraduate course in programming languages, CS 524 must be included in the program of study. No more than 50% of the hours in the program of study may be 500-level courses. No more than three semester hours of selected topics or independent study courses may be included in a program of study. Exceptions must be recommended by the student's advisor and approved by the department chair. All courses taken as part of the MS in Computer Science will normally be Computer Science courses. Any courses outside the Computer Science department must be approved in advance by a Computer Science advisor. Historically, this has been the advisement practice in Computer Science. This is simply making sure that students are fully aware of the expectations of the Computer Science department, even before meeting with an advisor.

Computer Science, MSSE

Degree Requirements and Restrictions

The Master of Science in Software Engineering is an interdisciplinary program, joint between the Computer Science department and the Electrical and Computer Engineering department.

At least half of the hours must be completed in courses numbered 600 or above.

The Master of Science in Software Engineering is conferred under Plan I or Plan II.

Plan I (Thesis)

A minimum of 24 semester hours of coursework and the writing of an acceptable thesis is required. At least six hours of thesis credit (CS 699) must be earned. Thesis students substitute the two CS 699 courses for the Capstone Course and one elective. Total hours required is 30 hours.

A student must present his/her thesis and pass an oral examination based on the thesis and related coursework. Plan I students must register for CS 699 each term they receive supervision from their advisor.

Plan II (Non-Thesis)

A minimum of 30 semester hours of coursework is required.

Code	Title	Semester Hours
CS 617	DES & ANALY OF ALGORITHM	3
CS 650	SOFT'W ENGINEERING PROC	3
CS 652	OBJECT-ORIENTED DESIGN	3
Choose one of the following:		
CS 613	COMPUTER ARCHITECTURES	
or CS 690	ADVANCED OPERATING SYSTEMS	
or CPE 536	INTERNALS OF MODERN OPER SYS	
or CPE 631	ADV COMP SYSTEMS ARCHITECTURE	
Cybersecurity Requirement		3
Choose one of the following:		
CS 585	INTRO TO COMPUTER SECURITY	
or CPE 549	INTRO TO CYBERSECURITY ENGINRG	
Capstone		3
CPE 657		
Concentration Areas		6
Choose two courses within any one concentration:		
Big Data and Data Mining		
CS 554	INTRO TO CLOUD COMPUTING	
CS 641	DATA MINING	
CS 696	SELECTED TOPICS IN CS (ST: Data Visualization)	
CS 696	SELECTED TOPICS IN CS (Machine Learning (CS 640))	
CS 696	SELECTED TOPICS IN CS (Big Data Analytics)	
Project Management (ISE 690 is required as one of the two courses)		
ISE 690	STATISTICAL METHODS FOR ENGR	
EM 660	ENGR MGMT THEORY	
MGT 601	TECH & INNOVATION MGMT	
MKT 604	NEW PRODUCT DEVELOPMENT	

Parallel Programming	
CPE 512	INTRO PARALLEL PROGRAMMING
CPE 612	PARALLEL ALGORITHMS
CPE 613	GEN PURPOSE GPU COMPUTING
Embedded Systems	
CPE 538	REAL TIME & EMBEDDED SYSTEMS
CPE 523	HARDWARE/SOFTWARE CO-DESIGN
CPE 621	ADVANCED EMBEDDED SYSTEMS
Advanced Cybersecurity	
CPE 649	ADV CYBERSECURITY ENGINEERING
CPE 645	COMPUTER NETWORK SECURITY
IS 663	COMPUTER FORENSICS
Electives (Must be an approved CS or CPE course)	
Total Semester Hours	6
	30

Earth System Science

National Space Science and Technology Center
Room 4044
Telephone: 256.961.7877
Email: aes@uah.edu

Chair: Dr. John Mecikalski, Professor (<https://www.uah.edu/science/departments/atmospheric-science/faculty-staff/john-mecikalski/>)

The Atmospheric and Earth Science department offers the following graduate degree programs:

Master of Science - Earth Systems Science (p. 996)

Admission Requirements

Refer to the appropriate section of the Graduate Catalog for general admission and degree requirements. Students should have an appropriate foundation with at least two semesters of calculus, two semesters of physics, an introductory course in computer programming, and preferably chemistry before entering the program. Please consult the department for guidance.

Program Objective

The M.S. in Earth System Science program specifically enables students to gain not only an understanding of the physics of the climate system and the environment but also a working hands-on knowledge of how data and information is used to aid decision makers. Our graduates will be successful in writing or presenting a scientific research paper in a peer-reviewed scientific journal, book chapter, or at a national or international scientific conference or workshop. Our final objective is to produce graduates who successfully obtain professional employment in the Earth System Science field within one year of graduation.

Learning Outcomes

Students will demonstrate

- Knowledge of the reviewed literature in the earth system sciences that is relevant to their specific research
- Effective use of remotely sensed environmental data, image processing and GIS toward decision making or policy related applications in the earth system sciences
- Effective oral communication skills in reporting the results of their scientific research

Master's Program in Earth System Science

- Earth System Science, MS (p. 996)

ESS 501 - SURVEY ATMOSPHERIC SCIENCE

Semester Hours: 3

General survey of the field of atmospheric science includes thermodynamics, atmospheric dynamics, cloud physics, and atmospheric radiation. Quantitative examination of atmospheric properties including atmospheric composition, structure and dynamics.

ESS 502 - SCI & SOC ASPTS NATRL DISASTER

Semester Hours: 3

Examination of the physical causes of major natural geophysical hazards and their impact on the natural and built environment, society and the economy. Evaluation of the ability to forecast events, and develop sound mitigation and recovery measures. Specific case studies are considered.

ESS 507 - ENVRNMTL THRTS PBL PY DEC MKG

Semester Hours: 3

Researchers, policymakers and environmental campaigners have identified 25 potential future threats to the global environment. This course examines the nature and consequences of these threats and their potential impacts for the survival of the human race.

ESS 508 - PYTHON FOR ID ESS APPLICATIONS

Semester Hours: 3

Introduction to GIS model building, Python programming, and automation of scripts for ArcGIS. Techniques in Model Builder, Python, and the methods for automation will be taught using data from numerous available data sources across the internet with heavy emphasis on the Earth Sciences.

ESS 509 - SCI PROGRMNG FOR EARTH & ATMOS

Semester Hours: 3

Survey of data types and languages commonly used in the meteorological community along with practical application to meteorology. Course is designed to prepare students for graduate work and research in atmospheric science.

ESS 510 - OPERATIONAL WEATHER FORECAST'G

Semester Hours: 3

Operational Meteorology covers subjective and objective methods of atmospheric prognosis, including techniques for forecasting operationally-important weather elements. Course explores interpretation, use and systematic errors of computer-generated products, human factors within forecasting, and application of meteorological theory in an operational setting. Course instruction is accomplished through analysis of various weather events from beginning to completion.

ESS 514 - GEOSPATIAL APPLICATIONS

Semester Hours: 3

An introductory look at the ways in which GIS can be put to use in different fields of study, drawing examples from Demography, Sociology, Archaeology, History and Ecology. Focus on cartography and map creation principles and public geospatial data acquisition.

ESS 515 - ADVANCED TOPICS IN GIS

Semester Hours: 3

Advanced continuation of concepts applied in Geospatial Applications. Students will learn through modules of real world scientific research how to use further tools in ArcGis including: 3D Analyst, Spatial Analyst, Network Analyst. Topics include web data dissemination, spatiotemporal analysis and some basic spatial statistics measures. Prerequisite: ESS 514.

ESS 561 - ATMOSPHERIC RADIATION I

Semester Hours: 3

ESS 590 - SPECIAL TOPICS IN ESS

Semester Hours: 3

Selected topics of interest not included under other courses.

ESS 610 - LAND USE APP & SUSTAINABILITY

Semester Hours: 3

Study of land use and sustainability issues using satellite image processing and GIS. International examples of urbanization, agriculture, transportation, water management, and natural resources exploitation. Discussions of current literature and quantitative analyses of satellite and situ data. Prerequisite: ESS 515 or consent of instructor.

ESS 612 - ADV GIS EARTH ATMOSPHERE PROBL

Semester Hours: 3

Advanced GIS and remote sensing/image processing. Discussion, guided readings, and group labs to interact with student peers and instructor to develop geospatial solutions to problems relevant to their thesis research including appropriate research design, data collection, and analysis. Prerequisites: ESS 515 and ESS 610.

ESS 625 - AIR POLL APP & DEC MAKG REMOTE

Semester Hours: 3

Course will review principles of air pollution, measurement methods, regulation, national and international standards and how research is used to make decisions regarding air quality. The course will use ground-based, satellite, and numerical modeling information through a case study approach. Prerequisites: ESS/ATS 501.

ESS 630 - PHYSICAL CLIMATOLOGY

Semester Hours: 3

This course examines the physical aspects of the global climate system, including the global energy balance, surface energy balance, hydrologic cycle, climate classification, ocean circulation, natural and anthropogenic climate change and other selected topics such as climate sensitivity. Prerequisites: ATS 501 or ATS 541.

ESS 632 - ENERGY, CLIMATE, ENVIRONMENT

Semester Hours: 3

This course focuses on energy and its impact on the environment including climate change and air pollution. Specific energy forms, such as fossil fuels, nuclear energy, solar energy, are discussed.

ESS 670 - SATELLITE REMOTE SENSING I

Semester Hours: 3

Using a hands on approach, this course covers a broad range of topics concerning digital image processing applied to the remote sensing of atmospheric, cloud and surface properties using various satellite data sets. Prerequisites: ESS 509.

ESS 676 - REMOTE SENSING OF ENVIRONMENT

Semester Hours: 3

This course pursues both basic and advanced concepts in radiative transfer processes and retrieval algorithms of land surface biophysical variables from remote sensing observations, with an emphasis on the hands-on experience of data preprocessing and information extraction by using ENVI. Prerequisite: ESS 514.

ESS 680 - NUMERICAL MOD APPL ESS

Semester Hours: 3

This course will provide the physical basis for numerical model applications in the earth-atmosphere system including spatial and temporal scales. Prerequisites: ESS 501 and ESS 509.

ESS 690 - SPECIAL TOPICS IN ESS

Semester Hours: 3

Selected topics of interest not included under other courses.

ESS 698 - MASTERS CAPSTONE

Semester Hours: 3

An extended research project resulting in a substantive paper that involves the original collection, analysis and/or interpretation of scientific data and/or results. Conducted under the guidance of an advisor. Required for MS ESS non-thesis option.

ESS 699 - MASTER'S THESIS

Semester Hours: 3-6

A minimum of six thesis credit hours is required for MS degree.

ESS 780 - SEMINAR

Semester Hour: 1

Speakers are invited to report on research relevant to the field of Atmospheric and Earth System Science. Students are expected to attend at least twelve seminars and to write short descriptions of the presentations.

ESS 781 - STUDENT SEMINAR

Semester Hour: 1

Guest speakers reports on research relevant to the fields of Atmospheric and Earth System Science. Students are expected to attend weekly seminars, submit a paper based on at least ten talks, and make a 15 minute conference-type presentation on a research topic in atmospheric science selected in agreement with their advisor.

ESS 782 - PROFESSIONAL DEVELOPMENT

Semester Hour: 1

Topics concerning professional ethics, writing scientific journal articles, proposals and resumes, preparing budgets, networking, time management, conference presentations, research administration, funding agencies, stress and burnout will be discussed.

Earth System Science, MS

The Earth System Science program is administered by the Atmospheric and Earth Science department.

Degree Requirements

- To earn a master's degree in Earth System Science, each student must satisfy all requirements of the School of Graduate Studies and of the Atmospheric Science Department.
- Students must formulate an appropriate Program of Study (POS), in consultation with a faculty advisor and chair, **before the end of the second semester.**
- Students must maintain a cumulative GPA of at least 3.0.

Option 1 - Thesis

Minimum degree requirements under this plan include completion of at least 24 credit hours of core (9 credit hours) and elective (15 credit hours) course work and at least 6 credit hours of thesis research. At least 50% of the required 24 semester hours must be from 600 level (or higher) courses. In addition, all MS in ESS students are required to take 6 credit hours of supporting courses, which do not count toward minimum degree requirements.

Code	Title	Semester Hours
Required Core Courses ¹		
ESS 507	ENVRNMTL THRTS PBL PY DEC MKG ²	3
ESS 514	GEOSPATIAL APPLICATIONS ^{2,3}	3
ESS 630	PHYSICAL CLIMATOLOGY	3
Required Supporting Courses		
ESS 508 or ESS 509	PYTHON FOR ID ESS APPLICATIONS SCI PROGRMNG FOR EARTH & ATMOS	3
ESS/ATS 780	SEMINAR	1
ESS/ATS 781	STUDENT SEMINAR	1
ESS/ATS 782	PROFESSIONAL DEVELOPMENT	1
Elective Courses		
Select 15 semester hours of electives ^{4,5}		15
Thesis Credits		
ESS 699	MASTER'S THESIS	6
Total Semester Hours		36

¹ Students must earn a B or above in core courses.

² Students who have earned a B or better in the undergraduate equivalent of ESS 507, ESS 508 (or ESS 509) and ESS 514 at UAH do not have to re-take the course at the graduate level. However, their Program of Study must include alternative semester hours to replace ESS 507 and ESS 514 at an appropriate level approved by their advisor and chair of the department.

³ If a student has advanced GIS experience, the ESS 514 core may be replaced with an advanced course at the discretion of the Department Chair.

⁴ 9 of these Elective semester hours must be from 600 level (or higher) courses.

⁵ Three Elective semester hours **may be** outside of the ESS/ATS only with advisor's approval.

Additional Information

One of the goals of this program is to train the student in transitioning research and observational products related to Earth System Science into public policy and decision-making arenas. Therefore, it is necessary that the student spend time working with a decision-making organization. The student must submit a 5 page thesis proposal to be approved by the advisor and committee by the **end of the third full semester**.

Option 2 - Non-Thesis

Minimum degree requirements under this plan include completion of at least 30 semester hours of graduate course work, which includes core (12 CH) and elective courses (18 CH). At least 50% of the required 30 credit hours must be from 600 level (or higher) courses. Students are also required to take 6 credit hours of supporting courses. The supporting courses do not count toward minimum degree requirements.

Code	Title	Semester Hours
Required Core Courses ¹		
ESS 507	ENVRNMTL THRTS PBL PY DEC MKG ²	3
ESS 508	PYTHON FOR ID ESS APPLICATIONS ²	3
or ESS 509	SCI PROGRMNG FOR EARTH & ATMOS	
ESS 514	GEOSPATIAL APPLICATIONS ^{2, 3}	3
ESS 632	ENERGY, CLIMATE, ENVIRONMENT	3
Elective Courses		
Select 3 semester hours from 500 or 600 level courses within ESS/ATS		3
Select 3 semester hours from 600 level courses within ESS/ATS		3
Select 3 semester hours from 500 or 600 level courses and may be outside of ESS/ATS ⁴		3
Select 9 semester hours from 600 level courses and may be outside of ESS/ATS ⁴		9
Required Supporting Courses		
ESS 780	SEMINAR	1
ESS 781	STUDENT SEMINAR	1
ESS 782	PROFESSIONAL DEVELOPMENT	1
ESS 690	SPECIAL TOPICS IN ESS ⁵	3
Total Semester Hours		36

¹ Students must earn a B or above in core courses.

² Students who have earned a B or better in the undergraduate equivalent ESS 507, ESS 508 (or ESS 509), and ESS 514 at UAH do not have to re-take the course at the graduate level. However, their Program of Study must include alternative semester hours at the appropriate level approved by their advisor and chair of the department.

³ If a student has advanced GIS experience, the ESS 514 core may be replaced with an advanced course at the discretion of the Department Chair.

⁴ Course selection from outside the department and colleges must be done with approval and guidance from faculty mentors and the department chair; faculty mentors will guide the student to pursue a coherent suite of complementary courses outside ESS.

⁵ ESS 690 Special Topics course will be replaced by ESS 690, Internship/MS Capstone course.

Additional Information

Non-thesis students will pursue approved external internship programs with the help of their mentor; in the event that a student does not receive an external internship, they will be required to do a capstone project with an ATS faculty member or approved ESSC scientist/researcher.

M.S. Supervisory Committee

The committee must consist of a minimum of three members and be approved by the Department Chair. Two of the three members must be full-time, tenured or tenure-earning, or emeritus faculty members in the department. The other member must be from a decision-making/end-user organization. The student must work closely with the advisor and committee members to select a thesis topic. Advisors have the responsibility to shape the research and ensure that a thesis can be written and defended within the time needed for graduation.

Comprehensive Examination/Thesis Defense

A final comprehensive examination is required of all candidates for a master's degree. In accordance with the Graduate Studies Dates and Deadlines, a written notice of the time and place of the examination/defense must be sent to the Graduate Dean. After approval by the Graduate Dean, the Department Chair sends a copy of the written Notification of Oral Examination/Defense to the candidate and each member of the committee. The candidate will be examined primarily on the thesis but they may also be tested on relevant course work. The examination is conducted by a committee of at least three faculty members appointed by the Department Chair and approved by the Graduate Dean. The examination must be given at least six

weeks before the end of the semester in which degree requirements are expected to be completed, and the results reported within two working days to the Graduate Dean. A student may take the examination only twice.

- **Thesis** candidates will be examined *primarily* on the thesis by a committee of at least three faculty members appointed by the Department Chair and approved by the Graduate Dean.
- **Non-thesis** students will write up a Masters-level research capstone project, present their findings in a formal presentation, and respond to questions from their faculty mentor, other faculty, and the public; successful and approved completion of this, as determined by the faculty mentor and department chair, will result in a pass for the non-thesis option.

Paperwork

- Students must formulate an appropriate Program of Study (POS), in consultation with a faculty advisor and chair, before the end of the second semester.
- Application for Graduate Degree according to Graduate Studies *Dates & Deadlines*.
- Notification of Oral Examination/Defense according to Graduate Studies *Dates & Deadlines*.

Mathematical Sciences

258A Shelby Center for Science
Telephone: 256.824.6470
Email: mathgrad@uah.edu

Chair: Dr. Toka Diagana (<https://www.uah.edu/science/departments/math/faculty-staff/toka-diagana/>), Professor

Graduate Program Director: Dr. Dongsheng Wu (<https://www.uah.edu/science/departments/math/faculty-staff/dongsheng-wu/>), Professor

The Mathematical Sciences department offers the following graduate degree programs:

Master of Arts - Mathematical Sciences (p. 1004)
Master of Science - Mathematical Sciences (p. 1004)
Doctor of Philosophy - Applied Mathematics (p. 1003)

Admission Requirements

In addition to fulfilling Graduate School admission requirements, all applicants for graduate study in mathematics or applied mathematics should have completed the equivalent of

- a complete calculus sequence,
- courses in linear algebra,
- abstract algebra,
- introduction to real analysis, and
- six additional semester hours in upper-division undergraduate mathematics courses.

Students deficient in more than two undergraduate courses in mathematics must remove these deficiencies before admission to the mathematics graduate program. Such students should consult the graduate program director of the department on how best to remove these deficiencies.

For unconditional admission, applicants must satisfy the requirements of the Graduate School. Only the aptitude portion of the Graduate Record Examination (GRE) is required by the department.

Program Objective

Our objective is to provide excellent instruction and resources for the mathematics education of our students and to help produce the new generations of well-educated mathematicians that are critical for the progress of mankind. Our second objective is to have graduates prepared for careers in government, industry, teaching at a secondary school level, or for graduate study in mathematics, and be admitted to graduate school or employed within one year of graduation.

Learning Outcomes

Students will demonstrate:

- Critical thinking skills to construct clear, valid, and succinct proofs
- Knowledge of a variety of technological tools, including computer algebra systems, probability, statistical packages, or computer programming languages
- Good mathematical communication skills, including the ability to convey mathematical knowledge in a variety of settings, both orally and in writing

Master's Programs in Mathematical Sciences

- Mathematical Sciences, MA (p. 1004)
- Mathematical Sciences, MS (p. 1004)

Doctoral Program in Applied Mathematics

- Applied Mathematics, PhD (p. 1003)

MA 502 - INTRO TO REAL ANALYSIS

Semester Hours: 3

Individualized special projects in mathematics and its applications for inquisitive and well prepared senior level undergraduate students. No credit allowed toward a major or minor in mathematics.

MA 503 - INTRO COMPLEX ANALYSIS

Semester Hours: 3

Complex algebra, analytic functions, Cauchy-Riemann equations, exponential, trigonometric, and logarithmic functions, integration, Cauchy integral theorem, Morera's theorem, Liouville's theorem, maximum modulus theorem, residue theory, Taylor and Laurent series, and applications.

MA 506 - METHODS PARTIAL DIFF EQUA

Semester Hours: 3

Survey of theory and methods for solving elementary partial differential equations. Topics include first-order equations and the method of characteristics, second-order equations, reduction to canonical form, the wave equation, the heat equation, Laplace's equation, separation of variables, and Fourier series.

MA 508 - APPLIED LINEAR ALGEBRA

Semester Hours: 3

Fundamental concepts of linear algebra are developed with emphasis on real and complex vector spaces, linear transformations, and matrices. Solving systems of equations, finding inverses of matrices, determinants, vector spaces, linear transformations, eigenvalues and eigenvectors, normal matrices, canonical forms of matrices, applications to systems of linear differential equations, and use of computer software such as MATLAB.

MA 515 - INTRO NUMERICAL ANALYSIS

Semester Hours: 3

Rigorous analysis and derivation of numerical methods for the approximate solution of nonlinear equations; interpolation and integration of functions, and approximating solutions of ordinary differential equations.

MA 520 - INTERM DIFFERENTIAL EQUATIONS

Semester Hours: 3

This is a second course in differential equations. Course topics include series solutions for second order differential equations and the method of Frobenius; eigenvalue and eigenvector methods for solving systems of linear first order equations; the qualitative theory of nonlinear equations; boundary value problems and the Sturm-Liouville theory. No credit given to students who have successfully completed MA 524.

MA 524 - DYNAMICAL SYSTEMS I

Semester Hours: 3

Scalar autonomous equations; existence, uniqueness, stability, elementary bifurcations; planar autonomous equations; general properties and geometry, conservative systems, elementary bifurcations linear systems, reduction to canonical forms, stability and instability from linearization. Liapunov functions, center manifolds, Hopf bifurcation.

MA 526 - PARTIAL DIFF EQUA I

Semester Hours: 3

Introduction to the theory for solving partial differential equations. No graduate credit given to students who have completed MA 506 for graduate credit. Topics include second-order equations, reduction to canonical form, well-posedness, the classical equations (wave, heat, and Laplace's) in one and several dimensions, separation of variables, Fourier series, general eigenfunction expansions, Sturm-Liouville theory, first-order linear and quasilinear equations, and shocks. Prerequisite: MA 502.

MA 536 - INTRO P-ADIC ANALYSIS

Semester Hours: 3

Introduction to p-adic analysis. Topics include rings; fields; ideals; congruences; valued fields; non-archimedean valued fields; field of p-adic numbers; field of complex p-adic numbers; ultrametric Banach spaces; p-adic Hilbert space; p-adic functions; strictly differentiable functions; Volkenborn Integral; Benoulli numbers; p-adic Gamma function; p-adic Riemann function; and p-adic Zeta function.

MA 538 - METRIC SPACES W/APPLICA

Semester Hours: 3

Metric spaces, continuous functions, compactness, connectedness, completeness, Arzela-Ascoli theorem, Stone-Weierstrass theorem, Hilbert spaces, contraction mappings, applications to existence and uniqueness of solutions of differential and integral equations. Prerequisites: MA 502.

MA 539 - MULTIDIMENSIONAL ANALYSIS

Semester Hours: 3

Finite-dimensional Euclidean space and sequential approach to its topology, continuous functions and their properties, differentiability and implicit function theorem, Riemann integral, elements of vector calculus, flows and their generating vector fields, introduction to metric spaces. Prerequisite: MA 544.

MA 540 - COMBINATORIAL ENUMERATION

Semester Hours: 3

Counting, pigeonhole principle, permutations and combinations, generating functions, principle of inclusion and exclusion, Polya's theory of counting.

MA 542 - ALGEBRA

Semester Hours: 3

Topics from group theory and ring theory: subgroups, normal subgroups, quotient groups, homomorphisms, isomorphism theorems, ideals, principal ideal domains, Euclidean domains, fields, extension fields, elements of Galois theory.

MA 544 - LINEAR ALGEBRA

Semester Hours: 3

Vector spaces over a field, bases, linear transformations, matrices, determinants, eigenvalues, similarity, Jordan canonical forms, dual spaces, orthogonal and unitary transformations.

MA 561 - INTRO TO FOURIER ANALYSIS

Semester Hours: 3

See MA 460. This course is taught as MA 460/561. Course completion and/or grade requirements for the MA 561 course will differ from those for the MA 460 course.

MA 562 - INTERMEDIATE FOURIER ANALYSIS

Semester Hours: 3

(Formerly MA 560). Brief review of classical Fourier analysis, Parseval's equality, Gaussian test functions. Introduction to generalized functions, the generalized transform, the generalized derivative, sequences and series of generalized functions, regular periodic arrays of delta functions, sampling, the discrete transform, the fast Fourier transform (other topics as time and interest permit).

MA 565 - INTERM MATH MODELING

Semester Hours: 3

Designed for beginning graduate students. No prior experience in formal mathematical modeling is required. In-depth discussion of some types of models from physics, the life sciences, and/or the social sciences, with formulation, analysis, and criticism of the models. Process of and factors involved in formulating a model is of prime importance. Content is divided into approximately one-half deterministic modeling and one-half stochastic modeling.

MA 585 - PROBABILITY

Semester Hours: 3

Course topics include probability spaces, random variables, conditional probability, independence, modes of convergence, and an introduction to sigma-algebras and measurability; distributions, including discrete, continuous, joint and marginal distributions, transformations of random variable, distribution and quantile functions, and convergence in distribution; expected value, including properties of general expected value, mean, variance, covariance, generating functions, and conditional expected value; special models and distributions, including Bernoulli trials and the binomial and negative binomial distributions, the Poisson model and the Poisson and gamma distributions, the normal distribution, finite sampling models and the hypergeometric distribution; the law of large numbers and the central limit theorem.

MA 590 - SELECTED TOPICS IN MATH

Semester Hours: 3

Requested selected topics.

MA 607 - MATHEMATICAL METHODS I

Semester Hours: 3

Review of vector calculus and coordinate systems, introduction to tensors, matrices, infinite series, complex variables with applications to calculus of residues, partial differential equations, and Sturm-Liouville theory. Orthogonal functions, gamma functions, Bessel functions, Legendre functions, special functions, Fourier series, integral transform and equations. (Same as PH 607.).

MA 609 - MATHEMATICAL METHODS II

Semester Hours: 3

Continuation of MA 607. (Same as PH 609.) Prerequisite: MA 607.

MA 614 - NUM METHODS/LINEAR ALGEBRA

Semester Hours: 3

Norms and vector spaces, matrix factorizations and direct solution methods, stability and conditioning, iterative methods for large linear systems, the algebraic eigenvalue problem. Prerequisites: MA 515 and either MA 508 or MA 544.

MA 615 - NUM METHODS PARTIAL DIFF EQ

Semester Hours: 3

Finite difference methods for parabolic, elliptic, and hyperbolic partial differential equations, error analysis, stability, and convergence of finite difference methods. Prerequisites: MA 515 and (either MA 506 or MA 526) and (either MA 508 or MA 544 or MA 614).

MA 624 - DYNAMICAL SYSTEMS II

Semester Hours: 3

Brief review of linear systems; local theory for nonlinear systems; existence, uniqueness, differentiability, asymptotic behavior, the stable manifold theorem, Hartman-Grobman theorem, Hamiltonian systems; global theory for nonlinear systems; limit sets and attractors, the Poincare map, the Poincare-Bendixson theorem; some aspects of bifurcation theory and chaos; bifurcations at nonhyperbolic fixed points and periodic orbits, homoclinic bifurcations, Melnikov's method, chaos. Prerequisite: MA 524 and either MA 508 or MA 544.

MA 626 - PARTIAL DIFF EQUA II

Semester Hours: 3

Continuation of MA 526. Qualitative results for solutions to the classical equations (energy inequalities, propagation of discontinuities, maximum principles, smoothness of solutions, existence and uniqueness, etc.), non-homogeneous equations, Poisson's equation, Green's functions, and the Cauchy-Kowalewski theorem. Prerequisite: MA 526.

MA 633 - GEOMETRY

Semester Hours: 3

Axioms of incidence and order, affine and metric properties, isometries, similarities, transformation groups, projective planes.

MA 638 - GENERAL TOPOLOGY

Semester Hours: 3

Set theory, logic, well-ordering principle, axiom of choice, topological spaces, product spaces, quotient spaces, continuous functions, connectedness, path connectedness, local connectedness, compactness, local compactness, countability and separation, generalized products, Tychonoff theorem.

MA 640 - GRAPH THEORY

Semester Hours: 3

Graphs, subgraphs, trees, connectivity, Euler tours, Hamilton cycles, matchings, edge colorings, independent sets, vertex colorings, planar graphs, Kuratowski's theorem, four color theorem, directed graphs, networks, cycle and bond spaces. Prerequisite: MA 540 or MA 542.

MA 643 - GROUP THEORY

Semester Hours: 3

MA 644 - MATRIX THEORY

Semester Hours: 3

Functions of matrices, invariant polynomials, elementary divisors, similarity of matrices, normal forms of a matrix, matrix equations, generalized inverses, non-negative matrices, localization of eigenvalues. Prerequisites: MA 508 or MA 503 or MA 544.

MA 645 - COMBINATORIAL DESIGN

Semester Hours: 3

Systems of distinct representatives, difference sets, coding theory, block designs, finite geometries, orthogonal Latin squares, and Hadamard matrices. Prerequisite: MA 540 and MA 544.

MA 653 - REAL ANALYSIS I

Semester Hours: 3

Countable sets, characterization of open and closed sets, Heine-Borel theorem, Riemann integral, Lebesgue measure and outer measure, measurable functions, Lebesgue integral, Fatou's lemma, and Lebesgue-dominated convergence theorem. Prerequisite: MA 538.

MA 654 - REAL ANALYSIS II

Semester Hours: 3

Differentiability of monotone functions, functions of bounded variation, absolute continuity, convex functions, Minkowski and Holder inequalities, L_p spaces, Riesz-Fischer representation theorem, Fubini's theorem and selected topics. Prerequisite: MA 653.

MA 656 - COMPLEX ANALYSIS I

Semester Hours: 3

Topology of the complex plane, analytic functions of one complex variable, elementary functions and their mapping properties, power series, complex integration, Cauchy's theorem and its consequences, isolated singularities, Laurent series, residue theory.

MA 658 - INTRO TO FUNCTIONAL ANALYSIS

Semester Hours: 3

Normed and inner product spaces, finite dimensional spaces, product and quotient spaces, equivalent norms, Hahn-Banach theorem, principle of uniform boundedness, open mapping theorem, Riesz representation theorem, complete orthonormal sets, Bessel's inequality, Parseval's identity, and conjugate spaces. Prerequisite: MA 538.

MA 661 - SPECIAL FUNCTIONS

Semester Hours: 3

MA 662 - ASYMPT/PERTURBATION METHOD

Semester Hours: 3

Asymptotic series, regular and singular perturbation theory, asymptotic matching, Laplace's method, stationary phase, steepest descents, WKB theory. Prerequisites: MA 502, and one of the following: MA 503, MA 504, MA 624.

MA 667 - CALC VAR/OPTIMAL CONTROL

Semester Hours: 3

Euler necessary condition for local extremum, Euler-Lagrange equation, Weierstrass necessary condition, Jacobi's necessary condition, corner conditions, problems of optimal control, Pontryagin maximum principles, transversality conditions, applications.

MA 685 - STOCHASTIC PROC/APPLI I

Semester Hours: 3

Discrete and continuous Markov chains, Poisson processes, counting and renewal processes, and applications. Prerequisite: MA 585.

MA 686 - STOCHASTIC PROC/APPLI II

Semester Hours: 3

Gaussian and Wiener processes, general Markov processes, special types of processes from queueing and risk theory, and selected advanced topics. Prerequisite: MA 685.

MA 690 - SP TOPICS IN MATHEMATICS

Semester Hours: 3

Offered upon demand. Advanced selected topics of interest in areas such as discrete mathematics, numerical analysis, differential equations, and stochastic processes.

MA 695 - GRADUATE SEMINAR

Semester Hour: 1

Selected topics in advanced mathematics, conducted as a research seminar.

MA 699 - MASTER'S THESIS

Semester Hours: 3-9

Required each semester a student is receiving direction on a master's thesis. A minimum of two terms is required. Maximum of nine hours credit awarded upon successful completion of the master's thesis.

MA 715 - NUM METHODS PART DIFF EQ II

Semester Hours: 3

Finite element methods for parabolic, elliptic, and hyperbolic partial differential equations; error analysis stability, and convergence. Prerequisites: MA 538 and MA 615.

MA 726 - THRY PART DIFFERNTL EQUA

Semester Hours: 3

Hilbert space theory of existence, uniqueness, and regularity for partial differential equations.

MA 740 - COMBINATORIAL ALGORITHMS

Semester Hours: 3

Linear, polynomial and exponential graph theoretic algorithms, generating combinatorial objects, and NP-completeness.

MA 756 - COMPLEX ANALYSIS II

Semester Hours: 3

Applications of residue theory, harmonic functions and their applications, Mittag-Leffler theorem, infinite products, Weierstrass product theorem, conformal mapping and Riemann mapping theorem, univalent functions, analytic continuation and Riemann surfaces, Picard's theorems, and selected topics.

MA 785 - ADV PROBABILITY THEORY

Semester Hours: 3

Measure and integration, probability spaces, convergence concepts, law of large numbers, random series, characteristic functions, central limit theorem, random walks, conditioning, Markov properties, conditional expectations, and elements of martingale theory.

MA 790 - SPECIAL TOPICS

Semester Hours: 3

Offered upon demand. Advanced selected topics of interest in areas such as discrete mathematics, numerical analysis, differential equations, and stochastic processes.

MA 795 - GRADUATE SEMINAR

Semester Hour: 1

Selected topics in advanced mathematics, conducted as a research seminar.

MA 799 - DOCTORAL DISSERTATION

Semester Hours: 3-9

Required each semester a student is receiving direction on a Ph.D. dissertation.

Applied Mathematics, PhD

The Ph.D. degree program in Applied Mathematics is designed to enable students to master a significant body of mathematics, including a specialty in Applied Mathematics; to relate this knowledge to a coherent area of science or engineering other than mathematics; and to carry on fundamental research in Applied Mathematics. Students who are interested in the program should contact the graduate program director of the department.

Each Program of Study requires at least 54 semester hours of graduate coursework, and must include a major area of concentration consisting of at least six courses in addition to the four common core courses, and a minor consisting of at least four related graduate courses in some area outside of the department. The major, minor, and other courses in the Program of Study must be selected so that the student will be prepared to conduct research in an area of Applied Mathematics.

Students must pass three examinations:

- Joint program examination
- Comprehensive qualifying examination
- Dissertation defense

The joint program examination is a written test of the student's ability to successfully pursue a Ph.D. in Applied Mathematics. It covers a four course common core in real analysis (MA 653, MA 654) and linear and numerical linear algebra (MA 544, MA 614). The joint program examination cannot be taken more than twice.

The comprehensive qualifying examination covers the entire Program of Study and the student's proposal for a dissertation topic, and is administered by the student's graduate study supervisory committee on behalf of the Graduate School. The examination is part written and part oral. It cannot be

taken more than twice. Upon successful completion of the comprehensive qualifying examination and dissertation proposal, the student is admitted to candidacy for the Ph.D. degree.

The dissertation defense is an oral presentation of the dissertation in the form of a seminar before the student's graduate study supervisory committee. The dissertation is evidence that the student can independently identify a problem of contemporary significance through familiarity with the current literature in some area of Applied Mathematics, organize and execute a program of research, recognize and analyze the results, and present them in cogent, well-written exposition. It must include mathematical results suitable for publication in a nationally recognized journal.

The Ph.D. degree program in Applied Mathematics is a joint program with the other two campuses (Birmingham and Tuscaloosa) of the University of Alabama System. All requirements of the program can be completed at the University of Alabama in Huntsville.

Mathematical Sciences, MA

The Master of Arts is conferred under Plan I (thesis) or Plan II (non-thesis). Students should explore with their faculty advisor which plan is better for their particular objectives. For the M.S. degree, a Program of Study must include a minor area in the College of Engineering or the College of Science. All minors must be outside of the department and must include at least six semester hours of approved graduate coursework. Master's programs that include a thesis (Plan I) require at least 18 semester hours of graduate coursework in mathematics and at least 24 semester hours of total graduate coursework, and programs without a thesis (Plan II) require at least 33 semester hours of graduate coursework and at least 24 semester hours of these should be in mathematics. At least 50 percent of the coursework semester hours must be completed in courses numbered 609 or above. MA 538 or MA 539 and MA 544 should be included in every Program of Study.

Students should plan a Program of Study for the master's degree with the help of a faculty advisor prior to the completion of 12 semester hours of coursework. Courses taken without an approved Program of Study may not apply toward a degree.

Master of Arts with Class A Teaching Certification

Teachers who hold the Alabama Class B Middle/Junior High or High School Certificate may pursue a program of study in mathematics that leads to a Master of Arts degree with Alabama Class A certification. The coursework for such a Program of Study is as follows:

Code	Title	Semester Hours
MA 538 or MA 539	METRIC SPACES W/APPLICA (or) MULTIDIMENSIONAL ANALYSIS	3
MA 542	ALGEBRA	3
MA 544	LINEAR ALGEBRA	3
MA 585	PROBABILITY	3
MA 614	NUM METHODS/LINEAR ALGEBRA	3
MA 633	GEOMETRY	3
ST 687	THEORY OF STATISTICS I	3
9 semester hours of appropriate graduate education courses		9
One approved MA or ST course numbered 609 or above		3

Individuals who are interested in obtaining a Master of Arts degree with Alabama Class A certification in mathematics, but who have not completed more than 12 semester hours in teacher education (graduate or undergraduate) courses, should consider the Non-Traditional Fifth Year Program. The MA and ST courses given in the preceding paragraph would be appropriate for such a program. Students should contact the Education Department for preliminary advisement on admission and general program requirements. More details on the Non-Traditional Fifth Year Program are given in the Education Department section.

Master's Degree Final Examination

A final comprehensive examination is required of all candidates for a master's degree. The candidate will be examined on the coursework and thesis in Plan I and on the coursework in Plan II. In the Mathematical Sciences Department this examination is oral, except that Plan II students who have passed a joint program examination for the Ph.D. degree in applied mathematics may use that examination as their master's degree final examination.

Mathematical Sciences, MS

The Master of Science degree is conferred under Plan I (thesis) or Plan II (non-thesis). Students should explore with their faculty advisor which plan is better for their particular objectives. For the M.S. degree, a Program of Study must include a minor area in the College of Engineering or the College of Science. All minors must be outside of the department and must include at least six semester hours of approved graduate coursework. Master's programs that include a thesis (Plan I) require at least 18 semester hours of graduate coursework in mathematics and at least 24 semester hours of total graduate coursework, and programs without a thesis (Plan II) require at least 33 semester hours of graduate coursework and at least 24 semester

hours of these should be in mathematics. At least 50 percent of the coursework semester hours must be completed in courses numbered 609 or above. MA 538 or MA 539 and MA 544 should be included in every Program of Study.

Students should plan a Program of Study for the master's degree with the help of a faculty advisor prior to the completion of 12 semester hours of coursework. Courses taken without an approved Program of Study may not apply toward a degree. Various areas of mathematics may be stressed in the program of study depending on the student's needs. For example, the coursework for a non-thesis Program of Study concentrating in probability and statistics might be:

Code	Title	Semester Hours
MA 538	METRIC SPACES W/APPLICA	3
or MA 539	MULTIDIMENSIONAL ANALYSIS	
MA 544	LINEAR ALGEBRA	3
MA 585	PROBABILITY	3
MA 653	REAL ANALYSIS I	3
MA 656	COMPLEX ANALYSIS I	3
MA 685	STOCHASTIC PROC/APPLI I	3
ST 687	THEORY OF STATISTICS I	3
MA 686	STOCHASTIC PROC/APPLI II	3
ST 787	THEORY OF STATISTICS II	3
Total Semester Hours		27

In addition, three approved graduate courses, including at least one numbered 609 or above.

The coursework for a non-thesis program of study concentrating in numerical analysis might be:

Code	Title	Semester Hours
MA 515	INTRO NUMERICAL ANALYSIS	3
MA 526	PARTIAL DIFF EQUA I	3
MA 538	METRIC SPACES W/APPLICA	3
MA 544	LINEAR ALGEBRA	3
MA 614	NUM METHODS/LINEAR ALGEBRA	3
MA 615	NUM METHODS PARTIAL DIFF EQ	3
MA 626	PARTIAL DIFF EQUA II	3
MA 715	NUM METHODS PART DIFF EQ II	3
Total Semester Hours		24

In addition, three approved graduate courses, including at least two courses numbered 609 or above.

Other possible concentration areas include differential equations and discrete mathematics.

Master's Degree Final Examination

A final comprehensive examination is required of all candidates for a master's degree. The candidate will be examined on the coursework and thesis in Plan I and on the coursework in Plan II. In the Mathematical Sciences Department this examination is oral, except that Plan II students who have passed a joint program examination for the Ph.D. degree in applied mathematics may use that examination as their master's degree final examination.

Physics and Astronomy

201C Optics Building
Telephone: 256.824.2482
Email: physics@uah.edu

Chair: Dr. James Miller, Professor (<https://www.uah.edu/science/departments/physics/faculty-staff/dr-james-a-miller/>)

The Physics and Astronomy department offers the following graduate degree programs:

Master of Science (p. 1013)
 Doctor of Philosophy (p. 1011)

Admission Requirements

Refer to the Graduate School section of the Graduate Catalog for general admission and degree requirements. Additional information on Graduate Teaching and Research Assistantships is available on the department web site <http://physics.uah.edu>. (<http://www.uah.edu/science/departments/physics/>) Undergraduate preparation should include courses typically required for a Physics major, such as modern physics, quantum mechanics, and upper level classical mechanics, electrodynamics, and thermal physics.

Program Objective

The primary objective of the Physics and Astronomy department is to educate and train the next generation of physicists, perform cutting-edge and internationally-recognized research, and support the education of students in allied areas such as engineering, chemistry, atmospheric science, and the biological sciences. Our second objective prepares Physics majors for employment in industrial research or for further graduate studies in physics or related fields, including astrophysics, optics, biophysics, engineering, or medicine.

Learning Outcomes

Students will:

- Exhibit a post-graduate level of knowledge in general physics topics
- Conduct a focused and thorough investigation of a topic and effectively communicate the results in a timely manner
- Possess the preliminary experience necessary for working in the private sector, academia, or industry

Master's Program in Physics

- Physics, MS (p. 1013)

Doctoral Program in Physics

- Physics, PhD (p. 1011)

PH 531 - INTRO TO PLASMA DYNAMICS

Semester Hours: 3

Single-particle motion in magnetic fields; fluid equations and fluid theory wave modes; MHD theory, stability, and wave modes; introduction to kinetic theory and hot plasma wave modes. (Same as MAE 531).

PH 541 - GEOMETRICAL OPTICS

Semester Hours: 3

Foundations and physics of geometrical optics, Fermat's principles and Huygen wavelets, refraction and reflection. The many forms of Snell's Law. Optical path lengths, geometrical wavefronts and rays. Ray tracing, ynu-chart and matrix methods. Gaussian imagery and paraxial optics, conjugate elements, cardinal points, and image-object relations. Stops and pupils, chief and marginal rays, vignetting, and the optical or Lagrange invariant. The y-ybar diagram, design of common systems: objectives, magnifiers, microscopes, collimators and detectors. Optical glasses and chromatic aberrations, wavefront and transverse aberrations, spot diagrams and ray fan plots. (Same as OSE 541 and EE 541.) Fall.

PH 542 - PHYSICAL OPTICS

Semester Hours: 3

Scalar and electromagnetic waves, polarization, coherence, reflection and refraction; two beam and multiple beam interference, interferometers, Fabry-Perots, thin films, diffraction, and absorption and dispersion. (Same as OSE 542 and EE 542.) Fall, Spring.

PH 544 - OPTOELECTRONICS

Semester Hours: 3

Review of polarized light, the Jones and Mueller calculi. Propagation of light in birefringent material. Modulation of light using electro-optic effect, Kerr effect, acousto-optic effect, and Faraday effect. Elements of photodetection and detectors, signal processing, and signal-to-noise. Design and analysis of beam scanners, optical rf-spectrum analyzer, optical sensors, and optical communication systems. (Same as OPT 444 and OPE 451.) Fall even years.

PH 546 - RADIOMETRY, DETECTORS & SOURCE

Semester Hours: 3

Theory and practice of radiometry and photometry. Blackbody radiation and Lambertian sources. The propagation of radiant energy in free space and through optical systems. Detector classes, responsivity, bandwidth, and noise. Power spectral density, properties of sources, photon noise. (Same as OPT 446, OSE 546.) Spring even years.

PH 551 - QUANTUM MECHANICS I

Semester Hours: 3

Waves and particles; wave packets and the uncertainty principle; Schrodinger's equation and wave mechanics; postulates of quantum mechanics; simple systems in one, two and three dimensions; the hydrogen atom; angular momentum and spin; numerical solutions of the Schrodinger equation. Prerequisites require undergraduate quantum mechanics course(s).

PH 553 - INTRO TO PARTICLE PHYSICS

Semester Hours: 3

Survey of elementary particle physics with emphasis on the Standard Model of quarks, leptons and gauge bosons. Lorentz transformations, four-vectors and relativistic kinematics, angular momentum and spin. Lifetimes, cross-sections and Feynman rules. Quantum electro- and chromo-dynamics, Dirac equation and renormalization. Physics beyond the Standard Model. Prerequisite: PH 551 or PH 651.

PH 560 - INTRO TO SOLID STATE PHYSICS I

Semester Hours: 3

Crystal binding and crystal structure. Crystal structure determination. Phonons and lattice vibrations. Free electron gas. Electronic energy band theory. Prerequisite with concurrency: PH 551. (Same as MTS 660.) Fall, even years.

PH 561 - INTRO TO SOLID STATE PHYSIC II

Semester Hours: 3

Thermal properties of solids. Electronic properties, optical properties, electronic properties in a magnetic field, semiconductor devices, magnetism, superconductivity, defects and alloys, dislocations and crystal growth, non-crystalline solids, surfaces and interfaces. (Same as MTS 661.) Spring, odd years. Prerequisite: PH 560.

PH 570 - OPT & PHOTONIC SYSTEMS DESIGN

Semester Hours: 3

Review of paraxial optics, ray tracing codes, aberration and diffraction calculations; acousto- and electro-optic modulators, spatial light modulators; fibers, fiber splicers and connectors; gratings and diffractive optical elements; laser and light emitting diodes, photodetectors and CCD arrays; correlator systems; optical communication networks; signal processing systems design. Fall, even years. Prerequisite: PH 541.

PH 571 - STELLAR ASTROPHYSICS

Semester Hours: 3

Structure and physical processes of stars from the interior to the atmosphere: energy production and transfer, atmospheric properties, and observed spectral features. Models for stellar structure. Star formation and evolution, including the effects of a companion. Prerequisites: upper level undergraduate astrophysics course, and upper level undergraduate E&M course.

PH 572 - GALAXIES & COSMOLOGY

Semester Hours: 3

Galactic structure; Oort's constants; rotation curves; galaxy types; structure formation and evolution; Hubble expansion; Friedmann equation; cosmic microwave background; radiation and matter eras; primordial nucleosynthesis; dark matter/energy issues; development of structure in the early universe; horizon & flatness problems; inflation. Prerequisite: PH 571 or advanced undergraduate Astrophysics course, suggested PH 553, PH 621. Spring, odd years.

PH 574 - INTRO TO GENERAL RELATIVITY

Semester Hours: 3

An introductory course on general relativity and gravitational physics. General relativistic phenomena as inferred from the behavior of particles and light rays for a selection of spacetimes. Major properties of such objects as black holes, wormholes, gravitational waves, and the universe as a whole. Prerequisites: Undergraduate level special relativity and classical mechanics.

PH 579 - OBSERVATIONAL ASTROPHYSICS

Semester Hours: 3

Astronomical coordinate systems and time; spherical astronomy; telescope designs; basic optics; CCDs; infrared arrays; observational calibration and noise; high resolution imaging techniques (e.g., adaptive optics); spectroscopy; and high and low energy observational techniques (e.g., X-ray telescopes, radio interferometry). Students will also conceive their own projects, write observing proposals, and convene as a Time Allocation Committee to review proposals and schedule telescope time. Students will acquire, reduce, analyze and interpret data from one of the allocated projects, and present the results in a short paper. Prerequisites: upper-level undergraduate astrophysics courses.

PH 589 - SELECTED TOPICS

Semester Hours: 3

PH 601 - CLASSICAL DYNAMICS I

Semester Hours: 3

Variational principles and Lagrangian mechanics, rigid body motion, Hamilton's equations, and theory of small oscillations. Aspects related to modern physics. Fall.

PH 607 - MATHEMATICAL METHODS I

Semester Hours: 3

Review of vector calculus and coordinate systems, introduction to tensors, matrices, infinite series, complex variables with applications to calculus of residues, partial differential equations, and Sturm-Liouville theory. Orthogonal functions, gamma functions, Bessel functions, Legendre functions, special functions, Fourier series, integral transforms and equations. Prerequisite: upper level undergraduate differential equations courses (s). (Same as MA 607.) Fall.

PH 609 - MATHEMATICAL METHODS II

Semester Hours: 3

Continuation of PH 607. (Same as MA 609.) Spring. Prerequisite: PH 607.

PH 615 - INTRO TO RADIOLOGICAL PHYSICS

Semester Hours: 3

Prerequisite: PH 551.

PH 616 - PHYSICS OF RADIATION THERAPY

Semester Hours: 3

Operation of X-ray tubes, electron linear accelerators, cobalt-60 units, cyclotrons. Principles of accelerating waveguides, klystrons, magnetrons, electron scattering foils, flattening filters, monitor chambers, collimators. Percent-depth-dose (PDD), tissue-phantom-ratio (TPR), tissue-air-ratio (TAR), peak scatter factor (PSF). Equivalent squares, calculation of monitor units for specific dose rates, collimator scatter factor (S_c), phantom scatter factor (S_p). Principles of brachytherapy: calibration of sources, absorbed dose using AAPM TG-43 protocol. Calculation of isodose distributions: convolution/superposition, Monte Carlo calculations. Intensity modulated radiation therapy (IMRT), stereotactic radiosurgery, tomotherapy, total-body irradiation. Prerequisite: PH 615.

PH 621 - STAT MECH KINETIC THRY I

Semester Hours: 3

Statistical methods, systems of particles, statistical thermodynamics, applications of thermodynamics, methods of statistical mechanics, applications of statistical mechanics, equilibrium between phases of chemical species. Summer.

PH 622 - STAT MECH KINETC THRY II

Semester Hours: 3

Addresses the statistical description of collective processes in gases, plasmas, and fields based on the use of transport theory. The course provides the basis for the mathematical description of the basic kinetic and continuum models used in all fields of solar, space and astrophysics. Addresses specifically the transport of gases and Chapman-Enskog theory, magnetohydrodynamics in a collisional description, energetic particle transport in collisionless plasma, the transport of low-frequency turbulence, and if time permits, the transport of radiation. Prerequisite: PH 621.

PH 631 - ELECTROMAGNETIC THEORY I

Semester Hours: 3

Electrostatic and magnetostatic fields in vacuum and materials, Maxwell's equations, electromagnetic waves. Prerequisites: upper level undergraduate E&M course(s), PH 607. Fall.

PH 632 - FOURIER OPTICS

Semester Hours: 3

Introducing the optical system as an invariant linear system, convolution, Sommerfield's diffraction integral, Fourier Transform, angular spectrum, coherent and incoherent imaging, optical transfer function. Prerequisite PH 542 (Same as OSE 632 and EE 632.) Spring.

PH 636 - INTRO TO SPACE PLASMA PHYSICS

Semester Hours: 3

Electromagnetic fields and particles in space; solar wind and solar energetic particles; currents and plasma waves in space; shocks and particle acceleration mechanisms; solar flares and coronal mass ejections. Spring, even years. Prerequisite: PH 531.

PH 642 - OPTICAL PHYSICS

Semester Hours: 3

Fundamental physics of optics and optical phenomena. Electromagnetic fields, sources and propagation. Coherence, interference, polarization, scattering, reflection, refraction, and diffraction. Optical properties of conductors and insulators. Introduction to quantum optics, lasers, and optical device physics. Offered Spring, even years. Prerequisite: PH 551.

PH 645 - LASERS I

Semester Hours: 3

Incoherent light sources; atomic and molecular energy levels; equation of motion for probability amplitudes using first-order time dependent perturbation theory; electric dipole interaction. Einstein rate equations and the Planck radiation law; induced dipole moments and frequency dependent susceptibility. Homogeneous and inhomogeneous line broadening mechanisms; laser cavities and modes, elementary laser theory, practical lasers. Prerequisite: upper level undergraduate E&M courses. (This course may be substituted for OSE 645.) Summer.

PH 651 - QUANTUM MECHANICS I

Semester Hours: 3

Free particle motion. Principles of wave mechanics. The Schrodinger equation and one-dimensional potentials. Approximation techniques: WKB, variational method, perturbation theory. Numerical methods. Prerequisites: undergraduate quantum mechanics or modern physics, some high-level programming (e.g., C++, Fortran, Mathematica) experience. Prerequisite with concurrency: PH 607.

PH 652 - QUANTUM MECHANICS II

Semester Hours: 3

Spherically-symmetric potentials, angular momentum, spin. Identical particles. Time-dependent perturbation theory. Scattering. Atomic structure. Prerequisite: PH 651 and PH 609.

PH 654 - OPTICAL TESTING

Semester Hours: 3

Spherometry; refractive index measurements; optical bench measurements of imaging systems via T-bar nodal slide (effective focal length, f-number, axial color, field curvature and distortion, transverse ray aberrations); illumination falloff; image resolution tests (finite object); modulation transfer function; star image testing; knife edge tests; Hartmann tests; Fizeau interferometer and testing configurations; null lens testing of aspheres; wavefront measurements (point diffraction interferometer, radial shear interferometer); (Same as OSE 654.) Spring.

PH 655 - APPLIED QUANTUM MECHANICS

Semester Hours: 3

Application of quantum mechanics in solid state, electronics, materials science, and optics. Topics to include: Hydrogen atom and molecule, excitons, phonons, Bloch's theorem, periodic boundary conditions, electrons and holes, band structure of simple semiconductors, dipole transitions, optical constants, absorption and emission processes. Introduction to device physics. (Same as OSE 655) Prerequisite: PH 651 or OSE 555.

PH 661 - DATA ANAL/STAT METH PH/ASTROPH

Semester Hours: 3

Moments of a distribution, linear and non-parametric correlation, central limit theorem, error estimation, least squares modeling, estimating model parameters, Monte Carlo techniques. Bayes' theorem and likelihood methods. Energy and temporal spectral analyses. Power density spectra: periodic and quasi-periodic systems. Prerequisite: upper level undergraduate mathematics courses. Fall, even years.

PH 670 - OPTOMECHANICAL DESIGN & MANUF

Semester Hours: 3

Practical aspects of optomechanical design, material selection, fabrication and integration of precision optical components and systems for commercial, space, and military applications. Topics include: fixture design, tolerance analysis, machining methods, thermal stabilization, integrated computer-aided design and analysis, diamond machining, finishing and plating techniques. (Same as OSE 670.) Fall, even years. Prerequisite: OSE 541.

PH 671 - OPTICAL FABRIC & TESTING

Semester Hours: 3

Fabrication and testing techniques of optical components and systems. Component measurements: refractive index, curvature, focal lengths, cardinal points and field curvature. Wavefront aberration and transverse aberration function measurements: geometric tests, interferometric tests, null tests. Basics of grinding, figuring, polishing and optical coating. Laboratory experience in manufacturing, polishing, testing, and coating reflective or transmissive optics. Offered on demand.

PH 673 - HIGH ENERGY ASTROPHYSICS

Semester Hours: 3

Radiative Transfer: Blackbody, scattering and diffusion, bremsstrahlung, synchrotron emission, Compton scattering. Relativistic electromagnetism. Plasma effects and introduction to magnetohydrodynamics. Observational aspects of white dwarves, neutron stars and black holes. Accretion and astrophysical jets. Active galactic nuclei and gamma-ray bursts. Offered Fall of odd years.

PH 674 - GEN RELATIVITY & GRAVITATION I

Semester Hours: 3

Special and general relativity: vector and tensor calculus; curved manifolds; elements of differential geometry; physics in curved spacetime; the Einstein equations; simple solutions of the Einstein equations; Schwarzschild geometry and the Kerr spacetime; black holes; sources, propagation, and detection of gravitational waves; a variational approach to general relativity; special topics.

PH 679 - EDUCATION CAPSTONE COURSE

Semester Hours: 3

Capstone experience for student pursuing secondary education certification option for MS degree. Student develops 1 credit, 100 level physics course on instructor-approved topic. Development includes syllabus, textbook evaluation, representative homework assignments, midterm, final, lecture outline, and lecture notes.

PH 689 - SELECTED TOPICS

Semester Hours: 1-3

Offered upon demand. Topics include: optical surface characterization, superconductivity, aeronomy, properties of solids, laser propagation, collision theory, magnetohydrodynamics. Fall, Spring, Summer.

PH 699 - MASTER'S THESIS

Semester Hours: 3-6

Minimum of 6 credit hours required for Plan I M.S. students. Maximum of nine hours credit toward Ph.D. course requirements awarded upon successful completion of master's thesis. Fall, Spring, Summer.

PH 731 - ADVANCED PLASMA THEORY

Semester Hours: 3

Vlasov theory; electrostatic and electromagnetic waves in a hot plasma; wave damping processes; micro-instabilities; quasilinear theory; numerical simulation of plasmas; applications to space and astrophysics. Spring, odd years.

PH 732 - ELECTROMAGNETIC TH II

Semester Hours: 3

Continuation of PH 631. Radiation from accelerated charges; Hamiltonian formulation of electrodynamics; covariant formulation of electrodynamics. Spring Prerequisite: PH 631.

PH 733 - QUANTUM DEVICES

Semester Hours: 3

Quantum aspects of optical, electronic, and semiconductor devices approached from a phenomenological/physical point of view. Topics will include: Quantum well devices, optical modulators, optical detectors, quantum Stark effects, electrooptic devices, high speed optical devices, frequency chirping in high speed devices and system applications. (Same as OSE 755.) Fall, odd years. Prerequisite: PH 551 or PH 651 or OSE 555.

PH 742 - OPTICAL SCATTERING THEORY

Semester Hours: 3

Scattering and absorption of radiation by particles with spherical symmetry and arbitrary shapes described using Maxwell's equations, vector Helmholtz equations, the Jones and Mueller calculus, and numerical techniques. Prerequisites: PH 631, or EE 609, or ATS 561.

PH 745 - LASERS II

Semester Hours: 3

The propagation of optical beams in homogeneous and lens-like media, optical resonators, interaction between radiation and atomic systems, laser oscillations and specific laser systems, switching and mode-locking of lasers, noise in laser amplifiers and oscillators, modulation of optical radiation. Fall, even years. Prerequisite: PH 645.

PH 746 - NON-LINEAR OPTICS

Semester Hours: 3

PH 751 - COMPUTATIONAL QUANTUM MECH

Semester Hours: 3

Numerical methods for solving the Schrodinger equation. Numerical approximation techniques: Rayleigh-Ritz theory. Quantum scattering from a spherically-symmetric potential. Multi-electron atoms: Hartree self-consistent field theory, Hartree-Fock theory, density functional theory. Electronic structure of diatomic molecules. Ab initio treatment of molecular structure. Additional extensive application to problems in molecular, atomic, and nuclear physics. Prerequisites: PH 652, high-level programming (e.g. C++, Fortran, Mathematica) experience. Offered on demand.

PH 752 - QUANTUM MECHANICS II

Semester Hours: 3

PH 753 - QUANTUM FIELD THEORY

Semester Hours: 3

Formalism of quantum field theory, construction and evaluation of Feynman diagrams for quantum electrodynamics and the weak interaction, first-order processes, renormalization, particle scattering and decay, nucleon structure, introduction to quantum chromodynamics, accelerator experiments, and astrophysical applications. Prerequisites: PH 609 and PH 652.

PH 789 - SELECTED TOPICS

Semester Hours: 1-3

Topics include superconductivity, advanced plasma theory, properties of solids, laser propagation, collision theory, quantum electronics, gravitational theories. Fall, Spring, Summer.

PH 792 - PHYSICS SEMINAR

Semester Hour: 1

Students attend seminars by invited speakers. Two semesters are required for all M.S. students and three semesters for Ph.D. students. Does not count toward minimum degree requirements. Fall, Spring.

PH 795 - ADV PHYSICS PROJECT LAB

Semester Hours: 3-6

Advanced laboratory research in one of the departmental research groups. Student works on an independent or group project. Completion of the course requires a written report that becomes part of the student's record. Fall, Spring, Summer.

PH 799 - DOCTORAL DISSERTATION

Semester Hours: 3-9

Prerequisites: Students must have passed the comprehensive examination at Ph.D. level and have Ph.D. advisor's approval. No more than 9 hours may be taken prior to passing the qualifying examination. Fall, Spring, Summer.

Physics, PhD

To obtain the Ph.D. degree in physics, a student must satisfy all requirements of the Graduate School as well as those in the Department of Physics. The major steps toward a Ph.D. degree are as follows:

1. Take the necessary core courses and pass the Comprehensive Exam at the Ph.D. Level.

Required core courses for the Ph.D. degree are:

Code	Title	Semester Hours
PH 601	CLASSICAL DYNAMICS I	3
PH 607	MATHEMATICAL METHODS I	3
PH 609	MATHEMATICAL METHODS II	3
PH 621	STAT MECH KINETIC THRY I	3
PH 631	ELECTROMAGNETIC THEORY I	3

PH 651	QUANTUM MECHANICS I	3
PH 652	QUANTUM MECHANICS II	3
PH 732	ELECTROMAGNETIC TH II	3
Total Semester Hours		24

The Comprehensive Exam is offered every August, and covers the material in the core courses given above except PH 732, which is usually taken after the Exam. There are sections dealing with quantum mechanics, electromagnetic theory and relativity, and classical and statistical mechanics. A full-time course schedule leading to the Comprehensive Exam at the start of the Fall semester of the second year is listed below.

Admission to the Ph.D. program in physics is granted upon passing the Comprehensive Examination at the Ph.D. level. Students are permitted two attempts to pass the Comprehensive Examination. A student who fails on the first attempt must retake the examination the following year. Full-time students are generally expected to take the exam for the first time at the start of their second year. Further details are found on the Department's (<http://uah.edu/physics/>) website.

Year 1

Fall		Semester Hours
PH 607	MATHEMATICAL METHODS I	3
PH 651	QUANTUM MECHANICS I	3
PH 601	CLASSICAL DYNAMICS I	3
PH 792	PHYSICS SEMINAR	1
Term Semester Hours:		10
Spring		
PH 609	MATHEMATICAL METHODS II	3
PH 652	QUANTUM MECHANICS II	3
PH 631	ELECTROMAGNETIC THEORY I	3
PH 792	PHYSICS SEMINAR	1
Term Semester Hours:		10
Summer		
PH 621	STAT MECH KINETIC THRY I	3
Elective		3
Term Semester Hours:		6
Total Semester Hours:		26

2. Form a supervisory committee and a Program of Study.

Once the Comprehensive Examination is passed, a student should proceed to form a supervisory committee and prepare a Program of Study. A Program of Study will consist of

- a minimum of 48 credit hours of graduate coursework. A maximum of 9 semester hours of PH 699 from a completed M.S. degree with thesis may be allowed to count toward this 48 semester hour requirement.
- three semesters of PH 792 with a grade of "S". Seminar semester hours do not count toward the 48 credit hours above.
- at least 18 semester hours of PH 799. No more than 9 of these semester hours may be taken prior to passing the Qualifying Examination (see below).

Courses in addition to those enumerated above can be selected in consultation with the student's advisory committee. Transfer of credit from other institutions requires approval of the advisory committee, the Department Chair, and the Graduate Dean.

3. Pass the Qualifying Examination.

After preliminary work on their chosen Ph.D. dissertation topic, the student must then pass the Ph.D. Qualifying Examination. This examination is conducted under the auspices of the Graduate School, and tests the student's general fitness for pursuing a research project in their chosen area and their general knowledge of physics. There are written and oral components to this exam. The written part consists of the student's responses to questions submitted by their Committee; these questions can deal with the specific proposed research or the general area of research (such as optics or astrophysics, as covered, e.g., in the elective courses taken in this area). The oral part is a presentation and defense of the proposed research.

4. Complete and defend a research dissertation.

Each student must complete and successfully defend a research dissertation, which must be approved by the student's supervisory committee, the Chair of the Physics Department, the Dean of the College of Science, and the Dean of the Graduate School. A significant portion of the dissertation should be submitted for publication in an approved journal with international circulation.

Physics, MS

There are three M.S. options in physics:

- Thesis
- Non-thesis
- Secondary Education Certification

Required core courses for each are:

Code	Title	Semester Hours
PH 601	CLASSICAL DYNAMICS I	3
PH 607	MATHEMATICAL METHODS I	3
PH 609	MATHEMATICAL METHODS II	3
PH 621	STAT MECH KINETIC THRY I	3
PH 631	ELECTROMAGNETIC THEORY I	3
PH 651	QUANTUM MECHANICS I	3
PH 652	QUANTUM MECHANICS II	3
PH 792	PHYSICS SEMINAR (two semesters) ¹	1
PH 792	PHYSICS SEMINAR	1
Total Semester Hours		23

¹ All M.S. students are required to complete two semesters of PH 792 with a grade of "S"; these semester hours do not, however, count toward minimum degree requirements given below.

Students should complete a Program of Study with the help of their faculty advisor before the completion of 12 semester hours of graduate coursework. A Program of Study is a detailed list of courses that the student will take to satisfy the appropriate degree requirements.

M.S. with Thesis

A student must take at least 24 semester hours in graduate courses, plus at least 6 semester hours of PH 699, culminating in the successful defense of their thesis. Students writing a thesis do not need to take the Comprehensive Examination.

Optics and Photonics Technology Curriculum

The OPT (PH) M.S. degree program is comprised of a minimum of 27 semester hours of graduate coursework, plus a minimum of 6 semester hours of PH 699. The thesis option is the only available route to the OPT degree. Students may pursue the OPT option through either the Physics Department (PH) or the Electrical & Computer Engineering Department (ECE). The OPT (PH) program of study, available on the Department website <http://physics.uah.edu>, meets the Department of Physics M.S. degree requirements and is suggested for students coming from a Physics background. Students in this category, having a Physics Department faculty member as an advisor, will be designated as having Physics as their "home" department. Courses have been chosen such that little or no prior graduate work in physics is required. The OPT degree program does not prepare the student for taking the Physics Comprehensive Exam or the OSE Preliminary Exam. Requirements for students seeking the OPT degree through the Electrical Engineering department, OPT (ECE), may be significantly different.

M.S. without Thesis

A student must take at least 33 semester hours of graduate coursework, and achieve an M.S. passing grade on the Comprehensive Examination. This exam is offered every August, and also serves as the preliminary examination for the Ph.D. degree program. The Comprehensive Examination is on material covered in the core courses given above, and thus has sections dealing with quantum mechanics, electromagnetic theory and relativity and classical and statistical mechanics. Criteria for an M.S. or Ph.D. pass are given on the Department's web site.

For students in the Optical Science and Engineering (OSE) Ph.D. program who desire an M.S. degree in Physics, a passing grade on the OSE Preliminary Examination is an acceptable substitute for the Comprehensive Examination.

A full-time course schedule leading to the Comprehensive Exam at the start of the Fall semester of the second year is listed below.

Year 1

Fall		Semester Hours
PH 607	MATHEMATICAL METHODS I	3
PH 651	QUANTUM MECHANICS I	3
PH 601	CLASSICAL DYNAMICS I	3
PH 792	PHYSICS SEMINAR	1
Term Semester Hours:		10
Spring		
PH 609	MATHEMATICAL METHODS II	3
PH 652	QUANTUM MECHANICS II	3
PH 631	ELECTROMAGNETIC THEORY I	3
PH 792	PHYSICS SEMINAR	1
Term Semester Hours:		10
Summer		
PH 621	STAT MECH KINETIC THRY I	3
Elective		3
Term Semester Hours:		6
Total Semester Hours:		26

Nine (9) Remaining Semester Hours

The remaining 9 semester hours of graduate coursework can be taken in the Physics Department (for advanced study in optics, space physics, astrophysics, or planetary science) or from another department such as Atmospheric Science. Students need to consult with their advisor regarding the selection of topical elective courses.

M.S. with Certification

With this option, also called the *Alternative Fifth-year Program* in the College of Education section of the Graduate Catalog, students are awarded an M.S. degree in Physics as well as Class A (Master's level) Teaching Certification by the State of Alabama. **We strongly encourage students to investigate this rewarding career option.**

This program is available to students who do not already have a Class B (baccalaureate level) Teaching Certification. Requirements are 27 graduate semester hours in Education courses and 24 graduate semester hours in Physics courses. The Education courses are specified in the College of Education section of this catalog, and include a high school internship. The Physics courses include the core courses above, plus 9 additional semester hours. Three of the 9 additional hours will be PH 679 the required Capstone Course for this M.S. option. Neither the Comprehensive Exam nor a thesis is required for this option. However, a thesis can replace the Capstone Course, if desired.

Space Science

Web Site: <http://www.uah.edu/science/departments/space-science> (<http://www.uah.edu/science/departments/space-science/>)

Cramer Research Hall/NSSTC

Telephone: 256-961-7479

Email: spa@uah.edu (%20space-science@uah.edu)

Chair: Gary P. Zank, Eminent Scholar and Distinguished Professor (<https://www.uah.edu/science/departments/space-science/faculty-staff/gary-zank-ph-d/>)

The Space Science department offers the following graduate degree programs:

Master of Space Science (p. 1018)

Doctorate of Space Science (p. 1020)

Program Objective

The Space Science department will provide opportunities through our graduate program for students to be introduced to and engage in cutting edge research in solar physics, heliospheric science, cosmic ray physics, and high-energy astrophysics with faculty from the Department of Space Science and with our research partners: The University of Alabama in Huntsville's (UAH's) Center for Space Plasma and Aeronomic Research (CSPAR) and

Marshall Space Flight Center (MSFC). Additionally, the department will provide a unique unified Space Science graduate program under the umbrella of a single university department.

Learning Outcomes

Students will demonstrate:

- Inculcated problem solving skills through introductory research in the field of space science for future use in science, engineering, teaching, and technology professions
- Ability to write a scholarly document
- Ability to prepare and deliver an effective oral scientific presentation

Master's Degree in Space Science

- Space Science, MS (p. 1018)

Doctoral Degree in Space Science

- Space Science, PhD (p. 1020)

SPA 522 - INTRODUCTION TO PLASMA PHYSICS

Semester Hours: 3

Provides students with an introduction to the basic physical processes associated with plasmas, which permeate all space environments. Both particle and fluid approaches are introduced, and a variety of elementary drift and wave phenomena are derived. Applications of the theory to various plasma instabilities are explored, along with specific examples of where these may occur in space science. While the goal of this course is to prepare students for more advanced topics in space physics, many of the fundamentals covered are equally relevant for students interested in plasma confinement and its associated engineering challenges.

SPA 526 - SPACE WEATHER

Semester Hours: 3

Physics of solar active regions, physics of solar flares and coronal mass ejections (CMEs), the propagation of CMEs, the acceleration and propagation of solar energetic particles, CME interaction with earth's magnetosphere.

SPA 532 - SPACE ORIENTATION EDUCATORS

Semester Hours: 3

A weeklong course at the U.S. Space and Rocket Center in Huntsville, Alabama for pre-service and in-service teachers. The inquiry based workshops are taught around the theme of space exploration include activities to be done across the curriculum. All activities are correlated to National Math, Science, Technology, Social Studies, and Reading Standards. Activities based on curriculum developed by NASA, CAP, NSATA, and the USSRC. Topics include moon, mars, rocketry, propulsion, hydroponics, math, biology, history and literature.

SPA 582 - SCIENCE CAREER PREP

Semester Hour: 1

This course will review many of the soft skills necessary to function as a successful scientist, whether in an academic career, in a federal laboratory, a for-profit research career in a company, or even a commercial career. Your career begins with graduate school, and learning the skills for a successful graduate career will carry over to your professional career. The goal of the course is impart wisdom from successful graduate students and career scientists, providing both a basis for a successful graduate career and your subsequent career. The course will help students reduce the learning things 'the hard way' approach by providing guidance for your career path. Each week will focus on a different skill that a career scientist requires.

SPA 610 - ADV MATH METHDS FOR SPA SCI

Semester Hours: 3

This course will focus on analytical methods for a series of advanced topics with an emphasis on practical applications to space science, such as Vector and Fourier Analysis, ODEs/PDEs in space science, and Green's functions, Spherical Harmonics, Spectral Analysis, Wavelet Transforms, Fractals and Complexity, and Inverse Problems.

SPA 622 - CLASSICAL & QUANTUM STATISTICS

Semester Hours: 3

Statistical methods, systems of particles, statistical thermodynamics, kinetic theory, methods of statistical mechanics, equilibrium between phases of chemical species. Quantum statistics of identical particles. Spin and statistics. Bose-Einstein and Fermi-Dirac distributions.

SPA 623 - TRANSPORT PROCESSES IN SPACE

Semester Hours: 3

Course presents a systematic treatment of classical and anomalous transport theory for gases, plasmas, energetic particles, and low frequency turbulence. The Chapman-Enskog approach is used to derive transport coefficients for neutral gases and collisional plasmas. The relationship between multi-fluid and MHD models is presented. Weak solutions and shock waves are discussed. The transport of energetic particles that experience scattering by magnetic field fluctuations is presented, together with basic models of the turbulence responsible for scattering turbulence transport in expanding flows such as the solar wind. Prerequisite: SPA 622 and SPA 522.

SPA 624 - SPACE PHYSICS I

Semester Hours: 3

A broad introduction to particle, MHD, and kinetic phenomena in space. This course is intended for all students interested in space, astro-, and plasma physics. Course covers fusion processes inside the Sun, solar neutrinos, solar atmosphere, coronal magnetic fields, physical mechanisms of magnetic field line reconnection and magnetic dynamo, the interaction between the solar wind with planets and the interstellar medium, corotating and merged interaction regions, collisional and collisionless shock waves in space. Includes an introduction to charged particle acceleration in the heliosphere. Examines differences between planetary magnetospheres, solar-terrestrial relationships, solar activity, climate, and culture. Prerequisite: SPA 522, SPA 631 (w/concurrency).

SPA 625 - SPACE PHYSICS II

Semester Hours: 3

The course develops a deeper understanding and knowledge of plasma instabilities, kinetic dispersion relations, microinstabilities, electrostatic and electromagnetic instabilities; advanced magnetohydrodynamics including MHD turbulence, reconnection; wave-particle interactions, including basic quasi-linear theory; weak and strong wave turbulence; nonlinear waves; collisionless shock waves. Prerequisite: SPA 624.

SPA 627 - HIGH ENERGY RADIATION DET&MSRM

Semester Hours: 3

This course will provide students with basic understanding of radiation detection for space-based missions. This course will cover the basic nuclear processes in radioactive sources and the interaction of radiation with matter. The statistical treatment of experimental data will be reviewed. General characteristics common to all types of detectors will be given. We will then cover specific classes of detectors focusing on ionization, scintillation and semiconductor detectors. Light collection and detection techniques will follow. The student will then be introduced to basic signal processing and timing techniques important to a successful instrument design. This course will be taught from a physicist point of view emphasizing the physical processes and interactions that make detection of radiation possible. This course is suitable for those students interested in detector development or astrophysical data analysis using state-of-the-art technology.

SPA 628 - SOLAR PHYSICS

Semester Hours: 3

The workings of the sun, from its interior to the outer reaches of the corona with emphasis on the observations. Energy release in core of the Sun and its transport to the solar atmosphere. Dynamo process and the 11 year solar activity cycle. Formation of active regions and structure of sunspots. The structure of corona, with particular details on the active region corona and its heating to several million kelvin. Energy release processes including solar flares and coronal mass ejections.

SPA 629 - ASTROPHYSICAL FLUID DYNAMICS

Semester Hours: 3

Covers astrophysical phenomena occurring outside the boundaries of the solar system. Subjects include stellar structure and rotation, waves and instabilities in astrophysical plasmas, the physics of spherical and disk accretion, supernova blast waves, and charged particle transport and acceleration in cosmic plasmas. Introduction to the principles of stellar formation, helioseismology, stellar dynamo, coronal heating, and astrophysical turbulence. Prerequisite: SPA 522.

SPA 630 - WAVES IN FLUIDS

Semester Hours: 3

Comprehensive introduction to the science of wave motions in fluids. Waves and first-order (hyperbolic) equations, wave hierarchies; gas dynamics and fluid equations; acoustics, nonlinear plane waves, simple waves, shock waves and structure, shock reflection, similarity solutions, supersonic flows in gas dynamics; the wave equation, including plane, spherical and cylindrical waves, geometrical optics, including far-field approximation, caustics, nonhomogeneous media, anisotropy; water waves, including shallow water theory; group velocity, dispersion; nonlinear waves, including Korteweg-de Vries, sine-Gordon, and nonlinear Schrodinger equations, solitons. Prerequisite: SPA 610.

SPA 631 - WAVES AND FIELDS

Semester Hours: 3

This course will cover the following topics: 1) Review of static solutions of the Maxwell equations. Boundary-value applications. Green function solutions. 2) Covariant electrodynamics: Basic application of special relativity to charged particles and fields. Lienard-Wiechert potentials. Solutions to the wave equation. 3) Space Science applications: Thermal Spectra and Particle Distributions. Cyclotron and synchrotron radiation. Bremsstrahlung and collisions. Compton Scattering. Prerequisite: SPA 610.

SPA 632 - IONOSPHERIC AND MAGNETOSPHERIC

Semester Hours: 3

This course will give insights to the Earth's ionosphere and magnetosphere. Seminars cover basic concepts and fundamental plasma physics relevant to the ionosphere and magnetosphere, electrodynamics, electric circuit systems, geomagnetic storms, and substorms, auroras, etc. Training projects involve the use of satellite data and ground-based observations. Prerequisite: SPA 522.

SPA 636 - ADV SPACE WEATHER

Semester Hours: 3

Advanced topics in Space Weather with emphasis on practical effects and impacts on human technology and society: interaction of solar disturbances with Earth's magnetosphere, Solar Energetic Particles, and their effects; Forecasting and Nowcasting of Space Weather; Space Weather at Mars and other planets. Prerequisite: SPA 522.

SPA 662 - COMPUTATIONAL PHYSICS

Semester Hours: 3

Numerical methods to solve common physics problems using C or Fortran. Numerical integration and differentiation, root finding, data fitting, introductory stochastic methods, linear and non-linear differential equations. Fourier analysis. Elliptic parabolic hyperbolic partial differential equations via finite differences, integro-differential equations. Applications to classical dynamics, electromagnetism, statistical and quantum physics.

SPA 663 - COMPUTATIONAL FLUID DYNMC &MHD

Semester Hours: 3

Numerical simulations of various problems in space physics, astrophysics, engineering, and plasma dynamics. Finite-volume and finite-difference, shock-capturing and shock-fitting methods for hyperbolic equations, including gas dynamics, MHD, and shallow water equations. The hierarchy of numerical methods is introduced in a systematic way, starting from standard linear schemes and arriving at modern discontinuity-capturing non-linear methods. Exact and approximate Riemann solvers, characteristic analysis of underlying equations. Different implementations of boundary conditions are introduced in relation with the mathematical properties of quasilinear hyperbolic systems. Prerequisite: SPA 624, SPA 662.

SPA 689 - SELECTED TOPICS

Semester Hours: 3

Selected Topics in Space Science not covered in other courses.

SPA 699 - MASTER'S THESIS

Semester Hours: 1-6

SPA 741 - PHYSICS OF COSMIC RAYS

Semester Hours: 3

Covers two principal areas of cosmic ray physics: (i) cosmic ray origin and acceleration, and (ii) cosmic ray transport and detection. Includes galactic cosmic rays, anomalous cosmic rays, and solar energetic particles. Transport theory, acceleration mechanisms and observational signatures. Prerequisite: SPA 623.

SPA 742 - GAMMA-RAY BURSTS AND JETS

Semester Hours: 3

Astrophysical jet sources: kinetic and magnetically-dominated relativistic outflows. Blandford-McKee solution. Photospheres. Relativistic shock physics. Emission in relativistic plasmas. Gamma-ray bursts; observations, theory. Prerequisite: SPA 622, SPA 624.

SPA 771 - COMPETITIVE GRANT WRITING WKSP

Semester Hour: 1

This course is designed for senior level graduate students who are about to graduate and start their professional career. It will introduce students to the real and complete process of competing for grant support. It is comprised of a series of lectures (workshops), case studies, and ends with a formal proposal from each participant and a mock review process.

SPA 789 - SELECTED TOPICS

Semester Hours: 3

Selected Topics in Space Science not covered in other courses.

SPA 796 - JOURNAL CLUB

Semester Hour: 1

This course requires graduate students to read, interpret and present literature critically to fellow students, researchers, and faculty. Students stay abreast of current knowledge in the field, develop presentation skills and promote department unity. Faculty instructor will lead, assign, and provide students feedback on their presentations.

SPA 799 - DOCTORAL DISSERTATION

Semester Hours: 1-9

Students must have passed the Comprehensive Examination at PhD level and have PhD advisor's approval. No more than 9 hours may be taken prior to passing the Qualifying Examination.

Space Science, MS

Information below is intended for prospective students who are considering a Master's degree in Space Science from UAH.

All questions about enrolling in our M.S. program should be directed to D (jacob.heerikhuisen@uah.edu)r. Gang Li (gang.li@uah.edu), Chair of the SPA Graduate Committee.

Requirements for M.S. Degree - Thesis Option

1. Complete the core coursework (15 credit hours), see Core Courses below.
2. Complete an additional 9 credit hours of elective courses. These are chosen from the Elective Courses list.
3. Complete SPA 582 and SPA 796 once.
4. Complete 6 hours of Master's thesis (SPA 699).
5. Write and defend a Master's thesis.

Code	Title	Semester Hours
Core Courses		
SPA 522	INTRODUCTION TO PLASMA PHYSICS	3
SPA 610	ADV MATH METHDS FOR SPA SCI	3
SPA 622	CLASSICAL & QUANTUM STATISTICS	3
SPA 624	SPACE PHYSICS I	3
SPA 631	WAVES AND FIELDS	3
Required Courses		
SPA 582	SCIENCE CAREER PREP	1
SPA 796	JOURNAL CLUB	1
Elective Courses		
Choose 3 courses from the following:		
SPA 526	SPACE WEATHER	
SPA 623	TRANSPORT PROCESSES IN SPACE	
SPA 625	SPACE PHYSICS II	
SPA 627	HIGH ENERGY RADIATION DET&MSRM	
SPA 628	SOLAR PHYSICS	
SPA 629	ASTROPHYSICAL FLUID DYNAMICS	
SPA 630	WAVES IN FLUIDS	
SPA 662	COMPUTATIONAL PHYSICS	
SPA 663	COMPUTATIONAL FLUID DYNMC &MHD	
SPA 689	SELECTED TOPICS	
SPA 741	PHYSICS OF COSMIC RAYS	
SPA 742	GAMMA-RAY BURSTS AND JETS	
SPA 771	COMPETITIVE GRANT WRITING WKSP	
SPA 789	SELECTED TOPICS	
Total Semester Hours		26

Year 1

		Semester Hours
Fall		
SPA 522	INTRODUCTION TO PLASMA PHYSICS	3
SPA 582	SCIENCE CAREER PREP	1
SPA 610	ADV MATH METHDS FOR SPA SCI	3
SPA 622	CLASSICAL QUANTUM STATISTICS	3
Term Semester Hours:		10
Spring		
SPA 526	SPACE WEATHER	3
SPA 624	SPACE PHYSICS I	3
SPA 631	WAVES AND FIELDS	3
SPA 796	JOURNAL CLUB	1
Term Semester Hours:		10
Summer		
SPA 699	MASTER'S THESIS	3
Term Semester Hours:		3
Year 2		
Fall		
SPA 627	HIGH ENERGY RADIATION DETMSRM	3
SPA 662	COMPUTATIONAL PHYSICS	3
SPA 699	MASTER'S THESIS	3
Term Semester Hours:		9
Total Semester Hours:		32

Requirements for M.S. Degree - Non Thesis Option

1. Complete the core coursework (15 credit hours), see Core Courses below.
2. Complete an additional 15 credit hours of elective courses. These are chosen from the Elective Courses list.
3. Complete SPA 582 and SPA 796 once.
4. Pass a Comprehensive Examination ('Comps'). The Comps are offered annually during the summer semester and consist of three sections: (a) Electromagnetic Theory, (b) Classical and Quantum Statistics, and (c) Plasma Physics. A passing grade of 40% or above in all three sections is required for a M.S. pass.

Code	Title	Semester Hours
Core Courses		
SPA 522	INTRODUCTION TO PLASMA PHYSICS	3
SPA 610	ADV MATH METHDS FOR SPA SCI	3
SPA 622	CLASSICAL & QUANTUM STATISTICS	3
SPA 624	SPACE PHYSICS I	3
SPA 631	WAVES AND FIELDS	3
Required Courses		
SPA 582	SCIENCE CAREER PREP	1
SPA 796	JOURNAL CLUB	1
Elective Courses		
Choose 5 courses from the following:		
SPA 526	SPACE WEATHER	
SPA 623	TRANSPORT PROCESSES IN SPACE	
SPA 625	SPACE PHYSICS II	
SPA 627	HIGH ENERGY RADIATION DET&MSRM	
SPA 628	SOLAR PHYSICS	
SPA 629	ASTROPHYSICAL FLUID DYNAMICS	
SPA 630	WAVES IN FLUIDS	

SPA 662	COMPUTATIONAL PHYSICS	
SPA 663	COMPUTATIONAL FLUID DYNMC &MHD	
SPA 689	SELECTED TOPICS	
SPA 741	PHYSICS OF COSMIC RAYS	
SPA 742	GAMMA-RAY BURSTS AND JETS	
SPA 771	COMPETITIVE GRANT WRITING WKSP	
SPA 789	SELECTED TOPICS	
Total Semester Hours		32

Year 1

Fall		Semester Hours
SPA 522	INTRODUCTION TO PLASMA PHYSICS	3
SPA 582	SCIENCE CAREER PREP	1
SPA 610	ADV MATH METHDS FOR SPA SCI	3
SPA 622	CLASSICAL QUANTUM STATISTICS	3
Term Semester Hours:		10
Spring		
SPA 526	SPACE WEATHER	3
SPA 624	SPACE PHYSICS I	3
SPA 631	WAVES AND FIELDS	3
Term Semester Hours:		9

Year 2

Fall		
SPA 625	SPACE PHYSICS II	3
SPA 627	HIGH ENERGY RADIATION DETMSRM	3
SPA 662	COMPUTATIONAL PHYSICS	3
SPA 796	JOURNAL CLUB	1
Term Semester Hours:		10
Spring		
SPA 628	SOLAR PHYSICS	3
Term Semester Hours:		3
Total Semester Hours:		32

Space Science, PhD

Information below is intended for prospective students who are considering a Doctoral degree in Space Science from UAH.

All questions about enrolling in our PhD program should be directed to Dr. Gang Li (gang.li@uah.edu), Chair of the SPA Graduate Committee.

Requirements for a Ph.D. degree

1. Complete the core coursework (18 credit hours), see Core Courses below.
2. Complete an additional 30 credit hours of elective courses. These are chosen from the Elective Courses list.
3. Complete SPA 796 three times (only 1 credit hour counts toward degree hours).
4. Complete SPA 582 once.
5. Pass a Comprehensive Examination ('Comps'). The Comps are offered annually during the summer semester and consist of three sections: (a) Electromagnetic Theory, (b) Classical and Quantum Statistics, and (c) Plasma Physics. A passing grade of 60% or above in all three sections is required for a Ph.D. pass.
6. Pass a Ph.D. qualifier exam. This step involves writing a dissertation proposal and forming a Ph.D. committee, that would normally consist of the student's faculty advisor and at least four other members from the UAH graduate faculty. We encourage students to invite at least one committee member external to the department.
7. Complete 18 credit hours of dissertation units (SPA 799).
8. Write and defend a Ph.D. dissertation.

9. Students must have a first authored peer reviewed paper published or accepted in a major international journal before their graduation date. Examples of acceptable journals include The Astrophysical Journal, Journal of Geophysical Research, Physics of Plasmas, Geophysical Research Letters, and Physical Review.

Code	Title	Semester Hours
Core Courses		
SPA 522	INTRODUCTION TO PLASMA PHYSICS	3
SPA 610	ADV MATH METHDS FOR SPA SCI	3
SPA 622	CLASSICAL & QUANTUM STATISTICS	3
SPA 623	TRANSPORT PROCESSES IN SPACE	3
SPA 624	SPACE PHYSICS I	3
SPA 631	WAVES AND FIELDS	3
Required Courses		
SPA 582	SCIENCE CAREER PREP	1
SPA 796	JOURNAL CLUB ¹	1
Elective Courses		
SPA 526	SPACE WEATHER	3
SPA 625	SPACE PHYSICS II	3
SPA 627	HIGH ENERGY RADIATION DET&MSRM	3
SPA 628	SOLAR PHYSICS	3
SPA 629	ASTROPHYSICAL FLUID DYNAMICS	3
SPA 630	WAVES IN FLUIDS	3
SPA 662	COMPUTATIONAL PHYSICS	3
SPA 663	COMPUTATIONAL FLUID DYNMC &MHD	3
SPA 689	SELECTED TOPICS	3
SPA 741	PHYSICS OF COSMIC RAYS	3
SPA 742	GAMMA-RAY BURSTS AND JETS	3
SPA 771	COMPETITIVE GRANT WRITING WKSP	1
SPA 789	SELECTED TOPICS	3

¹ Required to take class three times, but only 1 credit hour counts toward degree hours

Year 1		
Fall		Semester Hours
SPA 522	INTRODUCTION TO PLASMA PHYSICS	3
SPA 582	SCIENCE CAREER PREP	1
SPA 610	ADV MATH METHDS FOR SPA SCI	3
SPA 622	CLASSICAL QUANTUM STATISTICS	3
Term Semester Hours:		10
Spring		
SPA 526	SPACE WEATHER	3
SPA 624	SPACE PHYSICS I	3
SPA 631	WAVES AND FIELDS	3
SPA 796	JOURNAL CLUB ¹	1
Term Semester Hours:		10
Year 2		
Fall		
SPA 625	SPACE PHYSICS II	3
SPA 627	HIGH ENERGY RADIATION DETMSRM	3
SPA 662	COMPUTATIONAL PHYSICS	3
SPA 796	JOURNAL CLUB ¹	1
Term Semester Hours:		10
Spring		

SPA 623	TRANSPORT PROCESSES IN SPACE	3
SPA 628	SOLAR PHYSICS	3
SPA 629	ASTROPHYSICAL FLUID DYNAMICS	3
SPA 796	JOURNAL CLUB ¹	1
Term Semester Hours:		10
Year 3		
Fall		
SPA 630	WAVES IN FLUIDS	3
SPA 741	PHYSICS OF COSMIC RAYS	3
or SPA 742	or GAMMA-RAY BURSTS AND JETS	
SPA 799	DOCTORAL DISSERTATION	3
Term Semester Hours:		9
Spring		
SPA 663	COMPUTATIONAL FLUID DYNMC MHD	3
SPA 771	COMPETITIVE GRANT WRITING WKSP	1
SPA 799	DOCTORAL DISSERTATION	6
Term Semester Hours:		10
Year 4		
Fall		
SPA 799	DOCTORAL DISSERTATION	9
Term Semester Hours:		9
Spring		
SPA 799	DOCTORAL DISSERTATION	3-9
Term Semester Hours:		3-9
Total Semester Hours:		71-77

¹ Required to take class four times but only 1 credit hour counts toward degree hours

Course Descriptions

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Accounting (ACC)

ACC 513 - CORPORATE & PARTNERSHIP TAXATN

Semester Hours: 3

Tax accounting for partnerships, corporations, Sub chapter S corporations, estates, and trusts. Tax administration and research are emphasized.

ACC 515 - ADV FINANCIAL ACCOUNTING

Semester Hours: 3

Analysis of issues and alternatives in advanced problem areas including partnerships, intercorporate investments, business combinations, and foreign exchange. Master of Accountancy students only.

ACC 516 - ADVANCED COST ACCOUNTING

Semester Hours: 3

This course explores advanced development and use of cost management data for external reporting and especially internal planning and control. Topics include accounting ethics, the balanced scorecard, cost allocation, inventory management, capital budgeting, management control systems, and performance measurement. Master of Accountancy students only.

ACC 517 - ACC FOR STATE/LOCAL GOV/NON-PR

Semester Hours: 3

Fund accounting and local governments, hospitals, and universities. Special accounting principles, budgeting, accounting for various funds and account groups are emphasized.

ACC 520 - STATE AND LOCAL TAXATION

Semester Hours: 3

Principles of state income tax, sales, and other excise taxes and property tax. Taxation of interstate commerce will be examined along with US constitutional restrictions on the ability of states to tax interstate commerce.

ACC 532 - ADVANCED AUDITING

Semester Hours: 3

Practical application of auditing concepts and standards. An understanding of auditing principles is reinforced and expanded by exposure to problems and cases. Master of Accountancy students only.

ACC 533 - FORENSIC ACCOUNTING

Semester Hours: 3

Study of the nature and types of fraud. The course covers the tools and techniques used to prevent, investigate, and detect fraud.

ACC 540 - BASIC GOVERNMENT CONTRACT ACCT

Semester Hours: 3

Basic coverage and principles of government contract accounting with an emphasis on the Federal Acquisition Regulation (FAR).

ACC 541 - ADV GOVERNMENT CONTRACT ACCTG

Semester Hours: 3

Advanced issues in government contract cost accounting with an emphasis on the Federal Acquisition Regulation (FAR) and Cost Accounting Standards (CAS) cost allocation guidelines. Prerequisite: ACC 540.

ACC 570 - SEMINAR/CONT ACCTG ISSUE

Semester Hours: 3

Current topics in professional accounting. Master of Accountancy students only.

ACC 580 - PROFESSIONAL CERTIFICATION

Semester Hours: 3

Review of the four areas of the Accounting Standards and Procedures: Regulation, Business Environment and Concepts, Financial Accounting and Reporting, Auditing and Attestation. Knowledge of the concepts in each of the areas is required for professional accounting certification and practice. Master of Accountancy students only.

ACC 590 - SPECIAL PROJECTS

Semester Hours: 3

Independent study in the field of accounting which is of interest to a student.

ACC 595 - INTERNSHIP IN ACCOUNTING

Semester Hours: 1-3

Internship with a business or government agency that has particular relevance to the educational goals of the program. Students must keep a log and submit a report on their internship.

ACC 600 - FOUNDATIONS ACC MANAGERS & ENG

Semester Hours: 3

A graduate level introduction to the accounting framework and how it is used in evaluating economic conditions and success in decision making organizations. The course considers financial statements, accounting reports, and accounting terminology that constitutes the language of business. The course also introduces the use of accounting information for decision making, coordinating, motivating, and evaluating.

ACC 602 - MANAGERIAL ACCOUNTING

Semester Hours: 3

Examines the managerial uses of accounting. The focus is on the students gaining a comprehensive understanding of accounting concepts in decision-making, planning, and control. Prerequisite: ACC 600.

ACC 603 - FINANCIAL STATEMENT ANALYSIS

Semester Hours: 3

Concepts and techniques of financial statement analysis and decision-making. Topics include elements of financial statements, short and long term debt-paying ability, analysis of profitability, problems in specialized industries, forecasting, business valuation, and equity security analysis. Master of Accountancy students only.

ACC 607 - ACCOUNTING ANALYTICS

Semester Hours: 3

Applications of business analytics to support accounting, auditing, and management decision making. Emphasis on descriptive, visual, and predictive analysis. Master of Accountancy students only.

ACC 613 - TAX RESEARCH

Semester Hours: 3

This course focuses on the use and understanding of primary and secondary federal tax research materials as they apply to solving complex tax issues confronting tax practitioners. This course's ultimate goal is to help the students solve a tax problem by determining the relevant tax law, finding the relevant law, reconciling any conflicting law and communicating those conclusions. Additionally this course explores the procedural aspect of tax accounting necessary to practice before the Internal Revenue Service. Prerequisite: ACC 513 (with concurrency). Masters of Accountancy students only.

ACC 614 - COST MANAGEMENT

Semester Hours: 3

A study of various approaches to identifying and proactively managing the costs of providing services and products. Special attention is given to the development of cost data useful to managers for decision-making, current issues in cost management, and ethical considerations.

ACC 642 - ADV INTERN/OPR AUDITING

Semester Hours: 3

Introduction to the methodology of internal and operational auditing and to the utilization of results of the audit by management in decision making.

ACC 650 - SELECTED RESEARCH TOPICS

Semester Hours: 3

ACC 680 - FINANCIAL ACCOUNTING THEORY

Semester Hours: 3

A capstone course that includes a study of the historical development and theoretical structure of accounting followed by an appraisal of selected pronouncements of professional accounting organizations. Master of Accountancy students only.

ACC 699 - MASTER'S THESIS

Semester Hours: 1-3

Required each semester a student is working on and receiving direction on a masters thesis. A minimum of 2 semesters is required, but no more than six hours of credit is allowed.

Astronomy (AST)

AST 571 - STELLAR ATMOSP/INTERIORS

Semester Hours: 3

AST 572 - GALACTIC STRUC/COSMOLOGY

Semester Hours: 3

AST 573 - HIGH-ENERGY ASTROPHYSICS

Semester Hours: 3

Atmospheric Science (ATS)

ATS 501 - SURVEY OF ATMOSPHERIC SCIENCE

Semester Hours: 3

General survey of the field of atmospheric science includes thermodynamics, atmospheric dynamics, cloud physics, and atmospheric radiation. Quantitative examination of atmospheric properties including atmospheric composition, structure and dynamics.

ATS 509 - APPL COMPUTERS IN METEOROLOGY

Semester Hours: 3

Survey of scientific programming techniques used in atmospheric sciences. Various data types, control statements, and programming design using object oriented techniques are discussed, emphasizing efficient programming. Course prepares students for graduate work and research in atmospheric science.

ATS 510 - OPERATIONAL WEATHER FORECAST'G

Semester Hours: 3

Subjective & objective methods of atmospheric prognosis. Forecasting critical weather elements. Interpretation, use & systematic errors of computer-generated products, human factors, & application of meteorological theory in an operational setting.

ATS 513 - GIS & REMOTE SENSING

Semester Hours: 3

Hands-on approach to GIS and satellite remote sensing. Popular satellite data sets such as LANDSAT and AVHRR are coupled with GIS data sets to increase understanding of the earth system. Topics include satellite sensors, basic radiative transfer, orbits, raster formats, atmospheric correction, distortion, image corrections, rotations and mapping, spatial resolution, image interpretation, radiometric and geometric enhancement, multispectral transformations, and classifications. (Same as ATS 413, ES 413, ES 513.) Spring. Prerequisite: ATS 511 or ESS 511.

ATS 515 - ADVANCED TOPICS IN GIS

Semester Hours: 3

Advanced special topics: visualization of GIS and remote sensing data, landscape characterization (pattern vs. process), multitemporal analysis, aggregation of data types, developing an integrated GIS environment for performing complex space-time modeling analyses, and land-atmosphere interactions. (Same as ATS 415, ES 415, ES 515.) Spring.

ATS 520 - INTRO ATMOS CHEM & AIR POLLUTI

Semester Hours: 3

An introduction designed to provide students with the basics of atmospheric chemistry and air pollution concepts. Topics include air pollutants, air-pollution meteorology, atmospheric gases and aerosols, and atmospheric processes.

ATS 522 - AIR POLLU:METEOROLOGY CONCEPTS

Semester Hours: 3

ATS 541 - ATM THERMODYN & CLOUD PHYSICS

Semester Hours: 3

Thermodynamic & cloud physical processes in the atmosphere. Atmospheric statics & stability. Role of aerosols in nucleation of cloud and ice particles. Physical processes that produce the growth of hydrometeors in cold and warm clouds. Applicable measurement techniques.

ATS 551 - ATMOS FLUID DYNAMICS I

Semester Hours: 3

Fluid dynamics in the atmosphere. Coriolis acceleration, scale analysis and appropriate approximations of the complete governing equations. Numerical analysis and interpretation of weather phenomena.

ATS 553 - ATS RADIATN/REMOTE SENSING

Semester Hours: 3

ATS 554 - FORECASTING MESOSCALE PROC

Semester Hours: 3

Detection and forecasting of atmospheric mesoscale phenomena including the structure and evolution of clouds, precipitation (including floods) thunderstorms and severe weather. Includes basics of instruments used to detect mesoscale phenomena, most notably satellite and radar.

Prerequisites: ATS 551.

ATS 561 - ATMOSPHERIC RADIATION I

Semester Hours: 3

Fundamentals of terrestrial atmospheric radiation. Topics include: basic concepts, radiative transfer equation, gaseous absorption, scattering by molecules and particles, band models, transmittance along an inhomogeneous path.

ATS 571 - INTRO TO RADAR METEOROLOGY

Semester Hours: 3

Introduction to principles of radar meteorology, including radar operations, hardware, interpretation and analysis. Doppler, dual-polarization and dual-wavelength radar theory, methods and applications are covered. Prerequisite: ATS 541.

ATS 572 - SATELLITE METEOROLOGY

Semester Hours: 3

The goal for this course is to provide students in undergraduate and graduate level Earth and Atmospheric Science a background in satellite meteorology. During all components of the course there will be a heavy emphasis on practical meteorological satellite interpretation with respect to land surface and especially atmospheric features. Prerequisites: ESS 508 or ATS 509.

ATS 581 - ATS THERMODYNAMICS & CHEM

Semester Hours: 3

ATS 590 - SPECIAL TOPICS

Semester Hours: 1-3

Selected topics of interest not included in other courses.

ATS 603 - CLIMATE DYNAMICS

Semester Hours: 3

Origin and evolution of the climate system including underlying causes for past climates such as occurred during the ice ages. Statistical processing of various time series to extract climatic signals in the data. Determination of global-scale forcing mechanisms, which impact climate. Prerequisites: ATS 541 and ATS 551.

ATS 606 - DATA ANALY ATMOSPHERIC SCNTS

Semester Hours: 3

A theoretical and practical introduction to various data analysis methods commonly used in atmospheric science. Topics include forecasting techniques to generate models to fit data, assess models using parametric tests, probability theory and Monte Carlo methods to solve a variety of problems.

Prerequisites: ATS 509.

ATS 620 - ATMOSPHERIC CHEMISTRY & AEROSI

Semester Hours: 3

Primary processes, thermodynamics, photochemistry, kinetics, models, and measurements applied to troposphere and stratosphere; natural and anthropogenic; chlorine, nitrogen, hydrogen, and oxygen catalytic cycles; ground- and satellite-based observations of trace species. Prerequisites: ATS 520.

ATS 622 - AIR POLLUTION MODELING

Semester Hours: 3

Air pollution Lagrangian and Eulerian modeling concepts and methods from micro to synoptic scales; plume, large eddy simulations and urban-regional models in research and regulatory applications; transport, dispersion, chemistry, clouds, aerosols, and wet/dry deposition. Prerequisites: ATS 520 and ATS 551.

ATS 630 - PHYSICAL CLIMATOLOGY

Semester Hours: 3

This course examines the physical aspects of the global climate system, including the global energy balance, surface energy balance, hydrologic cycle, climate classification, ocean change and other selected topics such as climate sensitivity. Prerequisites: ATS 501 or ATS 541.

ATS 635 - GENERAL CIRCULATION

Semester Hours: 3

Detailed examination of the observed dynamic, thermodynamic and chemical structure of the atmosphere, including mid-latitude baroclinic systems, tropical systems, global-scale energy, mass and momentum budgets and the fundamental climatology of the atmosphere. Prerequisites: ATS 541 and ATS 551.

ATS 642 - PRECIP PHYSICS FOR RADAR

Semester Hours: 3

Cloud microphysics theory, models, in-situ and radar observations of hydrometers will be utilized together to explore advanced concepts in precipitation physics and their connection to radar meteorology, including coalescence, break-up, freezing, size sorting, aggregation, riming and melting. Prerequisite: ATS 531 and ATS 571.

ATS 651 - ATMOS FLUID DYNAMICS II

Semester Hours: 3

Wave motions in the atmosphere with emphasis of Rossby, Kelvin and gravity waves. Systematic scaling of primitive equations to develop quasi-geostrophic and Ekman-layer theory. Shallow water theory, stratified flows, and barotropic and baroclinic instability. Prerequisites: ATS 551.

ATS 652 - ADV SYNOPTIC METEOROLOGY

Semester Hours: 3

Analysis, interpretation and forecasting synoptic-scale and mesoscale phenomena, including air masses, frontal systems, cyclones, anti-cyclones and waves toward understanding process dynamics. Emphasize the use of observational, satellite and numerical model data, including radars and profilers. Prerequisites: ATS 541 and ATS 551.

ATS 654 - FORECASTING MESOSCALE PROCESSE

Semester Hours: 3

ATS 655 - BOUNDARY LAYER METEOROLOGY

Semester Hours: 3

Survey of atmospheric boundary layer (ABL) properties. Review of turbulence, convective and stable boundary layers, surface forcing, boundary layer discontinuities, and singular phenomena within the ABL. Atmospheric field measurements are used to enhance understanding of ABL process. Prerequisites: ATS 541 and ATS 551.

ATS 656 - TROPICAL METEOROLOGY

Semester Hours: 3

Overview concepts of the dynamics and climatology of the tropics and of significant tropical precipitation systems. Topics also include Kelvin waves, equatorial flows, convective scale dynamics, island meteorology, tropical cyclones, ENSO, radiative-convective equilibrium, gregarious cloud systems. Prerequisites: ATS 541 and ATS 551.

ATS 657 - NOWCASTING THEORY METHODS

Semester Hours: 3

Theory, methods and applications of 0-6 hour weather and ecological prediction, which is a forecast time period when numerical prediction models have low skill. Topics include predictability, data assimilation, statistical methods, and algorithms using Earth and atmospheric science observations.

ATS 670 - SATELLITE REMOTE SENSING I

Semester Hours: 3

Using a hands-on approach, this course covers a broad range of topics concerning digital image processing applied to the remote sensing of atmospheric, cloud and surface properties using various satellite data sets. Prerequisites: ATS 509.

ATS 671 - GROUND BASED REMOTE SENSING

Semester Hours: 3

Principles and measurement capabilities of active and passive ground-based remote sensing systems: radar, wind profiler, lidar, sodar, and passive radiometer systems. Integration of remote sensing measurements to retrieve properties of atmospheric phenomena. Hands on usage and field measurements. Prerequisites: ATS 541.

ATS 672 - DUAL POLARIZATION RADAR MTRLGY

Semester Hours: 3

Theory, analysis and interpretation of dual polarization radar for meteorological applications. Course covers dual polarization radar system hardware; the basic theory underlying polarimetric radar data and methodology; analysis, interpretation and application of polarimetric radar variables; and dual meteorological and convective weather applications; specifically, precipitation measurement and hydrometeor identification. Example applications include rain rate estimation, drop size determination, hail identification, tornado detection, snow vs rain delineation, and cloud electrification studies. Prerequisites: ATS 571.

ATS 673 - LIGHTNING

Semester Hours: 3

An introduction to lightning. Topics include qualitative and quantitative description of lightning discharges; electrification of thunderstorms; temporal and spatial variation of lightning on multiple scales; various types of lightning; basic lightning models; current methods of measuring lightning. Prerequisites: ATS 509.

ATS 675 - ATMOSPHERIC DATA ASSIMILATION

Semester Hours: 3

Data assimilation methods and concepts including objective analysis and initialization as relevant to numerical weather prediction. Emphasis on variational methods, successive correction, optimal interpolation, adjoint and gradient concepts, singular vectors, Kalman filters and nudging. Prerequisites: ATS 541 and ATS 551.

ATS 681 - NUMERICAL ATMOS MODELING

Semester Hours: 3

Introduction to numerical methods applied to simulation of the atmosphere. Basic numerical solution techniques, along with filtering, radiative parameterizations, thermodynamics, turbulent parameterization, initialization and coordinate transformation. Prerequisites: ATS 551.

ATS 690 - SEL TOPICS IN ATMOS SCI

Semester Hours: 1-4

Selected topics of interest not included under other courses.

ATS 699 - MASTER'S THESIS

Semester Hours: 1-6

Required each semester a student is enrolled and receiving direction on a master's thesis.

ATS 740 - CLOUD PROCESSES

Semester Hours: 3

Theory and observations of the bulk microphysics and kinematic structures of clouds. Topics include: interactions among dynamical, microphysical and thermodynamic processes within cloud systems, the dynamics of organized convective systems, and remote sensing of clouds and precipitation features. Prerequisites: ATS 541 and ATS 551.

ATS 761 - ATMOSPHERIC RADIATION II

Semester Hours: 3

Advanced topics in atmospheric radiative transfer. Specific topics include Maxwell equations, Mie theory, polarization and radiative transfer in a scattering atmosphere. Prerequisites: ATS 561.

ATS 762 - MICROPARTICLE OPT & RADIOMETRY

Semester Hours: 3

Propagation of electromagnetic radiation. Maxwells equations, Kramers-Kronig analysis, Mueller matrices, Stokes vectors, Rayleigh theory, scattering & absorption by single & multi sphere, near & internal fields, geometric optics, discrete dipole approximation, & T-matrices. Prerequisites: ATS 561.

ATS 770 - SATELLITE REMOTE SENSING

Semester Hours: 3

Using various satellite data sets and radiative transfer models, this course will train students to calculate and study cloud, aerosol, ocean and land surface properties to assess the radiative energy budget of the earth-atmosphere system. Prerequisites: ATS 670.

ATS 780 - ATMOSPHERIC SCIENCE SEMINAR

Semester Hour: 1

Speakers are invited to report on research relevant to the field of atmospheric science. Students are expected to attend at least twelve seminars and to write short descriptions of the presentations.

ATS 781 - STUDENT SEMINAR

Semester Hour: 1

Guest speakers report on research relevant to the fields of Atmospheric and Earth System Science. Students are expected to attend weekly seminars, submit a paper based on at least ten talks, and make a 15-minute conference type presentation on a research topic in atmospheric science selected in agreement with their advisor. Prerequisites: ATS/ESS 780.

ATS 782 - PROFESSIONAL DEVELOPMENT

Semester Hour: 1

Topics concerning professional ethics, writing scientific journal articles, proposals and resumes, preparing budgets, networking, time management, conference presentations, research administration, funding agencies, stress and burnout will be discussed. Selected topics of interest not included under other courses.

ATS 790 - SEL TOPICS IN ATMOS SCI

Semester Hours: 1-4

Selected topics of interest not included under other courses.

ATS 799 - DOCTORAL DISSERTATION

Semester Hours: 3-9

Required each semester student is enrolled and receiving direction on a doctoral dissertation.

Biological Sciences (BYS)

BYS 505 - PSYCHOPHARMACOLOGY

Semester Hours: 3

Introduction to drug classification and action with emphasis on physiological and psychological interactions. Same as PY 505.

BYS 519 - GENE STRUCTURE & FUNCTION

Semester Hours: 3

Advanced studies of macromolecular structure and biological function of proteins and nucleic acids involved in the passage of genetic information and cellular response. Structural significance of viruses and molecular evolution included.

BYS 523 - PRINCIPLES OF VIROLOGY/A&M

Semester Hours: 3

Course offered jointly by Alabama A&M University and UAH but which is taught on the A&M campus. Principles of viral infectivity, multiplication, and chemical constitution; laboratory techniques for their isolation, cultivation, identification, and enumeration.

BYS 524 - MYCOLOGY/A&M

Semester Hours: 3

Course offered jointly by Alabama A&M University and UAH but which is taught on the A&M campus. Lines of phycomycetes using representative species; various series of actinomycetes; representative pathogenic (crop and vegetative pathogens) and nonpathogenic heterobasidiomycetideae organisms; order and families of homobasidiomycetidae. Ontogenetics, cellular, and structural study applied to all divisions, classes, series, orders and families.

BYS 526 - MICROBIAL ECOLOGY

Semester Hours: 4

Course offered jointly by Alabama A&M University and UAH but which is taught on the A&M campus. Relationship of soil and aquatic microorganisms and their importance in ammonification, nitrification, and other biological processes.

BYS 529 - BIostatISTICS/AL A&M

Semester Hours: 4

BYS 530 - APP. OF GEostatISTICS/AL A&M

Semester Hours: 4

BYS 531 - BIOLOGICAL DATA SKILLS

Semester Hours: 3

This course covers a range of computational skills needed specifically for biologists who do not have any training in computer science. The course focuses on command line tools, basic programming in Python, and various aspects of data handling including, data curation, organization, storage, querying, and archiving. The course will include a project that ties together skills that are useful for individual students.

BYS 532 - MEDICAL PHYSIOLOGY

Semester Hours: 4

Detailed study of physiology, covering membrane transport, muscle, nerve, heart, lung, gastrointestinal and renal function. Emphasis will be on homeostasis, genetic disease and pharmacological therapy.

BYS 532L - LABORATORY

Semester Hours: 0

BYS 534 - MEDICAL PHYSIOLOGY II

Semester Hours: 3

Course offered jointly by Alabama A&M University and UAH but which is taught on the A&M campus. Continuation of mammalian physiology with consideration of kidney function, respiratory, digestive, reproductive, and endocrine systems.

BYS 535 - ADVANCED MICROBIOLOGY

Semester Hours: 3

Aspects of microbial behavior, development, morphogenesis or physiology.

BYS 537 - PSYCHOBIOLOGY STRESS & ILLNESS

Semester Hours: 3

Overview of physiological stress responses and their influence on health, behavior, and illness. Same as PY 536.

BYS 542 - NUTRITIONAL PHYSIOLOGY

Semester Hours: 3

Course offered jointly by Alabama A&M University and UAH but which is taught on the A&M campus. Advanced laboratory dealing with modern techniques of molecular biology and biochemistry.

BYS 543 - MOLECULAR BIOLOGY OF THE CELL

Semester Hours: 3

Advanced study of cell structure and function of macromolecules (lipids, proteins, carbohydrates and nucleotides). In depth literature readings on subcellular organelles, metabolic pathways, cell cycle, cancer, and cell differentiation.

BYS 547 - BIOCHEMISTRY I

Semester Hours: 3

Structural chemistry and function of biomolecules, mechanisms of biochemical reactions, and enzyme kinetics. Same as: CH 561.

BYS 548 - BIOCHEMISTRY II

Semester Hours: 3

Energy transduction, metabolism, biosynthesis of macromolecular precursors, storage, transmission, and expression of genetic information. Same as CH 562. Prerequisites: BYS 547 or CH 561.

BYS 556 - ADV MOLECULAR TECHNIQUES

Semester Hours: 3

Laboratory techniques in molecular biology including current methodology in genomics, proteomics and RNA analysis. Prerequisites: BYS 519 with concurrency.

BYS 560 - ENVIRONMENTAL BIOLOGY/A&M

Semester Hours: 3

Course offered jointly by Alabama A&M University and UAH but which is taught on the A&M campus. Principles of interaction between living systems and their resources. Current problems in management of natural resources including new approaches in management of pest populations.

BYS 561 - HERPETOLOGY

Semester Hours: 4

Classification, diversity, anatomy function, ecology, behavior, and evolution of amphibians and reptiles. Laboratory and field trips devoted to anatomy and identification, with an emphasis on Alabama and southeastern U.S. species.

BYS 562 - COMMUNITY ECOLOGY

Semester Hours: 4

Detailed consideration of ecological principles and concepts, as well as biotic and abiotic factors relevant to development of communities and ecosystems. Field trips required.

BYS 563 - POPULATION ECOLOGY

Semester Hours: 4

Distribution, population dynamics and behavior of populations in relation to environmental factors. Field trips required.

BYS 564 - LIMNOLOGY

Semester Hours: 3

Fresh-water environments and organisms exemplified by lakes, ponds, and streams in North Alabama.

BYS 601 - BIOINFORMATICS I

Semester Hours: 3

Practical use in Bioinformatics and X-ray crystallography.

BYS 602 - BIOINFORMATICS II

Semester Hours: 3

Practical use in Bioinformatics and applied Genomics.

BYS 619 - MICROBIAL GENETICS

Semester Hours: 3

Transmission, expression, and evolution of genes in microorganisms. Studies of chromosomes, plasmids, transposons, bacteriophages and other genetic elements.

BYS 630 - IMMUNOLOGY

Semester Hours: 4

Innate, humoral and cell-mediated immunity. Immune deficiencies and hyper sensitivities. Autoimmunity, transplantation and tumor immunology.

BYS 631 - MEDICAL PHARMACOLOGY/A&M

Semester Hours: 3

Course offered jointly by Alabama A&M University and UAH but which is taught on the A&M campus. Drug-receptor interaction, kinetics of drug absorption, distribution and elimination, and discussion of drugs affecting different systems. Pharmacogenetics, toxicity, mutagenesis, teratogenesis, carcinogenesis, and drug interactions. Mechanism of action of drugs, in relation to their use as therapeutic agents in medicine.

BYS 690 - SEMINAR

Semester Hour: 1

Student reports on current journal articles, research, or assigned readings. Graduate students should attend whether enrolled for credit or not. May be taken up to three times for credit.

BYS 691 - SPECIAL TOPICS

Semester Hours: 1-4

Directed readings and/or written reports on topics of individual student interest carried out under the supervision of an instructor. Prerequisite: permission of instructor required before registration.

BYS 692 - RESEARCH

Semester Hours: 2-4

Individual investigations of biological problems under supervision of a graduate faculty member. Permission of instructor required before registration.

BYS 699 - MASTER'S THESIS

Semester Hours: 1-6

Required each semester student is working on and receiving direction on master's thesis. Minimum of six hours required for M.S. thesis students.

Business Legal Studies (BLS)

BLS 500 - LAW, ETHICS & BUSINESS

Semester Hours: 3

An analytical review of corporate ethics addressed from a legal and business standpoint. Focus on codes of ethics, integration of integrity into corporate cultures, top management commitment to ethics, civic involvement, employer-employee relations, consumer protection, and international business.

BLS 506 - GOVMT CONTRACT LAW

Semester Hours: 3

Application of the legal principles governing government contracts as developed from common law, statutes, regulations, and court decisions. Includes requests for proposals, negotiation, inspection, acceptance, delivery, warranties, modification of contracts, equitable adjustment, and disputes.

Prerequisite: MGT 501 or ACC 540.

BLS 510 - BUSINESS NEGOTIATIONS

Semester Hours: 3

This course is designed to familiarize students with the theories, basic skills, and ethics involved in negotiation. Through a combination of readings, lectures, videotapes, role-play exercises, and discussion, students will develop an understanding of the dynamics of negotiation and the approaches available to a wide variety of business leaders engaged in the negotiation process. The course will include sessions in which students will have the opportunity to gain experience through role playing of simulations taken from actual cases.

BLS 511 - BUS LAW FOR ACCOUNTANTS

Semester Hours: 3

In-depth study of legal principles and problems encountered in practice by professional accountants. This course covers legal topics from a Uniform Commercial Code perspective.

BLS 590 - SPECIAL TOPICS BUSINESS LAW

Semester Hours: 3

Specialized instruction of an area of interest to students in business.

BLS 625 - LEGAL ASPECTS OF ENGRS

Semester Hours: 3

Legal problems and principles relevant to the practice of professional engineers. The legal system, contracts, torts, business organizations, employment law, intellectual property law, and environmental law.

Chemical Engineering (CHE)

CHE 540 - PHYSICAL PROP OF FLUIDS

Semester Hours: 3

Theoretical, experimental, and correlation methods for determining and predicting the thermodynamic and transport properties of various fluids. Critical properties, equations of state, vapor pressure and latent heat, heat capacity. Viscosity, thermal conductivity, diffusion coefficient, phase equilibrium, heat and free energy for formation.

CHE 541 - CHEMICAL KINETICS & REACTOR DE

Semester Hours: 3

Fundamental principles of chemical kinetics and chemical reactor engineering along with the design of both thermal and catalytic reactors.

CHE 549 - INTRO ENVIRONMENTAL ENGR

Semester Hours: 3

Engineering aspects of air, water, and thermal pollution. Hydrologic cycle, water sources and uses; industrial and other sources of primary and secondary pollutants. Transport process in environmental problems and in their control.

CHE 552 - EXPER TECH IN FLUID MECH

Semester Hours: 3

CHE 559 - SELECTED TOPICS/CHE

Semester Hours: 1-6

Discussion of biocompatible polymers and their application in drug delivery systems. Polymers of natural and synthetic origin will be studied, special emphasis will be placed upon the synthesis of biocompatible polymers. The formation of polymeric micelles, hydrogels and liposomes will be studied. The process of extravasation as uptake mechanism for polymeric delivery systems will be discussed. Reading material will be based on the latest publications in the field.

CHE 560 - INTRO TO BIOPROCESS ENGR

Semester Hours: 3

Application of engineering principles to the analysis of and the development and design of processes using biological catalysts including enzymes, plant and animal cells, and genetically engineered cells. Other topics include fermentation and biological mass transport processes.

CHE 561 - BIOSEPARATIONS RECOMBI TECH/PR

Semester Hours: 3

General characteristics of separation processes used in the biotechnology industry, including removal of insolubles, isolation and purification of thermally sensitive products for final use by the customer. Application of unit operation principles for biological separations, recombinant DNA techniques, protein engineering. Prerequisite: CHE 560.

CHE 594 - APPLIED MATERIALS PROCESSING

Semester Hours: 3

Synthesis and processing methods of materials for engineering applications. Selection and use of materials performance factors for design of structural and functional components. Use of computational methods in solving open-ended design problems that depend on an understanding of the nature and properties of materials will be emphasized. All classes of materials are covered.

CHE 595 - POLYMER ENGINEERING

Semester Hours: 3

Engineering principles of polymers and their role in manufacturing processes. Aspects of polymer phenomena and their relationship to processing of structural and functional components.

CHE 641 - ADV THERMODYNAMICS

Semester Hours: 3

Application of classical thermodynamics. Treatment of problems involving nonideal gases and liquids, phase equilibrium, and chemical equilibrium.

CHE 642 - PHYSICOCHEMICAL HYDRODYNAMICS

Semester Hours: 3

Treatment of electrokinetic phenomena, axial dispersion, convective diffusion in liquids, Brownian motion, flows driven by surface tensions, capillary motion.

CHE 644 - INTRO ELECTROCHEM SYSTEM

Semester Hours: 3

Thermodynamics, transport, and kinetics of electrodes and cells. Systems analysis of batteries, fuel cells, porous electrodes, electroplating, electrowinning, and corrosion processes. Convective diffusion at high Schmidt numbers.

CHE 646 - THERMODYNAMICS OF MATRLS

Semester Hours: 3

Fundamental thermodynamic review, phase equilibrium, chemical reaction equilibrium, free energy, binary and ternary phase transformations, solution models and selected topics.

CHE 648 - TRANSPORT PHENOMENA I

Semester Hours: 3

Introduction to transport phenomena, fluid and continuum mechanics. Exact solutions of the Navier-Stokes equation. Introduction to boundary-layer. Multiphase flows. Capillary flows.

CHE 649 - TRANSPORT PHENOMENA II

Semester Hours: 3

Introduction to transport phenomena with emphasis on energy and mass transport. Equations of energy change. Free and forced convection. Equations of mass change. Ficks Law. The Stephan-Maxwell equations. Mass transport in multiphase systems. Prerequisite: CHE 648.

CHE 650 - PRINC LIQUID/SOLID INTER

Semester Hours: 3

Applies basic principles in thermodynamics and kinetics to characterize surfaces and surface phenomena. Fundamental properties of gas-liquid, liquid-liquid, solid-liquid, and solid-gas interfaces and phenomena occurring at these interfaces.

CHE 652 - INTRO TO AIR POLLU CONTROL

Semester Hours: 3

Technology of air pollution dealing with air pollutants, effects, sources, combustion processes, and abatement and control technology. Engineering contributions to both the problems and their solutions. Nature of air pollution problem and fundamental technological approaches to its solution.

CHE 657 - ADVANCED PROCESS CONTROL

Semester Hours: 3

Application of modern control theory to chemical processes; multivariable control; estimation and adaptive control, optimal control.

CHE 658 - CATALYSIS/REACTOR DESIGN

Semester Hours: 3

Treatment of homogeneous and heterogeneous reaction kinetics, transport in fluid-solid reactions, catalyst deactivation and their effects on the analysis and design of chemical reactors. Prerequisite: CHE 541.

CHE 659 - SELECTED TOPICS/CHE

Semester Hours: 1-6

CHE 696 - GRAD INTERNSHIP CHE ENGR

Semester Hours: 1-9

Active involvement in an engineering project in an engineering enterprise, professional organization or government agency that has particular interest and relevance to the graduate student. Permission of CHE faculty member required.

CHE 699 - MASTER'S THESIS

Semester Hours: 1-9

CHE 724 - INSTR METH/BIO-MTLS CHARACTERI

Semester Hours: 3

CHE 725 - INSTR METH/BIO-MTLS CHARACTERI

Semester Hours: 4

CHE 747 - ADV TOP/BIOENGINEERING

Semester Hours: 3

Engineering aspects of microbial processes and the processing of biological materials. Integrating knowledge of governing biological properties and principles with chemical engineering methodology. Emphasis on current literature in the areas of purification and separation technology, bioprocess development and biomaterials.

CHE 749 - MASS TRANSPORT

Semester Hours: 3

Mass transfer in solid and fluid systems under steady and transient conditions. Integration of momentum, heat and mass transfer equations with application to reactive, rheological and multicomponent systems.

CHE 757 - OPT TECH/FLUID MECHANICS

Semester Hours: 3

Laser courses, molecular interactions with light and diatomic spectroscopy needed fluorescence, Brillouin scattering, four wave mixing, CARS and other applications in optical fluid diagnostics.

CHE 759 - ADV SELECTED TOPICS IN CHE

Semester Hours: 1-3

CHE 799 - DOCTORAL DISSERTATION

Semester Hours: 1-9

Required each semester student is enrolled and receiving direction on doctoral dissertation.

Chemistry (CH)

CH 500 - TOPICS IN CHEMISTRY

Semester Hours: 1-3

Advanced laboratory research in one of the departmental research groups. The student works on an independent or group research project. Completion of the course requires an appropriate written and oral report. Prerequisites: Approval of instructor.

CH 521 - CHEMICAL INSTRUMENTATION

Semester Hours: 4

Use of basic instrumentation in NMR, mass spectrometric, chromatographic, and spectrophotometric analysis.

CH 540 - POLYMER SYNTHESIS & CHARACTERI

Semester Hours: 3

Same as MTS 649.

CH 549 - SPECTROSCOPY & MOLEC STR

Semester Hours: 3

Intermediate level treatment of principles of spectroscopy and their application to determination of molecular structure.

CH 553 - INTRO QUANTUM MECH I

Semester Hours: 3

Waves and particles; Bohr's model; de Broglie waves, wave-packets, uncertainty principle; quantum mechanics postulates; Schroedinger equation; systems in 1, 2 & 3 dimensions; hydrogen atom. Same as PH 551, OSE 555, and MTS 651.

CH 554 - INTRO QUANTUM MECH II

Semester Hours: 3

Angular momentum and spin; atomic structure and spectrum; time-independent perturbation theory, variational methods; time-dependent perturbation theory and interactions of light with matter; scattering theory; electronic structure of solids; relativistic quantum mechanics. Same as: PH 552, MTS 652. Prerequisite: PH 551 or CH 553.

CH 561 - BIOCHEMISTRY I

Semester Hours: 3

Structural chemistry and function of biomolecules, mechanisms of biochemical reactions, enzyme kinetics, and energy transfer. Same as: BYS 547.

CH 562 - BIOCHEMISTRY II

Semester Hours: 3

Metabolism, biosynthesis of macromolecular precursors, storage, transmission, and expression of genetic information, and molecular physiology. Same as BYS 548. Prerequisites: CH 561 or BYS 547.

CH 600 - ADV INORGANIC CHEMISTRY

Semester Hours: 3

Survey with emphasis on structure and reactivity of inorganic compounds.

CH 602 - CHEM COORD COMPOUNDS

Semester Hours: 3

Modern bonding theory and stereo chemistry of coordination compounds.

CH 621 - METHODS OF CHEMICAL ANALYSIS

Semester Hours: 3

Literature, seminar course. Theory and methodology of various techniques of chemical analysis.

CH 631 - SYNTHETIC ORGANIC CHEMISTRY

Semester Hours: 3

Survey of certain reactions that enjoy widespread application to the synthesis of organic compounds.

CH 632 - PHYSICAL ORGANIC CHEMISTRY

Semester Hours: 3

Reactive intermediates, structure-activity relationships, reaction mechanisms and techniques used to determine them.

CH 633 - ORGANIC STRUCTURE DETERMINATION

Semester Hours: 3

Structure determination of organic molecules using spectroscopic methods, especially NMR, IR, and MS. Emphasis on the theory and interpretation of many NMR methods useful in chemistry research.

CH 634 - MOLECULAR MODELING

Semester Hours: 4

Molecular modeling methods, including molecular mechanics, molecular docking, molecular orbital theory, and density functional theory, will be used to investigate conformational properties of organic compounds, molecular interactions between biological macromolecules and organic ligands, electronic structure of organic and inorganic compounds, frontier molecular orbitals, pericyclic reactions, and reactive intermediates. Extensive computational laboratory work included.

CH 635 - CHEMICAL TOXICOLOGY

Semester Hours: 3

An introduction to the principles of chemical toxicology, including the effects of drugs, environmental pollutants, natural toxins and venoms and other potentially hazardous chemicals at the physiological, cellular, and molecular level.

CH 640 - ADV CHEMICAL THERMODYNAMICS

Semester Hours: 3

First, second, and third laws of thermodynamics. Thermodynamic functions. Applications to thermal properties of gases, liquids, solids, and solutions. Chemical reactions, phase transitions, and electrochemistry.

CH 641 - STATIST THERMODYNAMICS

Semester Hours: 3

Principles leading to the development of Maxwell-Boltzmann, Bose-Einstein, and Fermi-Dirac statistics. Thermodynamic properties calculated from partition functions.

CH 642 - ADV CHEMICAL DYNAMICS

Semester Hours: 3

Non-equilibrium thermodynamics, macroscopic and microscopic theories of diffusion, chemical reaction rate laws and mechanisms, transition state theory, gas phase molecular dynamics, electrical conduction in electrolyte solutions, electrode kinetics. Prerequisite: CH 640.

CH 643 - QUANTUM CHEMISTRY

Semester Hours: 3

Application of quantum theory to the chemical bond.

CH 644 - CHEM ELECTRODYNAMICS

Semester Hours: 3

Maxwell's equations applied to electrodynamic problems in chemistry. Theory of dielectrics, dipole moments, Beer's law, Landolt's rule, light scattering, magnetic properties, quantum theory of radiation.

CH 645 - POLYMER PHYSICAL CHEMISTRY

Semester Hours: 3

Introduction to structure, properties and processing of polymers. Physical behavior of polymers, structure-property relationships, polymer characterization, thermodynamics of polymer solutions and melts, mechanical evaluation of polymers. Same as MTS 747. Prerequisite: CH 540.

CH 646 - THERMODYNAMICS OF MATERIALS

Semester Hours: 3

Fundamental thermodynamic review, phase equilibrium, chemical reaction equilibrium, free energy, binary and ternary phase transformations, solution models and selected topics. Same as CHE 646 and MTS 646.

CH 647 - ADV BIOPHYSICAL CHEMISTRY I

Semester Hours: 3

Topics include: computer data analysis & simulation, first & second laws of thermodynamics, free energy & equilibrium, calorimetry, protein stability, binding & interactions, solution thermodynamics, electrolytes. Students who have completed CH 347 cannot earn credit for CH 647.

CH 648 - ADV BIOPHYSICAL CHEMISTRY II

Semester Hours: 3

Advanced biophysical chemistry, including biochemical reaction kinetics, enzyme catalysis, quantum mechanics, statistical thermodynamics, spectroscopy, including UV-VIS, fluorescence, circular dichroism, NMR, and Structure determinations. An emphasis is placed on the current research literature. Prerequisite: CH 647 Students who have completed CH 348 cannot earn credit for CH 648.

CH 650 - PRINC LIQUID/SOLID INTER

Semester Hours: 3

Applies principles in thermodynamics & kinetics to characterize surfaces & surface phenomena. Fundamental properties of gas-liquid, liquid-liquid, solid-liquid and solid-gas interfaces and phenomena at these interfaces. Same as MTS 650 and CHE 650.

CH 699 - MASTER'S THESIS

Semester Hours: 3-6

Required each semester a student is enrolled and receiving direction on a masters thesis. Minimum of two terms is required. (A maximum of six hours may be applied towards the degree).

CH 700 - CURRENT TOPICS IN CHEMISTRY

Semester Hours: 1-3

Advanced laboratory research in one of the departmental research groups. The student works on an independent or group research project. Completion of the course requires a written and an oral report. Prerequisite: approval of instructor.

CH 705 - SEL TOP IN INORGANIC CHEM

Semester Hours: 3

Prerequisites: CH 600 and approval of instructor.

CH 721 - SP TOP IN ANALYTICAL CHEMISTRY

Semester Hours: 3

Prerequisites: CH 621 and approval of instructor.

CH 735 - SEL TOP IN ORGANIC CHEM

Semester Hours: 3

Prerequisites: CH 632 and approval of instructor.

CH 745 - SEL TOP IN PHYSICAL CHEM

Semester Hours: 3

CH 746 - SOLID STATE CHEMISTRY

Semester Hours: 3

Chemical properties of solids. Includes phase equilibria, chemical bonding in ionic and covalent crystals, thermodynamics of atomic defects, ionic conductivity in solids, corrosion, & introduction to surfaces and adsorption.

CH 765 - SEL TOPICS IN BIOCHEM

Semester Hours: 3

Prerequisites: CH 560 and approval of instructor.

CH 780 - CHEMISTRY SEMINAR

Semester Hour: 1

Required during each semester of residence.

CH 799 - DOCTORAL DISSERTATION

Semester Hours: 3-9

Civil Engineering (CE)

CE 511 - INTRO GEOGRAPHICAL INFO SYS

Semester Hours: 3

Introduces vector, raster and tabular concepts, emphasizing the vector approach. Topics include: spatial relationships, map features, attributes, relational database, layers of data, data ingesting, digitizing from maps, projections, output, applications, and availability of public data sets.

CE 520 - URBAN TRANSPORTATION PLANNING

Semester Hours: 3

Planning of highway systems and terminals as part of a complete planning approach; public transportation system planning; transportation planning studies, projection analysis, plan formulation, and programming.

CE 541 - OPEN CHANNEL HYDRAULICS

Semester Hours: 3

Design and analysis of erodible and non-erodible channels. Uniform flow, channel roughness, gradually and spatially varied flow, rapidly varied flow, hydraulic jumps, gradually varied unsteady flow, flood routing, flow measurements, channel models, channel and culvert design.

CE 549 - INTRO ENVIRONMENTAL ENGR

Semester Hours: 3

Engineering aspects of air, water, and thermal pollution. Hydrologic cycle, water sources and uses; industrial and other sources of primary and secondary pollutants. Transport process in environmental problems and in their control.

CE 550 - ENVIRONMENTAL CONTROL

Semester Hours: 3

Engineering design and synthesis of environmental control systems. Control of multiphase systems with application to air and water pollution control.

CE 552 - INDUSTRIAL WASTE TREATMENT

Semester Hours: 3

Advanced topics in the area of hazardous waste management and water quality control. Emphasis on industrial waste, including hazardous waste management. Topics include: generation, storage, collection, transfer, disposal, recycling, economic, environmental, and regulatory considerations.

CE 554 - SOLID & HAZARDOUS WASTE MGMT

Semester Hours: 3

Waste characterization, minimization, collection, treatment, transport, and disposal. Landfill design and incineration options. Leachate characteristics and potential groundwater contamination. Prerequisite: CE 549.

CE 555 - WATER QUALITY LABORATORY

Semester Hours: 3

Properties of natural water sources and laboratory methods associated with water and wastewater treatment systems. Students design and demonstrate a water treatment system to bring a water sample into compliance with drinking water standards.

CE 556 - WATER QUALITY CONTROL PROC

Semester Hours: 3

Principles of public water supply design. Source selection, collection, purification, and distribution for municipal use. Collection of waste waters, their treatment, and disposal. Prerequisite: CE 549.

CE 557 - HYDROLOGY

Semester Hours: 3

Occurrence and movement of water over the earth's surface for engineering planning and design. Relationship of precipitation to streamflow with frequency analysis, flood routing, and unit hydrograph theory.

CE 558 - ENVIRONMENTAL ENGR DSGN

Semester Hours: 3

Engineering design and project management of environmental quality/restoration systems. Students will complete a design project focusing on one of the following systems: sanitary landfill, municipal incinerator, or groundwater/site remediation. Lectures will address skills for technical presentations and proposal writing, as well as process design and decision making.

CE 559 - SEL TOPICS CIVIL ENGINEERING

Semester Hours: 1-6

CE 561 - VIBRATIONS ELASTIC SYS

Semester Hours: 3

Formulation of the equations of motion of discrete and continuous systems, analytical and numerical methods of solution, eigenvalue problems, and dynamic response.

CE 571 - ADVANCED SOIL MECHANICS

Semester Hours: 3

Continuum mechanics applied to soil behavior. Theoretical approaches to consolidation, shear strength, slope stability and soil stabilization.

CE 572 - SOIL DYNAMICS

Semester Hours: 3

Behavior of soils under dynamic, earthquake and blast loading. Analysis of foundation vibration and isolation.

CE 573 - EARTH STRUCTURES ENGINEERING

Semester Hours: 3

Principles of earth structure design. Theories of earth pressures and the design of retaining wall systems including gravity, cantilever, mechanically stabilized earth, flexible sheet pile, and anchored wall systems. Methods of stability analyses for retaining walls, earth slopes, and embankment design.

CE 574 - APP MECHANICS OF SOLIDS

Semester Hours: 3

Stresses and strains at a point, theories of failures, stress concentration factors, thick-walled cylinders, torsion of noncircular members, curved beams, unsymmetrical bending, and shear center.

CE 577 - EXP TECH SOLID MECHANICS

Semester Hours: 3

Experimental methods to determine stress, strain, displacement, velocity, and acceleration in various media. Theory and laboratory applications of electrical resistance strain gages, brittle coatings, and photoelasticity. Application of transducers and experimental analysis of engineering systems.

CE 578 - MATRIX METH STRUCT MECH

Semester Hours: 3

Matrix application to formulation and solution of linear problems in structural mechanics. Stresses, vibrations, and stability of engineering structures.

CE 581 - STRUCTURAL ANALYSIS II

Semester Hours: 3

Reactions, shears, moments and deformations in complex structural systems. Statically indeterminate systems, advanced geometric and energy methods.

CE 583 - REINFORCED CONCRETE DESIGN

Semester Hours: 3

Theory and practice of reinforced concrete design. Theory and design of high strength concrete mixtures. Design of reinforced concrete beams, slabs and columns using the ultimate strength design code of the American Concrete Institute.

CE 584 - STEEL DESIGN

Semester Hours: 3

Principles of the design of steel structures using ASD methods. Analysis and design of structural elements including beams, columns, connection details.

CE 585 - FOUNDATION ENGINEERING

Semester Hours: 3

Design of foundations with emphasis on reinforced concrete, footings, caissons, piles, retaining walls, and mat foundations. Effect of bearing pressure on foundations. Prerequisite: CE 583.

CE 586 - ADV CEMENTITIOUS & COMPOSITE

Semester Hours: 3

Concrete structures, rheology, mechanical properties, environmental durability, dimensional stability, advanced concrete technologies (such as high strength, fiber reinforced, and fracture mechanics), advanced fiber polymer composites, and repair/rehabilitation of concrete structures.

CE 587 - BRIDGE DESIGN

Semester Hours: 3

Bridge loads, load distribution, composite beam bridges, bridge bearings, reinforced and prestressed concrete slab and T-beam bridges, bridge evaluations and ratings, and upgrade methodology.

CE 603 - ADVANCED CONCRETE DESIGN

Semester Hours: 3

Design of concrete columns; bond, anchorage and reinforcing details; design of two-way slabs; design and analysis of multistory building frames; introduction to prestressed concrete; design of prestressed cross-sections for moment.

CE 611 - GIS IN CIVIL ENGINEERING

Semester Hours: 3

Advanced topics in geographical information systems (GIS) with civil engineering applications. Emphasis will be placed on spatial/temporal data analyses using digitized maps and database information in an area of CE specialization. Research project will be required.

CE 622 - ADVANCED TRAFFIC ENGRG DESIGN

Semester Hours: 3

In depth analysis of traffic engineering concepts related to intersection analysis (signalized and un-signalized) as well as arterial systems.

CE 646 - EROSION & SEDIMENTATION

Semester Hours: 3

River morphology and river response, incipient erosion and its prediction, bed form and roughness, degradation, aggradation, and local scour in alluvial rivers. Design of stable channels, computation of bed load.

CE 650 - ENVIRONMENTAL IMPACT ANAL

Semester Hours: 3

National environmental policy act and its implementation. Environmental impact process. Writing an environmental impact statement.

CE 651 - ENVIRONMENTAL REGULATIONS

Semester Hours: 3

Basic understanding of environmental law with an appreciation for the practical implementation of regulations for environmental engineers. Includes an overview of the major American environmental laws for protection of water and air resources, as well as permitting requirements and health/safety responsibilities. Prerequisite: CE 549.

CE 652 - INTRO TO AIR POLLUTION CONTROL

Semester Hours: 3

Technology of air pollution dealing with air pollutants, effects, sources, combustion processes, and abatement and control technology. Engineering contributions to both the problems and their solutions. Nature of air pollution problem and fundamental technological approaches to its solution.

CE 653 - GROUNDWATER ENGINEERING

Semester Hours: 3

Application of engineering principles to the movement of groundwater. Influence of physical and geological environment on groundwater hydraulics. Water well hydraulics and aquifer evaluation. Emphasis on practical groundwater engineering problems. Prerequisites: MA 526 or MAE 693.

CE 654 - ENVIRONMENTAL TRANSPORT

Semester Hours: 3

Fundamental principles of mass transport, chemical partitioning/transformations in environmental systems. Practical transport examples for surface water, ground water, and atmospheric systems will be presented and mathematical modeling will be utilized for solutions.

CE 655 - HAZARDOUS WASTE MGMT

Semester Hours: 3

Topics include definition of hazardous waste, regulatory considerations, risk assessments, and categories of waste. Current and emerging treatment and disposal technologies will be explored.

CE 656 - ENV SYSTEMS SAMPLING & ANAL

Semester Hours: 3

CE 657 - ADVANCED HYDROLOGY

Semester Hours: 3

Hydrologic cycle, including interrelationships between classical and statistical methods of hydrology. Evaluation of governing equations, linearizations, analytical approximations and numerical solution techniques for various boundary conditions. Stochastic hydrologic modeling in both temporal and spatial domains. Prerequisites: ISE 690, MAE 586, MAE 693, and CE 557.

CE 658 - SUSTAINABLE DESIGN

Semester Hours: 3

The built environment has a substantial impact on energy and material resources as well as being a critical determinant of health and productivity. This course covers topics such as site planning and construction variables, energy and water alternatives, and current rating systems. Case studies and field trips of historic and contemporary projects exemplifying various sustainability features will be included.

CE 659 - SEL TOPICS CIVIL ENGINEERING

Semester Hours: 1-6

CE 660 - STRUCTURAL DYNAMICS

Semester Hours: 3

Application of the theory of vibrations to discrete and continuous models of structures. Numerical methods of analysis for both spatial and temporal variables. Model synthesis and step-by-step time integration methods. Finite element applications: substructuring techniques.

CE 662 - GEOTECHNICAL ENGINEERING

Semester Hours: 3

Shallow foundation's immediate and consolidated settlement, advanced deep foundations under lateral and axial loads, design of single and pile groups, soil-pile interaction, introduction to seismology, earthquake characteristics, dynamic soil properties and response, soil profile response spectra, soil liquefaction. Prerequisite: CE 585.

CE 666 - EARTHQUAKE ENGR & STRUCT DYNAM

Semester Hours: 3

This allows structural engineers to consolidate their knowledge on the effect of earthquake ground motions on civil engineering structures. The course will cover the analysis and the theories of structures made of various materials that are located in active seismic zones. Finally, the course will allow structural engineers to acquire new basic knowledge in earthquake engineering that will allow them to communicate better with scientists and engineers of other disciplines in earthquake engineering (e.g. seismologist, geotechnical engineers, etc.).

CE 671 - CONTINUUM MECHANICS

Semester Hours: 3

Kinematics and kinetics, various coordinate systems, constitutive equations for continuous media; governing partial differential equations from first and second laws of thermodynamics; applications to solids, liquids, and gases.

CE 672 - THEORY OF ELASTICITY

Semester Hours: 3

Formulation of boundary-value problems of classical elasticity. Application to plane problems, prismatic members, and axisymmetric problems. Introduction to three-dimensional problems.

CE 673 - PLASTICITY

Semester Hours: 3

Fundamentals of mechanical behavior of metals and nonmetals for stress states greater than the yield stress state. Deformation and flow theories. Stress-strain relations and yield criteria. Solution of boundary value problems with plastic bodies. Limit analysis of structures.

CE 674 - FINITE ELEMENT ANALYSIS I

Semester Hours: 3

Finite element theory, variational methods, weighted residuals. Applications to linear partial differential equations in continuous media. Solution of boundary value and initial value problems.

CE 675 - ROCK MECHANICS

Semester Hours: 4

Principles of continuum mechanics applied to the design of structures in rock; tunnels, underground structures and foundations. Joint behavior; stresses; analysis of rock slopes; instrumentation.

CE 676 - VISCOELASTICITY

Semester Hours: 3

Mechanical behavior of materials having time-dependent and temperature-dependent material properties. Creep and relaxation phenomena. Elastic-viscoelastic analogies. Formulation of stress-strain laws. Solution of boundary value problems for viscoelastic bodies.

CE 677 - OPTICAL TECH IN SOLID MECH

Semester Hours: 3

Overview of conventional methods for experimental stress analysis. Introduction to applied optics with emphasis on non-destructive, laser-based testing methods, fiber optic recording systems, photoelectronic-numerical data acquisition, and computer aided analysis.

CE 678 - MECHANICS OF COMPOSITE MATRLS

Semester Hours: 3

Introduction to composite materials, micro- and macro-mechanical behavior of laminae; bending, buckling and vibration of laminated plates.

CE 679 - HYPERVELOCITY IMPACT PHENOMENA

Semester Hours: 3

Fundamental principles of penetration mechanics. Analytical and numerical approaches to perforation and penetration problems. Shock jump conditions, hogniots, and equations of state; low, high, and hypervelocity impacts of finite and thin targets.

CE 681 - ADVANCED STRUCTURAL ANALYSIS

Semester Hours: 3

Explores modern methods of structural analysis, matrix formulation of flexibility and stiffness methods, and analysis of structures with material and geometric nonlinearities. Also introduces energy methods for indeterminate structures. Prerequisite: CE 581.

CE 683 - GRADUATE SEMINAR

Semester Hour: 1

Professional activities designed to promote the skills required to organize and deliver oral technical presentations and to broaden the individual's awareness of technical issues. Required for all students pursuing a graduate degree. Students will be graded 'S' (Satisfactory) or 'U' (Unsatisfactory) based upon their performance and attendance. Students who do not receive an 'S' grade must register for the course until an 'S' is obtained.

CE 696 - GRAD INTERNSHIP CE ENGR

Semester Hours: 1-9

Active involvement in an engineering project in an engineering enterprise, professional organization or government agency that has particular interest and relevance to the graduate student. Permission of CEE faculty member required.

CE 697 - MASTER'S PLAN II PROJECT

Semester Hours: 3

Application-oriented student project designed to show competence in an area of civil engineering.

CE 699 - MASTER'S THESIS

Semester Hours: 1-9

Required each semester in which a student is working and receiving direction on a master's thesis. Minimum of two semesters and 6 hours required for M.S.E. students. A maximum of nine hours of credit is awarded upon successful completion of master's thesis. The 1 hour option is only available to students who have successfully defended their thesis and submitted it for approval, but do not meet the deadlines for graduation in the semester submitted. Students may only use the 1 hour option once in their career.

CE 722 - SLIDING MODE CONTROL

Semester Hours: 3

CE 756 - HAZARDOUS WASTE REMEDIAT

Semester Hours: 3

Engineering design skills applied to the solution of real world hazardous waste remediation problems. Remedy screening and selection; treatment train development for a Superfund facility.

CE 762 - WAVE MOTION CONT ELASTIC BODIE

Semester Hours: 3

Elements of stress wave propagation in bounded elastic media. Propagation of elastic waves in infinite and semi-infinite bodies, cylinders, rods and beams.

CE 765 - RAND VIBRAT ELASTIC SYSTEM

Semester Hours: 3

Dynamic analysis of elastic systems including the response of complex structures to random excitations. Typical excitations include random wind, thermal, earthquake, aerodynamic, and ocean wave phenomena. Probabilistic mechanics methods. Concepts of reliability. Stationary and ergodic processes.

CE 772 - THEORY STRUCT STABILITY

Semester Hours: 3

Energy criterion for stability of elastic structure under conservative loading. Stability concept for general continuous systems. Rigorous and approximate methods of analysis. Buckling of structural elements under impulsive and nonconservative loading. Postbuckling behavior.

CE 773 - THEORY OF SHELLS

Semester Hours: 3

Analysis of thin plates and shells, including higher approximations theories and transverse-shear deformations; illustration of theories by selected problems.

CE 774 - FINITE ELEMENT ANAL II

Semester Hours: 3

Advanced topics in finite element analysis: application to nonlinear partial differential equations in continuum mechanics: theoretical studies of convergence and stability of solutions.

CE 778 - FRACTURE MECHANICS

Semester Hours: 3

CE 779 - ADV PENETRATION MECHANIC

Semester Hours: 3

Advanced analytical modeling of penetration and perforation phenomena, hydrocode development and applications, and similitude analysis.

CE 799 - DOCTORAL DISSERTATION

Semester Hours: 3-9

Communication Arts (CM)

CM 505 - ADVANCED MEDIA WRITING

Semester Hours: 3

This course offers an overview of various media writing genres, including Broadcast, Advertising and Public Relations. Students complete a mix of timed assignments with each context to acquire a more complete survey of media writing and prepare for a career within the mass media.

CM 508 - CLASSICAL RHETORICAL THEORY

Semester Hours: 3

This course surveys the early development of rhetorical theory in the Western world, from its sophistic origins in the 5th century BCE, through the Greek philosophers and educators, to the Romans and early Christians.

CM 509 - CONTEMPORARY RHETORICAL THEORY

Semester Hours: 3

This course surveys contemporary rhetorical thought, including modern and postmodern theories. The course requires rigorous academic analysis and critique as students explore historical and current rhetorical concepts.

CM 514 - CREATIVE NONFICTION WRITING

Semester Hours: 3

This course introduces students to the genre of creative non-fiction. Undergraduate students (CM 414) will write five essays and revise toward a final writing portfolio. Graduate students (CM 514) will write five essays and a collage assignment, revising toward a final portfolio.

CM 518 - LEGAL ARGUMENT

Semester Hours: 3

This course examines argumentation in legal communities, that is, the way lawyers and judges provide reasoned support for the positions they defend concerning what the law requires in a given case. It considers common forms of legal argument, sources and forms of evidence, and legal values that underlie legal argument. It provides students with a critical perspective from which to judge legal arguments and a basic set of tools for developing legal arguments. This course will not provide any in-depth consideration of the content of civil, criminal or constitutional law, but will use examples from various areas of law to illustrate how legal arguments are developed.

CM 520 - PUBLIC RELATIONS WRITING

Semester Hours: 3

This course provides students with professionalization in their writing and editorial skills in public relations. By emphasizing different audiences and various media, students will find and hone their public relations voice. Students will gain experience with instant responses, making ethical and legal decisions, and practicing a wide range of PR writing and design including the development of media kits, pitches, backgrounders, press releases, memos, newsletters, radio announcements, and brochures. Students will gain firsthand experience writing on a digital platform for a non-profit organization and building a digital audience.

CM 526 - BURKEIAN THEORY & CRITICISM

Semester Hours: 3

This course surveys key concepts in the theory of Kenneth Burke and their discussion and application of rhetorical scholars. Through readings, lectures and class discussions students will gain insight into this, the most important rhetorical theorist of the 20th century.

CM 530 - MASS MEDIA IN AMERICA

Semester Hours: 3

CM 533 - DARK SIDE INTERPERSONAL COMM

Semester Hours: 3

Research from the dark side of communication has typically been studied from a single standpoint confined to a specific context. This course offers a more complete view of human communication by exploring a variety of topics related to the 'darker' side of interactions situated in the contexts of Interpersonal Communication, Organizational Communication, Computer Mediated Communication, Health Communication, and Blended Communication. By merging theory and practical application, the different contexts provide students with an enhanced understanding of how dark side behaviors are experienced and communicated.

CM 535 - SOCIAL MEDIA

Semester Hours: 3

This course focuses on uses and effects of social media in interpersonal, organizational, mass mediated, health, and political settings. It investigates questions such as: Who uses social media? Can we develop meaningful relationships through social media? How do people use social media to find information, get social support, and evoke political change? Is privacy dead? This course focuses on the history of social media and current computer-mediated communication theories.

CM 540 - PUBLIC RELATIONS CAMPAIGNS

Semester Hours: 3

This course provides professionalization and team work experience for students in the public relations track. Students practice the research, planning, implementation, and evaluation of strategic communication plans for various public relations contexts.

CM 542 - USABILITY STUDIES

Semester Hours: 3

Introduces students to the theory and practices of usability, which involves designing useful, easy-to-use websites, software, and products. The course involves group projects conducting real-world usability testing.

CM 544 - ADVERTISING

Semester Hours: 3

This course defines advertising and considers how it works, how it is developed, and some controversies surrounding its use.

CM 551 - ORGANIZATIONAL TRAIN & DEVELOP

Semester Hours: 3

Provides students with the opportunity to learn to design, and execute, professional organizational training programs. Students learn to design needs assessments, write training proposals and contracts, as well as design budgets, training scripts, presentations and post-evaluations for companies.

CM 552 - USER-CENTERED DESIGN

Semester Hours: 3

Introduces students to user-centered design principles that inform the practice of user experience design. Students will use visual thinking as they complete contextual inquiries and mapping exercises.

CM 553 - COMMUNICATING WITH USERS

Semester Hours: 3

This course teaches students how to effectively research user needs and produce technical communication documents to meet those needs.

CM 554 - NEW MEDIA WRITING & RHETORIC

Semester Hours: 3

This course teaches students to consider and implement rhetorical principles across a variety of media and includes an examination of communication strategies used widely in academic and industry settings. The course focuses on new media through an exploration of digital technologies and the way digital culture and new media have dramatically impacted reading, writing and research practices.

CM 555 - COMMUNICATION AND CULTURE

Semester Hours: 3

This course explores the complex and dynamic relationship between communication and culture. It uses a contextual approach to examine significant similarities and distinctions between and among cultures from both macro and micro cultural perspectives, giving particular attention to how verbal and nonverbal communication moderates our cultural practices.

CM 600 - INTERNSHIP

Semester Hours: 3

The student works in a professional capacity for at least 10 hours a week under a general supervision of a faculty member and direct supervision of a management-level practitioner in some field of professional communication (user experience, advertising, public relations, professional writing, journalism).

CM 610 - COMMUNICATION PEDAGOGY

Semester Hours: 3

This course is designed to prepare students for teaching in the field of communication. Toward this end, students will explore a mix of theories, methods, and strategies related to communication pedagogy. Students will also have the opportunity to develop their teaching competency by engaging in various teaching assignments.

CM 631 - ADVANCED COMMUNICATION THEORY

Semester Hours: 3

This course surveys major theories that inform the scholarly study of human communication. Through readings, discussions, and research, students learn how communication theories are developed, analyzed, evaluated, and applied. More specifically, the course goals are: 1) to enhance students' ability to critically analyze current theories of human communication, and 2) to provide students with the opportunity to actively participate in research that tests major communication theories. Original works are read.

CM 633 - INTERPERSONAL COMMUNICATION

Semester Hours: 3

The art of communicating 'one to one' is the focus of this course. This course surveys major theories that inform the scholarly study of interpersonal communication. Through readings, discussions, and research, we will learn how interpersonal communication theories are developed, analyzed, evaluated, and applied. More specifically, the course goals are: 1) to enhance students' ability to critically analyze current theories of interpersonal communication, 2) to provide students with the opportunity to actively participate in research that tests major interpersonal communication theories.

CM 640 - SPECIAL TOPICS

Semester Hours: 3

CM 662 - INFORMATION ARCHITECTURE

Semester Hours: 3

This class reviews research in technical communication, information science, cognitive science, semiotics, and computer science that helps students understand how communities represent, organize, retrieve, and ultimately use information.

CM 670 - ADVANCED COMMUNICATION METHODS

Semester Hours: 3

This course is concerned with the methods and philosophy of scientific communication research. Having taken a basic course that covers elements of research design is highly recommended.

CM 675 - RHETORICAL CRITICISM

Semester Hours: 3

This course examines how rhetorical scholars analyze persuasive discourse, providing hands-on opportunities for students to engage in such analyses. It examines significant variables in rhetorical processes, a number of methods employed to understand adaptations to rhetorical needs, and considers pragmatic, ethical, social and ideological dimensions of persuasive discourse.

CM 699 - MASTERS THESIS

Semester Hours: 3-6

Required each semester during which a student is working and receiving direction on a masters thesis. No more than 6 hours credit may be applied toward the degree.

Computer Engineering (CPE)

CPE 512 - INTRO PARALLEL PROGRAMMING

Semester Hours: 3

Introduction to processing in parallel and distributed computing environments. General concepts of parallel machine models, processes, mutual exclusion, process synchronization, message passing, and programming languages for parallel computing and scheduling. Design and analysis of parallel algorithms. Parallel programming environments: Pthreads for shared memory multiprocessor systems and PVM/MPI for distributed networked computers.

CPE 523 - HARDWARE/SOFTWARE CO-DESIGN

Semester Hours: 3

Study and design of Systems On a Chip (SOC). Emphasis on Field Programmable realizations of SOC systems. Prerequisite: CPE 522 or CPE 526.

CPE 526 - VLSI HARDWARE DESC LANG/MODL/S

Semester Hours: 3

Modern VLSI design techniques and tools, such as silicon compilers, (V)HDL modeling languages, placement and routing tools, synthesis tools, and simulators. Students will design, simulate, and layout using both programmable logic families and ASIC libraries.

CPE 527 - VLSI DESIGN I

Semester Hours: 3

Introduction to VLSI design using CAD tools, CMOS logic, switch level modeling, circuit characterization, logic design in CMOS, systems design methods, test subsystem design, design examples, student design project. Design project to be fabricated and tested in CPE 528. Students enrolling in CPE 527 must enroll concurrently in CPE 527L.

CPE 527L - LABORATORY

Semester Hours: 0

Students enrolling in CPE 527L must enroll concurrently in CPE 527.

CPE 528 - VLSI DESIGN II

Semester Hours: 3

Advanced experience with CAD tools for VLSI design, IC testing. Design project from CPE 527 will be fabricated and tested. Implementation and verification of test programs, IC testing and troubleshooting, legal, economic, and ethical design issues. Oral presentations and written reports are required. Students enrolling in CPE 528 must enroll concurrently in CPE 528L.

CPE 528L - LABORATORY

Semester Hours: 0

Students enrolling in CPE 528L must enroll concurrently in CPE 528.

CPE 531 - INTRO COMPUTER ARCHITECTURE

Semester Hours: 3

Existing computer structures. Computer organization with emphasis on busing systems, storage systems, and instruction sets. Special purpose architecture, performance models and measures, VLSI influence on architecture.

CPE 534 - OPERATING SYSTEMS

Semester Hours: 3

Study of the fundamentals of operating systems. Emphasis on processes, file management, interprocess communication, input-output, virtual memory, networking and security.

CPE 536 - INTERNALS OF MODERN OPER SYS

Semester Hours: 3

In depth study of the design of modern operating systems such as Unix, NT, and Linux. Emphasis on the internals and implementation details of interrupt processing, real-time clocks, device independent I/O, process management, memory management, file management.

CPE 538 - REAL TIME & EMBEDDED SYSTEMS

Semester Hours: 3

Study of design methodologies for reliable real time systems.

CPE 549 - INTRO TO CYBERSECURITY ENGINEERING

Semester Hours: 3

Introduction to cryptography and computer security through hardware and physical security to a knowledge of audit methods, security management, and public law. The course will introduce security engineering skills such as business process analysis, software security, IAE evaluation, and IAE testing. Prerequisite: CPE 548.

CPE 549L - INTRO CYBERSECURITY ENGINEERING LAB

Semester Hours: 0

Students enrolling in CPE 549 must enroll concurrently in CPE 549L.

CPE 555 - SECURE SOFTWARE DEVELOPMENT

Semester Hours: 3

Overview of methodologies for development of high-assurance software. Major topics include analysis of security and safety risks, software certification criteria, the software development lifecycle, risk mitigation, design and coding best practices, verification techniques, and auditing of software for insecure and unsafe coding constructs.

CPE 557 - SOFTWARE REVERSE ENGINEERING

Semester Hours: 3

This course provides fundamental knowledge of software reverse engineering. The course provides the ability (a) to understand software of unknown origin or software for which source code is unavailable, (b) to determine how something works, (c) to discover data used by software, and (d) to aid in the analysis of software. The course introduces tools for reverse engineering, including disassemblers, debuggers, monitors, virtual machines and modern tools for software analysis.

CPE 559 - SYSTEMS SECURITY

Semester Hours: 3

This course (1) introduces cyber physical, industrial control, embedded and Supervisory Control and Data Acquisition (SCADA) control systems, (2) examines common vulnerabilities and threats associated with these systems, and (3) examine techniques to defend these systems from cyber-attacks.

CPE 561 - TRANSLATION SYSTEMS

Semester Hours: 3

Grammars, parsers, and lexical analyzers; implementation of translators via top-down and bottom up techniques; grammar analysis to identify ambiguities. Practical applications of translators including conversion of file formats and compilation of traditional computer languages.

CPE 590 - SPECIAL TOPICS IN COMPUTER ENGINEERING

Semester Hours: 1-3

CPE 590L - SELECTED TOPICS LABORATORY

Semester Hours: 0

CPE 601 - SURVEY INFORMATION ASSURANCE

Semester Hour: 1

CPE 610 - SELECTED TOPICS IN COMPUTER ENGINEERING

Semester Hours: 1-6

CPE 612 - PARALLEL ALGORITHMS

Semester Hours: 3

Introduction to metrics describing the performance and scalability of parallel algorithms. Performance analysis of parallel algorithms for performing sorting, matrix multiplication, solving linear equations, and FFT.

CPE 613 - GENERAL PURPOSE GPU COMPUTING

Semester Hours: 3

The focus of this course is to introduce emerging techniques and programming paradigms that can be used to accelerate the processing speed of scientific and other high performance applications using Graphics Processing Units, GPUs. GPUs represent low-cost highly parallel video processing hardware that can be programmed for general purpose applications using CUDA/OpenCL software architecture. The course will survey the current state of research and industrial activity and will give student's hands-on experience implementing design applications on real-world GPU facilities for a wide range of scientific applications. Prerequisite: CPE 512.

CPE 619 - MODELING & ANAL COMPU/COMMUN S

Semester Hours: 3

Modeling of single and multiprocessor systems, single and multi-stage interconnection networks, Computer Networks. Analysis using Stochastic processes, Markov and Queuing techniques. Modeling using Petri Nets and Finite State models. Prerequisite: EE 500 or MA 585.

CPE 621 - ADVANCED EMBEDDED SYSTEMS

Semester Hours: 3

Deeply embedded low-power wireless sensors. Low-power microcontroller architectures, sensor platform architecture, wireless intelligent sensors, low power wireless communication standards, battery powered systems, resource constrained operating systems, data aggregation/sensor synergy, and collaborative signal processing.

CPE 625 - CMOS ANALOG CIRCUIT DESIGN

Semester Hours: 3

Analog circuit design in CMOS technology. CMOS processing technology. MOS transistor modeling. Basic current mirrors and single-stage amplifiers. Noise analysis and modeling. Basic OPAMP design and compensation. Advanced current mirrors and OPAMPS. Bandgap references. Oscillators. CMOS technology characterization for radio-frequency (RF) design.

CPE 626 - ADVANCED VLSI DESIGN

Semester Hours: 3

Advanced VLSI Design. Case study of the VLSI design of a modern RISC processor using a Hardware Description Language. Prerequisite: CPE 526.

CPE 628 - TESTING OF HARDWARE SYSTEMS

Semester Hours: 3

Introduction to testing of digital electronic circuits and systems. Topics include: fault modeling, testing problems, testing schemes, test generation for combinational and sequential circuits, the complexity of testing, design for testability, built-in self-testing and boundary scan.

CPE 631 - ADV COMP SYSTEMS ARCHITECTURE

Semester Hours: 3

Study of architectural features of modern processors, including cache memories and memory systems, pipeline designs, branch prediction techniques. Design of superscalar, multithreaded VLIW processors, code optimization for such systems will be studied. Quantitative evaluation of architectural features are emphasized throughout the course. Prerequisite: CPE 512 and CPE 531.

CPE 633 - FULT-TOLERANT COMPUTING SYSTEM

Semester Hours: 3

Analysis and design of very high reliability and availability systems. Fault types, reliability techniques, and maintenance techniques. Case studies of high-availability long-life, life-critical systems. Both hardware and software techniques for achieving fault-tolerance will be studied.

CPE 635 - SYSTOLIC ARRAY PROCESSING

Semester Hours: 3

Systolic structure of fast algorithms and switchable array realizations.

CPE 641 - DATA & DIGITAL COMMUNICATIONS

Semester Hours: 3

Introduction to digital and data communications; transmission channels; modulation and coding; telephone networks; data communication standards; noise and distortion; computer interfacing; protocols.

CPE 643 - OPTICAL COMMUNICATIONS

Semester Hours: 3

CPE 645 - COMPUTER NETWORK SECURITY

Semester Hours: 3

Principles and concepts of computer network security. Introduction to cryptography, confidentiality, authentication, digital signatures, E-mail security, IP security, web security, intruders, malicious software, firewall, and other network security-related issues. Prerequisite: CPE 548.

CPE 646 - MOBILE & WIRELESS NETWORKS

Semester Hours: 3

High-level issues in mobile and wireless networks. The main topics are mobile IP, mobile Ad hoc NETWORKS (MANETS) wireless sensor networks, wireless LAN, Bluetooth, cellular networks, satellite systems and security issues in mobiles and wireless networks. Prerequisite: CPE 548.

CPE 647 - UBIQUITOUS COMPUTING

Semester Hours: 3

The course is based on the new 'anytime, anywhere' computing paradigm, also known as ubiquitous computing. This course is project oriented, and explores issues of mobile, wireless, and distributed computing in Internet environment, advanced human-computer interfaces, and power efficient computing.

CPE 648 - ADVANCED COMPUTER NETWORKS

Semester Hours: 3

Advanced principles and concepts of general-purpose computer networks, with a special emphasis to internetworking and Internet. Transport and higher level protocols emphasis. Programming issues. High-speed networking, congestion control, data compression, security and distributed processing will be covered. Prerequisite: CPE 548.

CPE 649 - ADV CYBERSECURITY ENGINEERING

Semester Hours: 3

Introduction to topics ranging from how to attack computer systems and networks to how to protect and recover from attacks on computer systems and networks. Basic process utilized by computer attackers in order to develop a complete understanding and appreciation of the threat to information assurance. Process of detecting, preventing, and recovering from information assurance attacks. Intrusion Detection and Prevention Systems, Auditing, Security Vulnerability Assessments, and the Incident Response process. Prerequisite: CPE 549.

CPE 649L - ADV CYBERSECURITY ENG LAB

Semester Hours: 0

Students enrolling CPE 649 must enroll concurrently in CPE 649L.

CPE 656 - SOFTWARE ENGRG STUDIO I

Semester Hours: 3

This is the first course in a two course studio series required for the MSSE degree in the College of Engineering. Students will work in small design teams on medium sized software projects. Activities include developing requirements, designing and constructing system prototypes, developing and implementing test and verification plans, and presenting the project for evaluation. The practice of software design and evaluation will be conducted in an iterative cycle using best software engineering practices, so that design and execution can be refined over the lifecycle of the project. Prerequisite: CS 650.

CPE 658 - SOFTWARE ENGRG STUDIO II

Semester Hours: 3

This is the second course in a two course studio series required for the MSSE degree in the College of Engineering. Students will work in small design teams on medium sized software projects. Activities include developing requirements, designing and constructing system prototypes, developing and implementing test and verification plans, and presenting the project for evaluation. The practice of software design and evaluation will be conducted in an iterative cycle using best software engineering practices, so that design and execution can be refined over the lifecycle of the project. Prerequisite: CPE 656.

CPE 690 - SELECTED TOPICS COMPUTER ENGRG

Semester Hours: 1-6

CPE 692 - CYBERSECURITY CAPSTONE

Semester Hours: 3

A capstone course emphasizing the integration of various principles, theories, and techniques for developing, implementing and using cybersecurity strategies and applications in organizations. Includes readings, lectures, tours, situation analysis, cases, and the completion of a major practical project. Normally taken in the last semester of a student's program. Minimum grade B required. Prerequisites: CS, 585, CPE 549, IS 660, IS 663.

CPE 695 - PROJECTS IN COMPUTER ENGRG

Semester Hours: 3

CPE 699 - MASTER'S THESIS

Semester Hours: 1-9

Required each semester student is working and receiving direction on a master's thesis. Minimum of two semesters and 6 hours required for M.S.E. students. A maximum of 9 hours credit is awarded upon successful completion of master's thesis. The 1 hour option is only available to students who have successfully defended their thesis and submitted it for approval, but do not meet the deadlines for graduation in the semester submitted. Students may only use the 1 hour option once in their career.

CPE 710 - SEL TOPICS IN PARALLEL PROC

Semester Hours: 3

CPE 715 - SELECTED TOPICS IN COMPUTATIONAL

Semester Hours: 3

CPE 720 - SELECTED TOPICS IN VLSI DESIGN

Semester Hours: 3

Prerequisite: CPE 626.

CPE 726 - ALGORITHMS FOR VLSI DESIGN TOOLS

Semester Hours: 3

Tools for VLSI Design. This course is concerned with the algorithms found in VLSI design tools.

CPE 730 - SELECTED TOPICS IN COMPUTER SYSTEMS

Semester Hours: 3

Prerequisite: CPE 631.

CPE 731 - DISTRIBUTED SHARED MEMORY SYSTEMS

Semester Hours: 3

Study issues related to performance, granularity of sharing, multithreading, cache coherence, memory consistency models, pull vs push caching, false sharing, thread migration. Case studies systems, including DASH, FLASH ThreadMarks, SHRIMP, Calypso, Alewife to understand these issues.

CPE 735 - SELECTED TOPICS IN OPERATING SYSTEMS

Semester Hours: 3

CPE 740 - SPECIAL TOPICS COMPUTER NETWORKS

Semester Hours: 3

Prerequisite: CPE 648.

CPE 742 - PARALLEL PROCESS DESIGN

Semester Hours: 3

CPE 748 - MOBILE & WIRELESS NETWORKS

Semester Hours: 3

High-level issues in mobile and wireless networks. The main topics are mobile IP, Mobile Ad hoc Networks (MANETs), wireless sensor networks, wireless LAN, Bluetooth, cellular networks, satellite systems, and security issues in mobiles and wireless networks. Prerequisite: CPE 648 or CS 670.

CPE 760 - SELECTED TOPICS COMPILER/TRANSLATORS

Semester Hours: 3

CPE 790 - SELECTED TOPICS COMPUTER ENGINEERING

Semester Hours: 1-6

CPE 795 - RESEARCH IN COMPUTER ENGINEERING

Semester Hours: 1-6

CPE 799 - DOCTORAL DISSERTATION

Semester Hours: 3-9

Required each semester student is enrolled and receiving direction on doctoral dissertation.

Computer Science (CS)

CS 513 - INTRO TO COMP ARCHITECTURE

Semester Hours: 3

Combinational and sequential logic design, register transfer concepts, logic design of memory, arithmetic units, control units, and I/O system of simple computers. Machine and Assembly Language Programming. Architectural Tradeoffs. Same as CS 309 plus CS 413. No credit for CS graduate students.

Prerequisites: (CS 221 or CPE 212 or CS 517) and (MA 113 or MA 115).

CS 517 - DATA STRUCTURE ANALYSIS OF ALGORITHMS

Semester Hours: 3

Basic data structures: stacks, queues, lists, etc. Algorithm complexity analysis. Basic algorithm techniques: divide & conquer, dynamic programming, backtracking. Classification of problems: tractable, NP, intractable, unsolvable. Same as CS 221 plus CS 317. No credit for CS graduate students.

Prerequisites: (CS 121 or CPE 211) and (MA 113 or MA 115).

CS 524 - PRINCIPLES PROGRAMMING LANG

Semester Hours: 3

Comparison of principles and paradigms of modern programming languages. How different programming languages implement lexical, syntax, and semantic analysis, including the design of compilers. Formal grammars, BNF notation, parse trees, abstract data types. No credit for student who have taken CS 424. Prerequisite: CS 317 or CS 517.

CS 526 - PROG TRANS & COMPILER CONSTR

Semester Hours: 3

Language representation; grammar classification; lexical analysis technique and tools; parsing technique and tools; compile-time and run-time symbol table design; code generation and optimization; error diagnostics. Compiler writing tools. Prerequisite: CS 317 or CS 517; (CS 424 or CS 524 and CS 403 recommended).

CS 530 - SURVEY ARTIFICIAL INTELLIGENCE

Semester Hours: 3

Survey of Artificial Intelligence (AI). AI crosses many disciplines, to make computational systems behave intelligently. This course provides a broad intro of AI sub-domains, including search, knowledge representation, reasoning, & machine learning. No credit for students who have taken CS 430. Prerequisite: CS 317 or CS 517; (CS 424 or CS 524 recommended).

CS 537 - INTRO TO NEURAL NETWORKS

Semester Hours: 3

Introduction to artificial neural networks, covering the most prominent models. Neural networks solutions to classification, clustering, data compression, and constrained optimization applications. Experience with neural networks through projects. Prerequisites: (CS 317 or CS 517) and MA 244.

CS 543 - INTRO TO MULTIMEDIA SYSTEMS

Semester Hours: 3

Multimedia authoring, color models for image and video, introduction to image and video compression, digital audio, multimedia networks, multimedia synchronization, multimedia retrieval. Students may not receive credit for both CS 443 and CS 543. Prerequisite: CS 317 or CS 517; (CS 490 recommended).

CS 545 - INTRO COMPUTER GRAPHICS

Semester Hours: 3

Introduces underlying theory and mechanics of interactive computer graphics. Basic modeling, rasterization, 2D/3D transformations, and viewing. 3D graphics rudiments. Some hardware and historical perspectives. Many programs. No credit for students who have taken CS 445 Prerequisites: (CS 221 or CS 517) and MA 244.

CS 546 - ADVANCED COMPUTER GRAPHICS

Semester Hours: 3

High resolution 3D graphics, including advanced topics in viewing, vertex processing, fragment processing, local and global illumination and shading, 3D modeling (including curve and surface representation), texture mapping, and some coverage of solid modeling and color theory. Game production pipeline. Hierarchical issues, visibility, and 3D processing algorithms may also be covered. A significant number of programming projects are involved, with some different program requirements and additional theoretical expectations for CS 546 students. (Same as CS 456; no credit for both).

Prerequisite: CS 445 or CS 545.

CS 547 - GAME ENGINES & LEVEL DEV

Semester Hours: 3

(Same as CS 447) This course provides the opportunity for students to produce fully functional games from beginning to end with team members. Along the way, students work on homework/projects involving design document creation, prototyping and gameplay/implementation. Also, game software as artistic content has led to collaborations between engineers and artists. In this course, students focus on not only game engineering development but also art asset generation and management. Considers a 3D game design and development using game engines focusing on the fundamental components for developing cross-platform games. The course focus includes design, development, and distribution of computer games. Emphasis also is on user interface and menus, scripting for game programming, game physics, terrain generation, asset management, animation management, special effects, and cross platform game development. Students may not receive credit for both CS 447 and CS 547. Prerequisites: CS 330 and (CS 445 or CS 545).

CS 548 - HUMAN-COMPUTER INTERACTION

Semester Hours: 3

Introduces underlying theory and mechanics of interactive computer graphics. Basic modeling, rasterization, 2D/3D transformations, and viewing. 3D graphics rudiments. Some hardware and historical perspectives. Many programs. Introduction to human-computer interaction and principles of graphical user interface design. Includes examination of interactive environments including windowing systems development tools, multimedia, and visual programming interfaces. Prerequisite: CS 445 or CS 545.

CS 553 - CLIENT/SERVER ARCHITECTURES

Semester Hours: 3

Client/server distributed computing. Web based applications. Students will practice concepts in programs involving leading edge technologies such as AJAX, RESTful and WS-* web services, Enterprise Java Beans, .NET. No credit for students who have taken CS 453 Prerequisite: (CS 307 or CS 321) (CS 370 recommended).

CS 554 - INTRO TO CLOUD COMPUTING

Semester Hours: 3

Different cloud computing paradigms: IaaS, SaaS, PaaS. Open Source cloud software (for ex., OpenStack, CloudStack). RESTful interfaces, AWS interface. Cloud security. Students may not receive credit for both CS 454 and CS 554. Prerequisites: (CS 307 or CS 321) (CS 370 recommended) (CS 390 or CS 590 recommended).

CS 565 - NETWORK SECURITY

Semester Hours: 3

Fundamentals of network security and cryptography. Examines security at different network layers. Wireless security. Firewalls. Intrusion detection and penetration analysis. Students may not receive credit for both 465 and 565. Prerequisites: CS 221 or CPE 212.

CS 571 - MOBILE COMPUTING SFTWR ARC&DEV

Semester Hours: 3

Considers application design for the mobile space, focusing on the fundamental requirements for mobile applications that target mobile devices. The course focus includes development, testing, distribution of mobile applications in a cross-platform environment. Emphasis also is on multimedia and entertainment computing and games. This course will also cover various issues in mobile computing from the readings from research literature such as software engineering practices, analysis of social media and general mobile analytics. Prerequisites: CS 221 or CPE 212.

CS 580 - MOBILE DIGITAL FORENSICS

Semester Hours: 3

This course examines digital forensics of mobile devices such as smart phones and tablets in a law enforcement context. Mobile device characteristics that make forensics examinations difficult are discussed. Various forensics tools are critically examined with an eye toward improved tool development. Prerequisites: CS 413 or CS 513 or CPE 323.

CS 581 - MODELING & SIMULATION I

Semester Hours: 3

Discrete event simulation from a computer science perspective. Mathematics of probability distributions applied to simulation. Design, implementation, and application of discrete event simulation software. Application to computer and network system design. Prerequisites: CS 221 and either MA 385 or MA 585 OR ISE 390 or ISE 690.

CS 582 - MODELING & SIMULATION II

Semester Hours: 3

Advanced modeling methods, including Monte Carlo simulation, agent-based modeling, and mathematical modeling, from a Computer Science perspective. Emphasis on implementation, execution, and validation of working computer models using different modeling methods. Prerequisites: CS 481 or CS 581.

CS 585 - INTRO TO COMPUTER SECURITY

Semester Hours: 3

This course examines the issues related to security policies, models and mechanisms applicable to providing security for computer-based systems including operating systems, database management systems, and networks. No credit for students who have taken CS 485 Prerequisites: CS 221 or CPE 212 or IS 310 AND either CS 470 or CS 570 or CPE 348 or IS 460 or IS 560.

CS 588 - INTRO TO BIG DATA COMPUTING

Semester Hours: 3

Provides big data concepts and characteristics; big data architectural concepts; big data ecosystem. Includes MapReduce framework and programming and coverage of big data applications. No credit for students who have taken CS 488 Prerequisites: CS 317 or CS 517.

CS 590 - PROGRAMMING ENVIRON W/UNIX

Semester Hours: 3

Strategies for design and development of systems and programs in the UNIX environment. Emphasis: automated tool and system development using UNIX tools. Advanced shell concepts including control flow and interrupt handling. Process and inter-process communication. Prerequisites: CS 221; (CS 390 recommended).

CS 595 - INDEPENDENT STUDY

Semester Hours: 3

Individual directed study under the supervision of an instructor. Must have approval of the instructor.

CS 596 - SPECIAL TOPICS

Semester Hours: 3

Individual directed study under the supervision of an instructor. Must have approval of the instructor.

CS 597 - SPECIAL TOPICS

Semester Hours: 3

Course offered by an instructor in a specialized area of computer science. Must have approval of instructor.

CS 598 - SPECIAL TOPICS

Semester Hours: 3

Course offered by an instructor in a specialized area of computer science. Must have approval of instructor.

CS 600 - INTERNSHIP IN COMPUTER SCIENCE

Semester Hour: 1

Work experience in Computer Science or a related field in a business or government agency; conducted under the direction of the agency supervisor and approved by a member of the CS faculty. A substantial report must be produced and approved by the supervisor and the faculty member.

CS 603 - FORMAL LANG/AUTOMAT THRY

Semester Hours: 3

Formal definition of programming languages. Formal grammars: regular, context-free, context sensitive, and phrase-structure. Automata: finite-state, pushdown, linear-bounded automata, Turing Machines. Relationship between formal languages and automata. Prerequisite: CS 617.

CS 613 - COMPUTER ARCHITECTURES

Semester Hours: 3

Organization, operation, and analysis of advanced computer architectures. Topics include advanced pipelining approaches, multi-processor architectures, instruction set architectures, memory hierarchy design, hardware and software-based performance optimization, and system performance measurement. Prerequisite: CS 513.

CS 617 - DES & ANALY OF ALGORITHM

Semester Hours: 3

Strategies of algorithm synthesis and analysis. Classical algorithm categories such as: divide-and-conquer, greedy method, dynamic programming, search and traversal. Computational complexity; theoretical results from lower- and upper-bound studies, NP-hard, and NP-complete problems. Prerequisite: CS 517.

CS 630 - ARTIFICIAL INTELLIGENCE I

Semester Hours: 3

Comparing and evaluating different approaches to the architecture and development of intelligent systems. Computationally efficient solutions for intelligent systems. Prerequisite: CS 530.

CS 635 - COMPUTAT MODEL COGNITION

Semester Hours: 3

Computational models of human information processing covering topics of current interest to both artificial intelligence and cognitive psychology. Use of computer simulations to test psychological theories. Application of psychological research to building AI systems. Prerequisite: CS 630.

CS 637 - DEEP LEARNING

Semester Hours: 3

Deep learning, a branch of machine learning focuses on modern neural networks. Deep learning extracts layered data representations to maximize task performance. Requires advanced algorithm and programming knowledge and a strong mathematical background in calculus, linear algebra, and probability & statistics. Several programming projects. Prerequisites: CS 617.

CS 640 - MACHINE LEARNING

Semester Hours: 3

Discriminant analysis, maximum likelihood decisions, deterministic and nondeterministic approaches for trainable classifiers, preprocessing and feature extraction, clustering, syntactic pattern recognition. Pattern recognition in image analysis. Prerequisite: CS 617; (MA 544 and MA 585 recommended).

CS 641 - DATA MINING

Semester Hours: 3

Data preprocessing, distance measures, classification with decision trees, Bayesian classifiers, neural networks, support vector machines, frequent item set analysis, association rule generation, clustering methods. Prerequisite: CS 617 (MA 544 and MA 585 recommended).

CS 642 - COMP PROC/DIGITAL IMAGES

Semester Hours: 3

Introduction to image processing systems; sensing, sampling and quantization; image transforms; image enhancement and restoration; image segmentation, and description; image correlation; image sequence analysis; practical applications of image processing. Prerequisites: CS 617 (MA 544 and MA 585 recommended).

CS 643 - DATA COMPRESSION

Semester Hours: 3

Lossless and lossy compression algorithms, Huffman coding, Arithmetic coding, Dictionary-based compression, quantization techniques, differential encoding, transform coding, wavelet-based coding; image compression, video compression, audio compression, applications of compression algorithms to audio, image, and video compression standards. Prerequisite: CS 617.

CS 646 - COMPUTER GEOMETRY MODELING

Semester Hours: 3

Numerical and computer rep. of curves and surfaces. Solid geometry modeling. Geometric data management. Curve and surface design, incl. cubic-B-splines, esp. Bezier curves/surfaces. Interpolation methods. Graph-based and Boolean models. Apps. to robotics, graphics, CAD. Prerequisite: CS 545.

CS 650 - SOFTWARE ENGINEERING PROC

Semester Hours: 3

The process of developing complex software products. Includes software life cycles, phases of development and disciplines such as CM, QA, V&V, and T&E. Issues of professionalism and the ethical use of computers. Background in algorithms and programming languages assumed. Prerequisite: CS 517.

CS 652 - OBJECT-ORIENTED DESIGN

Semester Hours: 3

A survey of formal and informal techniques and methodologies for software analysis, requirements, architecture and design. Emphasis is on effective development processes. Comparison of different approaches, considering their advantages and disadvantages. Prerequisite: CS 650.

CS 655 - FORMAL METHODS IN SOFTWARE ENG

Semester Hours: 3

Formal mechanisms to specify, validate, and verify software systems. Propositional and predicate calculi. Program verification through Dijkstra's weakest preconditions and Hoare's method. Formal specification via algebraic specifications and abstract model specifications. Prerequisites: CS 617 and CS 650.

CS 656 - SOFTWARE TESTING

Semester Hours: 3

Advanced software testing techniques, including white box, black box, integration testing, and system testing. Other topics may include test data adequacy, test data selection, and output oracle, including functional, structural, and fault-based testing methods. Prerequisite: CS 650.

CS 658 - SOFTWARE PROC & PROD IMPROVEMT

Semester Hours: 3

Software quality assurance as an umbrella activity. Use of process, project, quality and product metrics to gain insight into the software development activity. Use of metrics to drive incremental process improvement techniques. Examination of CASE tools and how they affect the software process. Prerequisite: CS 650.

CS 670 - COMPUTER NETWORKS

Semester Hours: 3

Detailed analysis of the organization and operation of computer networks, focusing on algorithms and organizations for the Transport Layer, Network Layer and Data Link Layer protocols of wired and wireless systems. Prerequisite: CS 513.

CS 685 - COMPUTER SECURITY

Semester Hours: 3

Advanced topics in security policies, models and mechanisms applicable to providing security for computer based systems, including operating systems, database management systems, and networks. Prerequisite: CS 617.

CS 686 - INFORMATION ASSURANCE

Semester Hours: 3

CS 687 - DATA BASE SYSTEMS

Semester Hours: 3

Basic concepts of database systems. Use of semantic models in database design. Data models with an major focus on the relational and object-oriented models. Relational query languages and normal forms. Database management system design issues. Security and integrity issues. Prerequisite: CS 617.

CS 690 - ADVANCED OPERATING SYSTEMS

Semester Hours: 3

Issues related to shared memory multiprocessors, multicore computers, clusters, grids and clouds. Concurrency and distributed process coordination. Introduction to network communication issues and systems such as client-server, peer-to-peer, transaction based. Prerequisite: CS 513.

CS 692 - CYBERSECURITY CAPSTONE

Semester Hours: 3

CS 695 - INDEPENDENT STUDY

Semester Hours: 3

Individual directed study under the supervision of an instructor. Must have instructor approval.

CS 696 - SELECTED TOPICS IN CS

Semester Hours: 3

Course offered by an instructor in a specialized area of computer science. Must have instructor approval.

CS 699 - MASTER'S THESIS

Semester Hours: 3-6

Course offered by an instructor in a specialized area of computer science. Must have instructor approval. Required each semester a student is working and receiving direction on master's thesis. Prerequisite: instructor approval.

CS 703 - THEORY OF PROG LANGUAGES

Semester Hours: 3

Syntactic analysis and semantic interpretation of programming languages based on research and results in formal languages and associated compiler techniques. Identification of research directions and potential research projects in programming languages. Prerequisite: CS 603.

CS 717 - ADV ALGORITHM DES/ANALYSIS

Semester Hours: 3

Parallel algorithms, combinatorial algorithms, approximation algorithms for NP-complete problems, computational complexity. Distribution of algorithms across complex architectures. Prerequisite: CS 617.

CS 742 - IMAGE PROC ALGO/ARCHITEC

Semester Hours: 3

Algorithms and data structures for image enhancement, segmentation, object recognition and image sequence analysis; real-time versus non real-time image processing; computer architectures for fast image processing; cellular logic array processors, distributed, systolic and binary array processors. Prerequisite: CS 613 and CS 642.

CS 790 - OPERATING SYSTEMS SEMINAR

Semester Hours: 3

Advanced research topics in operating system theory and practice. Students will read and discuss classic and current papers in the literature. Each student will present reports in class and prepare a substantial research paper. Prerequisite: CS 690.

CS 795 - INDEPENDENT STUDY

Semester Hours: 3

Individual directed study under the supervision of an instructor. Must have instructor approval.

CS 796 - ADVANCED SELECTED TOPICS

Semester Hours: 3

Course offered by an instructor in a specialized area of computer science. Must have instructor approval.

CS 799 - DOCTORAL DISSERTATION

Semester Hours: 3-9

Required each semester student is enrolled and receiving direction on doctoral dissertation. Maximum of 18 hours credit toward degree.

Earth System Science (ESS)

ESS 501 - SURVEY ATMOSPHERIC SCIENCE

Semester Hours: 3

General survey of the field of atmospheric science includes thermodynamics, atmospheric dynamics, cloud physics, and atmospheric radiation. Quantitative examination of atmospheric properties including atmospheric composition, structure and dynamics.

ESS 502 - SCI & SOC ASPTS NATRL DISASTER

Semester Hours: 3

Examination of the physical causes of major natural geophysical hazards and their impact on the natural and built environment, society and the economy. Evaluation of the ability to forecast events, and develop sound mitigation and recovery measures. Specific case studies are considered.

ESS 507 - ENVRNMTL THRTS PBL PY DEC MKG

Semester Hours: 3

Researchers, policymakers and environmental campaigners have identified 25 potential future threats to the global environment. This course examines the nature and consequences of these threats and their potential impacts for the survival of the human race.

ESS 508 - PYTHON FOR ID ESS APPLICATIONS

Semester Hours: 3

Introduction to GIS model building, Python programming, and automation of scripts for ArcGIS. Techniques in Model Builder, Python, and the methods for automation will be taught using data from numerous available data sources across the internet with heavy emphasis on the Earth Sciences.

ESS 509 - SCI PROGRMNG FOR EARTH & ATMOS

Semester Hours: 3

Survey of data types and languages commonly used in the meteorological community along with practical application to meteorology. Course is designed to prepare students for graduate work and research in atmospheric science.

ESS 510 - OPERATIONAL WEATHER FORECAST'G

Semester Hours: 3

Operational Meteorology covers subjective and objective methods of atmospheric prognosis, including techniques for forecasting operationally-important weather elements. Course explores interpretation, use and systematic errors of computer-generated products, human factors within forecasting, and application of meteorological theory in an operational setting. Course instruction is accomplished through analysis of various weather events from beginning to completion.

ESS 514 - GEOSPATIAL APPLICATIONS

Semester Hours: 3

An introductory look at the ways in which GIS can be put to use in different fields of study, drawing examples from Demography, Sociology, Archaeology, History and Ecology. Focus on cartography and map creation principles and public geospatial data acquisition.

ESS 515 - ADVANCED TOPICS IN GIS

Semester Hours: 3

Advanced continuation of concepts applied in Geospatial Applications. Students will learn through modules of real world scientific research how to use further tools in ArcGis including: 3D Analyst, Spatial Analyst, Network Analyst. Topics include web data dissemination, spatiotemporal analysis and some basic spatial statistics measures. Prerequisite: ESS 514.

ESS 561 - ATMOSPHERIC RADIATION I

Semester Hours: 3

ESS 590 - SPECIAL TOPICS IN ESS

Semester Hours: 3

Selected topics of interest not included under other courses.

ESS 610 - LAND USE APP & SUSTAINABILITY

Semester Hours: 3

Study of land use and sustainability issues using satellite image processing and GIS. International examples of urbanization, agriculture, transportation, water management, and natural resources exploitation. Discussions of current literature and quantitative analyses of satellite and situ data. Prerequisite: ESS 515 or consent of instructor.

ESS 612 - ADV GIS EARTH ATMOSPHERE PROBL

Semester Hours: 3

Advanced GIS and remote sensing/image processing. Discussion, guided readings, and group labs to interact with student peers and instructor to develop geospatial solutions to problems relevant to their thesis research including appropriate research design, data collection, and analysis. Prerequisites: ESS 515 and ESS 610.

ESS 625 - AIR POLL APP & DEC MAKG REMOTE

Semester Hours: 3

Course will review principles of air pollution, measurement methods, regulation, national and international standards and how research is used to make decisions regarding air quality. The course will use ground-based, satellite, and numerical modeling information through a case study approach. Prerequisites: ESS/ATS 501.

ESS 630 - PHYSICAL CLIMATOLOGY

Semester Hours: 3

This course examines the physical aspects of the global climate system, including the global energy balance, surface energy balance, hydrologic cycle, climate classification, ocean circulation, natural and anthropogenic climate change and other selected topics such as climate sensitivity. Prerequisites: ATS 501 or ATS 541.

ESS 632 - ENERGY, CLIMATE, ENVIRONMENT

Semester Hours: 3

This course focuses on energy and its impact on the environment including climate change and air pollution. Specific energy forms, such as fossil fuels, nuclear energy, solar energy, are discussed.

ESS 670 - SATELLITE REMOTE SENSING I

Semester Hours: 3

Using a hands on approach, this course covers a broad range of topics concerning digital image processing applied to the remote sensing of atmospheric, cloud and surface properties using various satellite data sets. Prerequisites: ESS 509.

ESS 676 - REMOTE SENSING OF ENVIRONMENT

Semester Hours: 3

This course pursues both basic and advanced concepts in radiative transfer processes and retrieval algorithms of land surface biophysical variables from remote sensing observations, with an emphasis on the hands-on experience of data preprocessing and information extraction by using ENVI. Prerequisite: ESS 514.

ESS 680 - NUMERICAL MOD APPL ESS

Semester Hours: 3

This course will provide the physical basis for numerical model applications in the earth-atmosphere system including spatial and temporal scales. Prerequisites: ESS 501 and ESS 509.

ESS 690 - SPECIAL TOPICS IN ESS

Semester Hours: 3

Selected topics of interest not included under other courses.

ESS 698 - MASTERS CAPSTONE

Semester Hours: 3

An extended research project resulting in a substantive paper that involves the original collection, analysis and/or interpretation of scientific data and/or results. Conducted under the guidance of an advisor. Required for MS ESS non-thesis option.

ESS 699 - MASTER'S THESIS

Semester Hours: 3-6

A minimum of six thesis credit hours is required for MS degree.

ESS 780 - SEMINAR

Semester Hour: 1

Speakers are invited to report on research relevant to the field of Atmospheric and Earth System Science. Students are expected to attend at least twelve seminars and to write short descriptions of the presentations.

ESS 781 - STUDENT SEMINAR

Semester Hour: 1

Guest speakers reports on research relevant to the fields of Atmospheric and Earth System Science. Students are expected to attend weekly seminars, submit a paper based on at least ten talks, and make a 15 minute conference-type presentation on a research topic in atmospheric science selected in agreement with their advisor.

ESS 782 - PROFESSIONAL DEVELOPMENT

Semester Hour: 1

Topics concerning professional ethics, writing scientific journal articles, proposals and resumes, preparing budgets, networking, time management, conference presentations, research administration, funding agencies, stress and burnout will be discussed.

Economics (ECN)

ECN 511 - ECONOMICS OF INFORMATION TECH

Semester Hours: 3

Economic theory underlying consumer and firm behavior and strategy in the information technology industry, with an emphasis on developing formal tools of analysis and applying them to real-world examples.

ECN 545 - GAMES & NETWORKS

Semester Hours: 3

An introduction to game theory and economic- and social network analysis. Prerequisites: ECN 600.

ECN 554 - INTERNATIONAL ECONOMICS

Semester Hours: 3

Behavior of foreign-exchange rates under different monetary standards, methods of financing international trade, historical development of international financial institutions, current and proposed methods for fostering international trade, and problems of international liquidity.

ECN 561 - ECONOMIC DEVELOPMENT

Semester Hours: 3

Understand economic development in the developing world. Examine economic transformation & social change towards addressing poverty, inequality, & social justice. Highlight domestic & international institutional, structural, & political sources of economic dynamism/lack thereof in the Global South.

ECN 575 - ECON LABOR MARKETS & HUMAN RES

Semester Hours: 3

Economic analysis of labor markets; labor demand and labor supply at the market and individual level. Topics include individual decisions to supply labor, compensating wage differentials, human capital investment, discrimination in labor markets, pay and productivity, and the role of labor unions.

ECN 580 - INTRODUCTION TO ECONOMETRICS

Semester Hours: 3

An introduction to the quantitative measurement and analysis of actual economic and business phenomena.

ECN 590 - SPECIAL PROJECTS

Semester Hours: 3

Faculty guided independent study in an area of interest to the student and faculty member.

ECN 600 - FOUNDATIONS OF ECONOMICS

Semester Hours: 3

This course covers the economic foundations in which businesses operate. Coverage includes output and pricing decisions of firms in various market structures; consumer and producer choice at the micro level; and macroeconomic issues, such as unemployment and inflation and government policy.

ECN 626 - MANAGERIAL ECON & TECH

Semester Hours: 3

The principles of microeconomics are used to formulate and analyze problems and these principles are applied to business decisions. The course includes an introduction to regression analysis and forecasting. Basic international economic concepts and the importance of technology are explicitly introduced. Prerequisites: ECN 600 and MSC 600.

Education (ED)

ED 500 - SPEC TOPICS EDUCATION

Semester Hours: 1-3

Independent study, special projects, and special in-service programs.

ED 501 - INTRO TO EDUCATION

Semester Hour: 1

Initial practicum experience designed to provide the opportunity to explore the role of the classroom teacher in today's diverse school settings. Required for graduate students receiving their initial certification.

ED 510 - FOUNDATIONS OF LITERACY

Semester Hours: 3

This course includes a study of methods, materials, and strategies for reading instruction. Components of the course will include but not be limited to the five pillars of reading instruction identified by the National Reading Panel (2000): phonemic awareness, phonics, fluency, vocabulary, and comprehension. Emphasis is placed on the various stages of and approaches to literacy development, knowledge of which is required for the Alabama Reading Specialist licensure.

ED 513 - LITERATURE FOR CHILDREN & ADOL

Semester Hours: 3

Course content will include the study of various genres of children's and adolescent literature and their relationship to beginning reading, enhancement of reading comprehension, and intervention instruction in the various content areas. (Same as EH 613) Must be admitted to the Teacher Education Program.

ED 520 - COMPUTER BASED INSTRUCT'L TECH

Semester Hours: 3

Introduces prospective teachers to current state of the art in educational technology. Extensive hands-on experiences with microcomputers and other emerging technology. Emphasis on effectively integrating technology into instructional setting for both special and regular students.

ED 521 - SECNDRY ELA INSTR WRIT TO READ

Semester Hours: 2-3

Candidates explore the ways they can use specific writing-to-learn activities to enhance their students' capacity to understand a variety of complex texts. Candidates will learn techniques for engaging students in the questioning, inference-making, syntactical pattern recognition, and meaning-making of both fiction and nonfiction works.

ED 522 - MIDDLE & SECD SCH MATH METHODS

Semester Hours: 2-3

This course is part one in a series of two courses that are designed for teacher candidates who are pursuing teaching certification who are pursuing teaching certification in middle and/or secondary mathematics. This methods course provides background for middle school and secondary teaching from the perspective of theory, research, and practice.

ED 523 - TCHNG SCIENCE MID & SEC SCH I

Semester Hours: 2-3

This course will focus on how secondary students learn science. Candidates will learn how to develop and design developmentally appropriate lessons in which their students are able to make observations, examine relationships, notice patterns, and make inferences, while confronting naive misconceptions. Candidates will discuss the nature of science (NOS).

ED 524 - TCHNG SOC STUD MID & SEC SCH I

Semester Hours: 2-3

This course teaches research-based techniques and strategies employed by social science teachers at the secondary levels. As well as learning theoretical foundations and the goal of social science instruction (citizenship skills), students will learn pedagogic skills, instructional strategies, and modes of reasoning unique to the social studies classroom.

ED 530 - APPLIED MULTICULTURALISM

Semester Hours: 3

Through an examination of constructs such as race, ethnicity, social class, gender, sexual orientation, and religious affiliation, students will develop an understanding of the connections between identity, difference, power, and privilege and the role(s) school (could/should) play in perpetuating or ending discriminatory practices. Furthermore and more importantly, students will develop an understanding of the ways research in both the humanities and social sciences can be used to interpret, analyze, and critique multiculturalism. Students will leave the course with research-based pedagogical practices designed to help all students learn to the best of their abilities.

ED 531 - SEC ELA METHDS READING

Semester Hours: 2-3

In this course, candidates will explore the ways they can use specific reading activities to enhance their students' ability to express themselves in multiple registers and forms of discourse. Candidates will learn techniques for engaging students in the process of developing and expressing their ideas while demonstrating and improved command of the grammatical, syntactical, and discursive elements of language.

ED 532 - SPACE ORIENTATION TEACHERS

Semester Hours: 3

A weeklong course at the U.S. Space and Rocket Center in Huntsville, Alabama for pre-service and in-service teachers. The inquiry based workshops are taught around the theme of space exploration include activities to be done across the curriculum. All activities are correlated to National Math, Science, Technology, Social Studies, and Reading Standards. Activities based on curriculum developed by NASA, CAP, NSATA, and the USSRC. Topics include moon, mars, rocketry, propulsion, hydroponics, math, biology, history and literature.

ED 533 - TEACH SC MID & SEC SCHOOL II

Semester Hours: 2-3

Students will discuss the status of science education in our nation's schools, and the need for implementing research-based strategies in the classroom using the 5E learning cycle as framework.

ED 534 - TEACH SOC ST MID & SEC SCHL II

Semester Hours: 2-3

This methods course is designed to study effective techniques and strategies employed by social science teachers at the middle and secondary levels. As well as learning theoretical foundations in social studies education, students will learn pedagogic skills, instructional strategies, and modes of reasoning unique to the social studies classroom.

ED 535 - INTRO APPLIED EDUCATIONAL RES

Semester Hours: 3

Introduction to the nature of research and its relationship to educational thought and practice. Primary focus will be on planning and executing research activities (i.e. action research, thesis development) in the diverse classroom and analyzing the collected data to improve instruction, educational performance, and adding to the body of knowledge in educational practices.

ED 539 - TCH REASON/PROOF SEC MATH

Semester Hours: 2-3

This methods course provides background for middle school and secondary teaching from the perspective of theory, research, and practice. It is designed to provide an introduction to and practice in ways in which to encourage students in mathematical reasoning and proof.

ED 540 - COGN DEV THEORIES LEARNING

Semester Hours: 3

The course is designed to inform students about recent developments in Cognitive Psychology and their implications for teaching and learning. Students will leave the course with a variety of 'cognitive understandings' for use in differentiated classrooms.

ED 545 - CURR & INSTR IN SEC SCHOOLS

Semester Hours: 3

This course is designed to address various contemporary teaching and learning strategies, as well as related issues, assessments strategies, and applicable theories related to secondary teaching and learning.

ED 560 - CURR/EMERGING INSTR TECH

Semester Hours: 3

Designed to build competency in computer technologies appropriate to instructional use. Concepts of authoring and scripting will be used to unify course materials. (Same as CS 560.).

ED 565 - INTRO DIFFERENTIATED INSTRUCTI

Semester Hours: 3

The course provides an introduction to the philosophy and practice of differentiation. Students will examine the elements, content, process, product, affect and environment by which instruction can be differentiated to address the complex challenges of meeting the diverse learning needs of all students.

ED 570 - DIFF INSTRUCTION SPEC POP

Semester Hours: 3

The course provides practical strategies to maximize learning for all students, particularly those with disabilities, gifted/talented, and English language learners (ELL).

ED 575 - READING PRIMARY GRADES

Semester Hours: 3

An introduction to the basic principles of literary instruction in culturally and linguistically diverse primary grade classrooms, including theoretical bases for instruction, methods of instruction and organization, developmentally appropriate strategies and materials, and assessment of children's literacy. Class activities include mini-lessons, discussions, group activities, and presentations. An intensive school-based practicum in grades preK-2 is required.

ED 580 - PROJECT BASED LEARNING

Semester Hours: 3

Develop a robust understanding of Project Based Learning (PBL) through critiquing, evaluating, and synthesizing PBL's core theoretical concepts.

ED 593 - ED EXCEPT CHILD & YOUTH

Semester Hours: 3

Introduction to the field of exceptional children and youth, including observations. This course, or equivalent, is a prerequisite to certification. Intensive field experience required.

ED 600 - SPEC PROB IN EDUCATION

Semester Hours: 1-3

Independent study, special projects, and in-service programs.

ED 604 - CONTRIBUTION PSY TO EDUC

Semester Hours: 3

Principles, theory, and practice of psychology for teaching and administrative service in educational institutions. Factors that determine learning and conditions of effective teaching. Administrator and supervisor as organizer of the milieu wherein teaching, learning, and growth occur. Intensive field experience required.

ED 605 - READING RESEARCH & INSTRUCTION

Semester Hours: 3

Elements of effective reading instruction for beginning readers as supported by current research and practice. Topics include balance, language-rich/print-rich environment, language development, phonemic awareness, print awareness, phonics, writing, spelling, and comprehension. Intensive field experience required.

ED 607 - EDU LEADER AS EVALUATOR

Semester Hours: 3

Procedures and techniques of evaluation and research approaches. Emphasis on teachers as evaluators; based on action research in the classroom. Intensive field experience required.

ED 608 - EXPAND RDG ABIL CONT AREA INST

Semester Hours: 3

Strategies to enhance reading comprehension when using materials in all subject areas. Teacher directed, integrated instruction; extensive use of authentic printed materials; discussion at literal and higher levels of understanding, motivation, vocabulary, and writing. Intensive field experience required.

ED 609 - CLASSROOM & BEHAVIOR MGMT

Semester Hours: 3

A focus on the variety of instructional management options to meet classroom and individual student needs to ensure success in school is integrated throughout all course activities. A range of management practices, including strategies for diverse and special populations is offered. Theoretical and reflective practices are incorporated during classroom meetings. Students will observe, research, and discuss current classroom approaches. After reflections, effectiveness of observed practices will be assessed. Student will discuss and develop alternative activities that promote successful management techniques. Intensive field experience required. Admission to the Teacher Education program or permission of chair is required for this class.

ED 610 - TEACHING FINE ARTS ELEM SCHOOL

Semester Hours: 2-3

This course covers multiple aspects of fine arts education including the use of content, functions, and achievements of the performing arts (dance, music, theatre) and visual arts as primary media for communication, inquiry, and engagement among elementary students.

ED 612 - DIAGNOSIS & ASSMNT OF READING

Semester Hours: 3

Focuses on ways to address the needs of students who do not read at grade level. Intervention strategies such as on-going assessment and evaluation, explicit instruction in phonemic awareness and phonics, extensive practice, comprehension strategies, and writing, along with careful examination of standardized state assessment measures. Intensive field experience required.

ED 615 - READING INTERMEDIATE GRD

Semester Hours: 3

This course provides an in-depth study in and application of the process of reading and reading instruction, theoretical approaches, instructional strategies, classroom organization, and the formal/informal assessment of reading in intermediate grades. This course is required of all elementary education majors and secondary education candidates who are pursuing a middle school endorsement. Intensive field experience required.

Prerequisites: Admission to the Teacher Education Program.

ED 620 - USING TECH REACH SPEC POP

Semester Hours: 3

Prepares teachers to plan curriculum integration by using computer technology and software in various curriculum areas for both regular and special students. Students will develop competency in instructional design and production skill techniques and implement instructional events using long-distance technologies.

ED 635 - ASMT GUIDE DIFFRNT INSTRUCTION

Semester Hours: 3

The focus of this course would be to use a variety of norm-referenced, criterion-referenced and other assessment data to inform instruction for a diverse classroom within the RTi model. Students would learn to use formative and summative assessments to determine the type of strategies needed to teach content.

ED 640 - DIFD STRGTY RES & TEACH ELL

Semester Hours: 3

The course provides the foundation for informed and effective instruction of nonnative speakers of English across diverse settings. ED 640 introduces students to theoretical underpinnings of historical and contemporary ESOL education; to the analysis, critique and selection of instructional materials; to the design of courses and lessons; and, to strategies for pedagogically sound classroom instruction, lesson planning, and action research.

ED 650 - DIFFNT ELEM MATH & SCI INSTRUC

Semester Hours: 3

This course will focus on guiding the learner to apply the concepts of differentiated instruction within mathematics and science contexts. Participants will learn how to implement effective strategies for managing flexible groups, acquire ideas for providing students with a variety of options to successfully target mathematics and science standards and understand how to plan strategically in order to reach the needs of diverse learners within the classroom through inquiry-based learning.

ED 665 - DIFFNT ELEM LITERACY (R & W)

Semester Hours: 3

This course will focus on guiding the learner to apply the concepts of differentiated instruction to elementary literacy concepts. Advanced teacher candidates will develop and implement differentiated instructional plans that utilize individual and flexible grouping strategies and resources to support the growth of strategic, independent readers and writers.

ED 671 - TCHG ELEM LANGUAGE ARTS

Semester Hours: 3

Introduction to current practices in language arts instruction with emphasis on the development of an integrated curriculum using children's literature as a foundation. Includes appropriate techniques for teaching of grammar, spelling, and handwriting. Intensive field experience required. Prerequisites: Admission to the Teacher Education Program.

ED 672 - TCHG ELEM SOCIAL STUDIES

Semester Hours: 3

Teaching social studies in grades K-6. Helping beginning teachers acquire background skills in organizing and teaching units of work. Intensive field experience required. Prerequisites: Admission to the Teacher Education Program.

ED 673 - TCHG NATURAL/HLTH SCIENCE

Semester Hours: 3

Integrates concepts from reflective practice with elementary science teaching. Opportunity to refine teaching skills in the planning, implementation, and evaluation of science lessons and units of instruction. Intensive field experience required. Prerequisites: Admission to the Teacher Education Program.

ED 674 - TCHG ELEM. MATHEMATICS

Semester Hours: 3

Overview of the mathematics concepts and skills taught in grades K-6 with an emphasis on the principles, methods, and materials used in the teaching and evaluation of elementary school mathematics. Focuses on the attitudes and behaviors of students and teachers in the actual planning and implementation of mathematics instruction for an elementary school classroom. Intensive field experience required. Prerequisites: admission to the teacher education program.

ED 690 - MASTER'S ACTION RESEARCH PROJ

Semester Hours: 3

The capstone course will serve as a mechanism to support the research, methodology, development, and experimental stages of the required action research. The student's work will be approved and supervised by a selected faculty advisor with direct connections to the research area. A symposium in which students present their research report will be culminating activity.

ED 691 - PORTFOLIO SEMINAR & SYMPOSIUM

Semester Hour: 1

The seminar will provide a forum in which the student's culminating portfolio is refined and submitted for faculty review. The seminar will also serve as a mechanism to support the final writing stages of the required action research project or case study report. The student's work will be approved and supervised by the faculty advisor(s). A symposium in which students present their research will be the culminating activity.

ED 692 - ADVANCED P-12 INTERNSHIP

Semester Hours: 3

This internship is for students in advanced programs. The internship is completed throughout the program with a culminating portfolio of all internship assignments.

ED 693 - ELEMENTARY INTERNSHIP

Semester Hours: 6

Observation, participation and teaching in elementary school (full time, 15 week semesters). Students will also attend campus-based seminars designed to meet specific needs of the interns.

ED 696 - P-12 INTERNSHIP

Semester Hours: 3-6

ED 698 - HIGH SCHOOL INTERNSHIP

Semester Hours: 3-6

Observation, participation, and teaching in middle/high school (full-time, 15 week semester). Students will also attend campus based seminars designed to meet specific needs of interns.

Education Collaborative (EDC)

EDC 511 - INSTRUCTIONAL STRATEGIES

Semester Hours: 3

This course provides foundational, in-depth pedagogical strategies for assisting learners in constructing their own understanding of information. This course focuses on multiple instructional options that all learners need in order to be successful. It takes a broad approach to the multiple teaching models that are necessary for working with diverse populations.

EDC 551 - FND OF VISUAL IMPAIRMENTS

Semester Hours: 3

Introduction to academic language found within the profession of special education of students with visual impairments. Examines standards, organizations, programs, and services for students with visual impairments. Studies the basic anatomy, diseases, and disorders of the visual system and explores how to conduct a Functional Vision Assessment.

EDC 610 - BEHAVIORAL ASSESSMENT

Semester Hours: 3

This course will provide an introduction to the strategies, methods, and ethics associated with behavioral assessment. The defining characteristics, strengths, and weaknesses of indirect assessments, descriptive assessments, and functional analysis will be reviewed. Students will learn to differentiate between and implement each type of assessment method. Assessment data collection, analysis, and interpretation will be discussed in the context of identifying appropriate behavioral interventions and goals.

EDC 611 - ETHICS IN ABA

Semester Hours: 3

This course will familiarize the student with ethical and professional responsibilities for Board Certified Behavior Analysts. Ethical decision-making processes will be emphasized with respect to the ethical guidelines set forth by the BACB (C), and the relationship between ethics, policy, and law will be explored.

EDC 612 - FUNDAMENTALS IN ABA I

Semester Hours: 3

This course will introduce students to the goals, philosophical assumptions, and dimensions of applied behavior analysis. Students will also be introduced to the basic concepts and principles of behavior analysis including, but not limited to, respondent and operant conditioning, reinforcement and punishment contingencies, schedules of reinforcement, extinction, motivating operations, and automatically and socially mediated consequences. The concepts and principles will be discussed with respect to how they are relevant to socially significant behavior.

EDC 613 - FUNDAMENTALS OF ABA II

Semester Hours: 3

Students will describe and explain behavior from the perspective of radical behaviorism and distinguish among behaviorism, the experimental analysis of behavior, applied behavior analysis, and professional practice guided by the science of behavior analysis. Students will be able to define and provide examples of more complex concepts and principles such as stimulus control, discrimination, generalization, verbal operants, and derived stimulus relations. Prerequisites: EDC 612.

EDC 614 - RESEARCH METHODS IN ABA

Semester Hours: 3

The purpose of this course is to introduce students to the fundamentals of behavior analytic research methods. The course will examine the strategies and tactics used in single-subject research to implement socially important behavior change.

EDC 615 - INTERVENTIONS IN ABA

Semester Hours: 3

This course will prepare students to identify and implement effective, data-based behavior-change procedures and interventions in applied settings. Elements of behavior change and procedures to accomplish behavior increases, decreases, generalization, and maintenance will be examined. Emphasis will be placed on reinforcement, schedules of reinforcement, extinction, and alternate treatment procedures. This course will also examine strategies, teaching self-management, group-oriented contingencies, shaping techniques, behavior chains, motivational systems, punishment, and other topics. Students will learn how to select and implement function-based interventions for the reduction of problem behaviors and skills-based prevention strategies.

EDC 616 - SUPERVISION & MGMT IN ABA

Semester Hours: 3

This course will prepare students to conduct supervision using the principles of behavior analysis. Students will develop performance expectations based on the context, select individualized, assessment-based goals to develop supervisee skills, develop function-based strategies to improve supervisee performance, and design staff training procedures based on behavior analytic research.

EDC 625 - ASSISTIVE TECH EDUC INDV W/ASD

Semester Hours: 3

This course provides an overview of assistive technology devices and services that are used in the instruction of students with autism spectrum disorders (ASD) and other communication disabilities.

EDC 636 - INTRO STUD AUTISM SPECTR DISOR

Semester Hours: 3

This course will provide advanced teacher candidates with an introduction to working with students diagnosed with autism spectrum disorders. Candidates will develop an understanding of the range of characteristics and behaviors associated with ASD, the effectiveness of early intervention on behaviors, and the theories regarding the etiology of the disorder.

EDC 645 - ASMT & BEHAVIOR APPLC ASD

Semester Hours: 3

This course focuses on assessment and intervention planning for children with ASD. Candidates will enhance their knowledge of various assessments appropriate to the ASD population and develop skills to administer and interpret assessments. The course will provide candidates with an overview of the Applied Behavioral Analysis approach to assessing and teaching students with ASD.

EDC 652 - INTRO TO O&M

Semester Hours: 3

Examines the psychosocial implications of blindness, with a particular focus on independence. Exploration of basic orientation mobility concepts including human guide and basic independent travel through the use of verbal description and tactile graphics.

EDC 653 - STRATEGIES FOR VI

Semester Hours: 3

Examines the strategies used to make education accessible to students with visual impairments through the creation of high-quality accommodations and/or modifications. Topics include organization, assessment, early intervention, and the expanded core curriculum. This course is a practicum for visual impairments.

EDC 654 - INTRO TO BRAILLE

Semester Hours: 3

Focused exploration of braille, braille literacy, and braille assessment.

EDC 655 - COLLAB & TRANSITION PLANNG

Semester Hours: 3

Using case-based instructional strategies, this course is designed to assist advanced teacher candidates in learning to build supportive relationships with families, paraprofessionals, and related service providers, including community agencies, as a foundation for designing differentiated learning experiences for students with disabilities.

EDC 656 - PROGRAMS FOR MIVI/DB

Semester Hours: 3

Intensive examination of curricular adaptations, assessment, and intervention for students with multiple disabilities and visual impairments or deafblindness.

EDC 657 - ADVANCED BRAILLE AND AT

Semester Hours: 3

Focused exploration of the braille for use in various contexts (STEM, music, foreign language), assistive technology and STEM education for students with visual impairments.

EDC 660 - PRCTL APPLC VIS INSTR STRATEGY

Semester Hours: 3

Advanced candidates will participate in an extensive summer clinic for children with ASD. Candidates learn how to create an appropriate learning environment, organize schedules for individual students, develop materials, engage in instruction, respond to behavioral issues, and document student progress.

Electrical Engineering (EE)

EE 500 - RANDOM SIGNALS & NOISE

Semester Hours: 3

Random variables and probabilistic description of signals. Introduction to random processes: autocorrelations, cross correlations, power spectral density. Noise analysis: thermal, shot, white, colored. Response of electrical systems to random inputs.

EE 501 - DIGITAL SIGNAL PROC ARCHITECTU

Semester Hours: 3

Introduction to digital signal processor architecture, applications, assembly language programming, and development tools for designing and implementing DSP systems.

EE 503 - COMMUNICA SYS & SIMULAT W/LAB

Semester Hours: 3

Modern test equipment and computer-based simulation methods are used to conduct experiments in the area of communication systems. Hands-on experiments are conducted using digital oscilloscopes, arbitrary waveform generators, vector impedance meters and other relevant test and measurement equipment. Methods are investigated for signal modulation and demodulation; studies are conducted on AM, FM, PSK, PCM and delta modulation circuits and systems. Several types of filters are investigated, both analytically and experimentally. Properties and behavior of phase-locked loop are studied by using both hardware and numerical simulations.

EE 504 - INTRO DATA COMMUNICA NETWORKS

Semester Hours: 3

Overview of historic development of modern telephone and data communication system, system architecture, standards, broadband switching systems, modems, protocols, personal and mobile communications, digital modulation techniques.

EE 505 - INTRO CONTROL/ROBOTIC SY

Semester Hours: 3

The basic theories and analytical techniques for modeling, analysis and control of dynamical systems. Transfer functions, block-diagrams, frequency response, stability criteria, series and feedback controller design, digital control. Introduction to the dynamic analysis and control of robotic systems.

EE 506 - COMMUNICATION THEORY

Semester Hours: 3

Review of elementary signals and systems including the Hilbert transform, cross and auto correlation, power density spectrum, and the Wiener-Khinchine theorem. Butterworth and Chebyshev lowpass filters. Bandpass signals and systems. The lowpass equivalent of a bandpass signal/system. Commonly used forms of linear and nonlinear modulation. Demodulation methods and circuits. Phase lock and frequency feedback techniques.

EE 510 - SELECTED TOPICS/ECE

Semester Hours: 1-6

EE 510L - SELECTED TOPICS LABORATORY

Semester Hours: 0

EE 514 - ANALOG AND DIGITAL

Semester Hours: 3

Analog filter design via Butterworth, Chebyshev, and elliptical approximation. Active filter design using operational amplifiers. Digital filter design methods.

EE 516 - DIGITAL ELECTRONICS

Semester Hours: 3

Introduction to digital electronics. The Metal-Oxide-Semiconductor (MOS) transistor. MOS inverters and gate circuits. Bipolar junction transistors, ECL inverters, and bipolar digital gates. Semiconductor memories. Circuit design for VLSI.

EE 519 - DIGITAL ELECTRONICS LAB

Semester Hour: 1

EE 527 - ELECTROMAGNETIC ENGINEERING

Semester Hours: 3

Review of Maxwell's equations, uniform plane waves in different types of media, reflection and transmission of uniform plane waves, transmission lines, microwave and fiber optic waveguides, antennas, wireless applications.

EE 532 - OPTICAL SYSTEMS DESIGN

Semester Hours: 3

Introduction to the geometrical design and analysis of optical systems, and to the design principles of lens systems.

EE 534 - OPTICAL FIBER COMMUNICATIONS

Semester Hours: 3

Introduction to optical fibers and their transmission characteristics, optical fiber measurements, sources and detectors, noise considerations for digital and analog communications, optical fiber systems. Prerequisite: EE 527.

EE 541 - OPTICS I

Semester Hours: 3

Foundations and physics of geometrical optics, Fermat's principles and Huygen wavelets, refraction and reflection. The many forms of Snell's Law. Optical path lengths, geometrical wavefronts and rays. Ray tracing, ynu-chart and matrix methods. Gaussian imagery and paraxial optics, conjugate elements, cardinal points, and image-object relations. Stops and pupils, chief and marginal rays, vignetting, and the optical or Lagrange invariant. The y-ybar diagram, design of common systems: objectives, magnifiers, microscopes, collimators and detectors. Optical glasses and chromatic aberrations, wavefront and transverse aberrations, spot diagrams and ray fan plots.

EE 542 - PHYSICAL OPTICS

Semester Hours: 3

Scalar and electromagnetic waves, polarization, coherence, reflection and refraction; two beam and multiple beam interference, interferometers, Fabry-Perots, thin films, diffraction, and absorption and dispersion.

EE 543 - OPTICAL COMM SYS & NETWORKS

Semester Hours: 3

EE 553 - LASER SYSTEMS

Semester Hours: 3

Spontaneous and stimulated emission, population inversion, optical resonators, three- and four-level systems, Q-switching and modelocking, semiconductor lasers, integrated optic waveguides and couplers, scanning systems, high power industrial applications. Includes a research project and oral presentation.

EE 570 - OPT & PHOTONIC SYSTEMS DESIGN

Semester Hours: 3

EE 586 - INTRO MODERN CONTROL SYSTEMS

Semester Hours: 3

The basic ideas and techniques of modern control theory. Analytical techniques for modeling, analysis and control of MIMO dynamic systems. State variable description of dynamic systems. State variable feedback control design and state observers. Kalman-filtering. Fundamentals of nonlinear systems analysis. Introduction to discrete time system modeling, analysis and control. Basics of adaptive and optimal control. Applications to aerospace and electric power systems.

EE 601 - LINEAR SYSTEMS

Semester Hours: 3

Formulation and solution by transform methods of differential equations of linear electrical and electromechanical systems, state equations, signal-flow graphs, and discrete-time systems.

EE 603 - RANDOM SIGNALS IN COMMUNICATIO

Semester Hours: 3

Random processes applied to communication and control. Concepts covered include stationarity, correlation, power spectrum, Brownian motion, thermal noise, Markov processes, and queuing theory. Emphasis on systems with noisy excitation.

EE 604 - DIGITAL IMAGE PROCESSING

Semester Hours: 3

Review of digital filters. Spatial filters and realizations. Edge and wedge detectors. Derivative matrices and u-notch, r-notch filters. Periodic images, their transformation and scanning, their two-dimensional Fourier transforms. Rational vectors and image filtering.

EE 605 - CLASSICAL CONTROL DESIGN

Semester Hours: 3

Design of feedback, feedforward, and minor-loop controllers/compensators using classical control engineering techniques and classical performance criteria. Frequency domain synthesis of lead, lag, lead-lag, etc. compensators; tuning of PD and PID controllers; error budgets; use of commercial CAD software for classical control design and performance evaluation; digital simulation techniques. CAD laboratory sessions.

EE 606 - STATISTICAL COMM THEORY

Semester Hours: 3

Generalized harmonic analysis. Correlation, convolution, power density spectra. Probability and statistics. Correlation detection. Optimum linear filtering and prediction.

EE 607 - ROBOTIC SYSTEMS CONTROL

Semester Hours: 3

In-depth study of information, decision and control problems associated with robotic system design. Sensor systems, recognition and decision algorithms, kinematics and dynamics, trajectory planning, analog and digital controllers, adaptive and optimal control.

EE 609 - ELECTROMAGNETIC FIELD THEORY

Semester Hours: 3

Mathematical approach to electromagnetic phenomena. Basic field concepts. Radiation and propagation. Waveguides and simple radiating and scattering systems. Perturbational and variational techniques. Prerequisite: EE 527.

EE 610 - SELECTED TOPICS/ECE

Semester Hours: 1-6

EE 612 - GRADUATE DESIGN PROJECT

Semester Hours: 3

Graduate design project in support of an M.S.E. program.

EE 613 - LASER ELECTRONICS

Semester Hours: 3

Resonant optical cavities. Atomic radiation. Laser oscillation and amplification. General characteristics of lasers. Laser excitation. Semiconductor lasers. Gas discharge phenomenon. Transition rates. Spectroscopy of common lasers. Detection of optical radiation.

EE 614 - DATA COMPRESSION

Semester Hours: 3

Introduction to the fundamental theories and techniques of lossless and lossy data compression. Topics include Huffman codes, arithmetic codes, Golomb-Rice code, dictionary techniques, context-based compression, scalar quantization, vector quantization, transform coding, subband coding, wavelets, compression standards, and selected advanced topics of data compression.

EE 615 - ANALOG CIRCUIT DESIGN

Semester Hours: 3

Use of operational amplifiers to synthesize special-purpose filters and circuits for analog signal processing and conditioning; linear and switching power supplies; high-frequency effects; circuits for transmitters and receivers; digital circuits from an analog viewpoint; A/D and D/A converters; selected topics.

EE 616 - MICROELECT DEV/INTE CIRC

Semester Hours: 3

Analysis and design of microelectronic devices for integrated circuits. Properties of semiconductors important to microelectronic device operation. Analysis and modeling of MOS devices and circuits. Analysis and modeling of metal semiconductor devices, junction diodes, bipolar transistors. Device fabrication technology. Prerequisite: EE 516.

EE 617 - VLS INTEGRATION DEVICES

Semester Hours: 3

Operation and modeling of the MOS transistor. Second-order considerations for a MOSFET, VLSI device fundamentals and scaling laws. Micron-length and submicron-length semiconductor devices. Basic technology and applications of VLSI. Impact of VLSI on computer architecture. VLSI computer aided design.

EE 618 - VLSI CIRCUITS

Semester Hours: 3

MOS device electronics. MOS processing and design rules. Circuit design with MOSFETS. MOS circuit technique. Combinational logic gate in CMOS. Pseudo-NMOS logic gates. Very high performance digital circuits. Sequential logic circuits. Designing semiconductor memories. Low power CMOS VLSI circuit design.

EE 619 - INTRO RADAR SYSTEMS

Semester Hours: 3

Topics include radar equation, CW radar, MTI and pulse Doppler radar, tracking radar, major systems components, detection in the presence of noise and clutter, ambiguity, and resolution.

EE 620 - CMOS ANALOG CIRCUIT DESIGN

Semester Hours: 3

Analog circuit design in CMOS technology. CMOS processing technology. MOS transistor modeling. Basic current mirrors and single-stage amplifiers. Noise analysis and modeling. Basic OpAmp design and compensation. Advanced current mirrors and OpAmps. Bandgap references. Oscillators. CMOS technology characterization for radio-frequency (RF) design. Same as CPE 625.

EE 622 - HARDWARE RELIABILITY

Semester Hours: 3

The objective for this course is to provide students with an understanding of the essential reliability physics of electronic devices as well as some of the practical technological considerations.

EE 629 - ANAL & COMP METH IN ELEC ENG I

Semester Hours: 3

Analytic and numerical solution techniques applicable to problems arising in engineering, utilizing complex variable theory, linear algebra, matrix theory, and transform methods.

EE 630 - ANAL & COMP METHODS ELEC EG II

Semester Hours: 3

Analytical and numerical solution techniques applicable to problems arising in electrical engineering. Partial differential equations, vector differential and integral calculus, special functions, Fourier analysis with applications and integral equations.

EE 632 - FOURIER OPTICS

Semester Hours: 3

Introducing the optical system as an invariant linear system, convolution, Sommerfield's diffraction integral, Fourier Transform, angular spectrum, coherent and incoherent imaging, optical transfer function.

EE 633 - ELECTRO-OPTICAL ENGINEER

Semester Hours: 3

Propagation of optical beams in homogeneous and guiding media, optical resonators, and spectrum analyzers, theory of laser oscillation, some specific laser systems, parametric oscillators, electro-optical and acousto-optical modulators.

EE 634 - OPTICAL COMMUNICATIONS

Semester Hours: 3

Optical communication systems; counting statistics; the optical detector response process; direct detection; heterodyne detection parameter estimation in optical communications; pointing, spatial acquisition and tracking.

EE 642 - DATA & DIGITAL COMMUNICATION

Semester Hours: 3

Introduction to digital and data communications; transmission channels; modulation and coding; telephone networks; data communication standards; noise and distortion; computer interfacing; protocols. Prerequisite: EE 603.

EE 648 - DIGITAL SIGNAL PROCESSING

Semester Hours: 3

Theory and applications of signal processing by digital techniques. Difference equations, Ztransform theory, digital-filter design, fast Fourier transform, quantization effects, and discrete estimation. Applications in digital filtering, signal processing, data analysis and smoothing, and image processing. Prerequisite: EE 528.

EE 654 - OPTICAL TESTING

Semester Hours: 3

EE 670 - OPTOMECHANICAL DESIGN & MANUF

Semester Hours: 3

EE 672 - DIGITAL PROC RANDOM SIGNALS I

Semester Hours: 3

Discrete signals, linear systems, spectral analysis and probability; and random discrete-time signals. Introduction to statistical interference, time-series analysis and spectral estimation of random discrete-time signals. Cross correlation and cross spectra, multitaper spectrum estimation and multivariable spectral analysis.

EE 673 - DIGITAL PROC RANDOM SIGNALS II

Semester Hours: 3

Parametric models for random signal processing; AR (autoregressive), MA (moving average), ARMA (autoregressive moving average), and Prony method. Two-dimensional spectral estimation; higher-order spectral analysis and multiresolution signal analysis.

EE 690 - UNIFORM GEOM THY DIFFRAC

Semester Hours: 3

Geometrical optics fields, geometrical optics reflected fields, two-dimensional wedge diffraction (GTD and UTD), three-dimensional wedge diffraction and corner diffraction, equivalent currents, diffraction at a smooth convex conducting surface, radar cross section.

EE 693 - ECE CAPSTONE

Semester Hours: 1-3

The purpose of this course is for students to perform research in a subject gained from courses taken at the graduate level. Students will be introduced to rhetorical theory, training in oral and written communication skills. They are required to organize and deliver oral and written technical presentations on individual research, journal articles, or design projects.

EE 696 - GRAD INTERN EE ENGR

Semester Hours: 1-9

Active involvement in an engineering project in an engineering enterprise, professional organization or government agency that has particular interest and relevance to the graduate student. Permission of EE faculty member is required.

EE 699 - MASTER'S THESIS

Semester Hours: 1-9

Required each semester student is working and receiving direction on a master's thesis. Minimum of two semesters and 6 hours required for M.S.E. students. A maximum of nine hours of credit is awarded upon successful completion of master's thesis. The 1 hour option is only available to students who have successfully defended their thesis and submitted it for approval, but do not meet the deadlines for graduation in the semester submitted. Students may only use the 1 hour option once in their career.

EE 700 - SAMPLED DATA CONT SYS

Semester Hours: 3

Classical and modern methods for analysis and design of sampled data-control systems; Ztransforms, transport lags, z and w plane analysis, state variables, and the transition matrix.

EE 701 - ADV LINEAR CONTROL THRY

Semester Hours: 3

Modern techniques for analysis and design of linear control systems. Matrix formulation, multivariable control systems, state variable concepts. Linear transformation, controllability, observability, discrete-time systems. Prerequisite: EE 505.

EE 703 - MODERN CONTROL DESIGN

Semester Hours: 3

Use of modern (state-variable) control concepts and theories to design high-performance controllers for multi-input/multi-output set-point regulation and servo-tracking/pointing problems. Modeling of uncertain disturbances; design of disturbance-accommodating controllers; introduction to adaptive and stochastic control. Use of commercial CAD software for modern control design and performance evaluation. CAD laboratory sessions. Prerequisite: EE 701.

EE 704 - NONLINEAR CONTROL SYSTEM

Semester Hours: 3

Classical and modern methods for analysis and design of nonlinear automatic control systems. State variables, phase plane, limit cycles, stability, describing functions, relay control, stabilization theory. Prerequisite: EE 701.

EE 705 - THEORY OPTIMAL CONTROL

Semester Hours: 3

General theory of optimal control of dynamic processes. Calculus of variations. Hamilton-Jacobi theory. Pontryagin's maximum principle, dynamic programming.

EE 706 - KALMAN FILT TECH CON & SIG PRO

Semester Hours: 3

Basic concepts of Kalman Filtering Theory with applications to: 1) analysis and design of control systems for dynamic processes with noisy sensors and random-type disturbance inputs, and 2) estimation, smoothing and prediction of information in noisy signals; Optimum Stochastic Control and the Separation Principle. Matrix Riccati Equation, Covariance Matrix, Orthogonal Projection Theorem. Prerequisite: EE 701.

EE 707 - INFORMATION THEORY

Semester Hours: 3

Self-information, entropy, mutual information, and channel capacity, encoding, error detecting and correcting codes. Sampling theorem. Discrete and continuous channels.

EE 709 - DISCR RANDOM SIG/SPEC ES

Semester Hours: 3

Review of linear systems theory, random discrete processes, classical spectral estimation, parametric models of discrete random processes, autoregressive (AR), moving average (MA), autoregressive moving average (ARMA) models.

EE 710 - SELECTED TOPICS/ECE

Semester Hours: 1-6

EE 711 - ANTENNA THEORY

Semester Hours: 3

Antennas and antenna arrays. Radiation patterns and impedance characteristics. Spheres, cylinders, horns, slots, microwave lenses, traveling-wave, and frequency independent antennas.

EE 716 - DEVICE MOD INTEG CIR DSG

Semester Hours: 3

Fundamental limits in integrated circuits. Advanced and detailed development of the theory of MOS and bipolar transistors. MOS and bipolar transistor models for IC design. Numerical algorithms for modeling microelectronic devices. Device modeling and simulation for radio frequency (RF) application. Computer-aided design and VLSI device development.

EE 717 - SPACE APPLI/ELECTROMAGNE

Semester Hours: 3

Plasma as a dielectric; dielectric functions for cold, warm, isotropic and anisotropic plasmas, body-plasma interaction; space craft electrodynamics, antennas in plasmas; mode of radiation, input impedance and radiation pattern, scattering problems involving plasmas.

EE 718 - MICROWAVE TECHNIQUES

Semester Hours: 3

Network representations and analysis of microwave devices. Discontinuities from a circuit point of view. Symmetry consideration. Scattering matrices in circuit design. Cavity resonators.

EE 721 - ROBUST AND ADAPTIVE CONTROL

Semester Hours: 3

Introduction to fundamental ideas of robust and adaptive control. Effects of parameter and disturbance uncertainties, H-infinity and mu-synthesis ideas; parameter estimation techniques; adaptive control algorithms; stability considerations; model-reference and linear adaptive control techniques.

EE 722 - SLIDING MODE CONTROL

Semester Hours: 3

The basic and advanced theories and analytical techniques for modeling and analysis of systems dynamics in sliding manifolds. Traditional and High Order Sliding mode controller design. Discontinuous and equivalent control, robustness. Applications to control of electro-mechanical systems, reusable launch vehicle, air craft, spacecraft, and DC-to-DC power converters. Prerequisite: EE 701.

EE 724 - RADAR WAVEFORMS & SIGNAL PROCE

Semester Hours: 3

Stretch Processing. Synthetic Aperture Radar and SAR signal processing, Space-time adaptive processing (STAP). Phase coded waveforms and processing. Frequency hop waveforms Prerequisite: EE 619.

EE 725 - ADVANCED RADAR TECHNIQUE

Semester Hours: 3

Modern radar systems for search and tracking are analyzed with emphasis on signal processing. Modeling and simulation of system and environment. Advanced techniques include CFAR, binary modulation, frequency agility, polarization agility, and synthetic aperture. Prerequisite: EE 603 and EE 619.

EE 726 - DECIS/ESTIMATION THEORY

Semester Hours: 3

Classical detection theory, including maximum likelihood, Neyman-Pearson, Bayes and minimax criteria. Estimation theory concepts and criteria, linear estimators, Kalman filters, maximum likelihood and least-squares estimator, matched filters, Cramer-Rao lower bound. Introduction to pattern recognition.

EE 727 - NUMER METH ELECTROMAGNET

Semester Hours: 3

Review of concepts in electromagnetics, antennas and scattering problems, method of moments and applications, finite difference and finite element methods, numerical solutions of transient problems associated with broadband systems, impulse response, direct solution of field equations in time domain.

EE 733 - NONLINEAR OPTICS APPLICATIONS

Semester Hours: 3

Modeling of optical nonlinearities; Kerr, thermal and photorefractive effects; nonlinearity-induced beam distortion; applications of nonlinearities in crystals and fibers; quantum well and SEED devices; soliton-based communication system; nonlinear optical switches, deflectors and limiters; measurements of nonlinearities.

EE 734 - FIBER OPTICS

Semester Hours: 3

Propagation in dielectric slab and fibers with step and graded index of refraction; electromagnetic and ray optical methods; eikonal equations; ray trajectory; WKB method; paraxial approximation; weakly guiding structures.

EE 735 - STATISTICAL OPTICS

Semester Hours: 3

Introduction to random variables and random processes; first-order properties of light waves; coherence of optical waves, partial coherence and imaging systems, imaging in randomly inhomogeneous media, fundamental limits in photoelectric detection of light.

EE 737 - CHAN CHAR COMM RAND MEDI

Semester Hours: 3

Modeling stationary and not strictly stationary random media; scatter communications channels; line of sight communication channels ? weak scattering and strong scattering.

EE 738 - OPT TRANSF/PATTN RECOGNI

Semester Hours: 3

Systems and transforms in diffraction theory; two-dimensional Fourier transform; Hankel transforms; generalized Hankel transforms; optical signals, correlation coherence; filtering; apodization; applications to optical pattern recognition.

EE 742 - WIRELESS COMMUNICATIONS

Semester Hours: 3

Design and analysis of wireless transmission systems. Prerequisite: EE 642.

EE 744 - CODING THRY & SPREAD SPECTRUM

Semester Hours: 3

Linear block coding techniques, convolutional codes and the Viterbi decoding algorithm, probability of error bounds, channels with intersymbol interference and additive Gaussian noise. Introduction to spread spectrum direct sequence and frequency hopping methods.

EE 745 - MOD/PHASE LOCK TECH COMM

Semester Hours: 3

Treatment of analog and digital phase locked loops. Applications in carrier regeneration, demodulation, and synthesis discussed. Linear and nonlinear PLL models and analysis. Noise analysis via Volterra Series and Fokker-Planck equation. False lock phenomenon.

EE 747 - PATTERN RECOGNITION ALGORITHMS

Semester Hours: 3

EE 748 - DIGITAL SIG PROC ALG/APP

Semester Hours: 3

Introduction to digital signal processors hardware architecture. Applications of digital signal processing in telecommunications, speech and image processing, radar and sonar. Development and implementation of DSP algorithms; DSP laboratory session.

EE 799 - DOCTORAL DISSERTATION

Semester Hours: 3-9

Required each semester student is enrolled and receiving direction on doctoral dissertation.

Engineering Management (EM)

EM 660 - ENGR MGMT THEORY

Semester Hours: 3

Comparison of classical management principles and theory with the current systems in high technology, research and development, and other scientific-engineering organizations. Use of people systems to accomplish goals in high technology organizations. Cases used to illustrate contemporary problems and environments.

EM 666 - ENGR PROJECT MANAGEMENT

Semester Hours: 3

Management and control of multifaceted engineering and technological projects. Coordination and interactions between client and various service organizations. Project manager selection. Typical problems associated with various phases of project life cycle. Case studies illustrate theories and concepts.

EM 679 - SELECTED TOPICS IN ENGR MGMT

Semester Hours: 3-9

EM 697 - ENGR MANAGEMENT PROJECT I

Semester Hours: 3-9

Application-oriented student project designed to show competence in engineering management.

EM 698 - ENGR MANAGEMENT PROJECT II

Semester Hours: 3-9

Application-oriented student project designed to show competence in engineering management. Continuation of EM 697.

EM 699 - MASTER'S THESIS

Semester Hours: 1-9

Required each semester student is working and receiving direction on a master's thesis. Minimum of two semesters and 6 hours required for M.S.E. students. A maximum of 9 hours of credit is awarded upon successful completion of master's thesis. The 1 hour option is only available to students who have successfully defended their thesis and submitted it for approval, but do not meet the deadlines for graduation in the semester submitted. Students may only use the 1 hour option once in their career.

EM 711 - RES METHODS IN SURVEY DEVELOPM

Semester Hours: 3

To immerse the student in research method appropriate at the PhD level. To investigate survey development and to understand requirements necessary in establishing a psychometrically sound survey instrument. To thoroughly understand the research process in collecting appropriate data, using statistical methodologies in analyzing data, and reporting significant findings.

EM 747 - STRATEGIC ENGINEERING MGT

Semester Hours: 3

Analysis of creating an organizational strategy for engineering and technology-based enterprises; identifying critical value streams and creating supplier and customer partnerships. Development of skills for leadership and management of innovation. Prerequisite: EM 660.

EM 760 - ENGR MGMT STRUCTURES & SYSTEMS

Semester Hours: 3

The course studies the impact of various organization structures in relation to the goals of high technology enterprises. Use and effectiveness of contemporary organizational systems as related to the knowledge worker. Cases used to illustrate contemporary problems and environments. Prerequisite: EM 660.

EM 761 - EVOL THRY ENG MGMT/IND SYS ENG

Semester Hours: 3

Development of applicable engineering management or industrial & systems engineering using classical concepts, contemporary studies, and practices at successful technology-based organizations.

EM 766 - MANAGING CHG IN HIGH TECH ORG

Semester Hours: 3

Challenges to implementing advanced technology equipment, systems, and methods in engineering organizations. Justifying technology, assimilating change, changing management roles, personnel practices and organizational structure, and dealing with impact of new technologies on business policies and strategic planning. Prerequisite: EM 666.

EM 767 - CONTEMPORARY APPL EM/ISE

Semester Hours: 3

Application of key qualitative and quantitative principles of engineering management or industrial & systems engineering to real-world case problems. Students work both as teams and as individuals to solve multidimensional problems which require an integrative point of view.

EM 779 - SELECTED TOPICS IN ENGR MGMT

Semester Hours: 3-9

EM 799 - DOCTORAL DISSERTATION

Semester Hours: 3-9

Required each semester student is enrolled and receiving direction on doctoral dissertation.

English (EH)

EH 500 - COMPOSITION STUDIES TCHRS

Semester Hours: 3

Introduction to effective strategies for the teaching of writing. Students will report on their own writing pedagogy as a result of reading and analyzing a range of writing research related to strategies of assigning, responding, and assessing writing.

EH 501 - THRY & PRACTICE TECHNICAL COMM

Semester Hours: 3

Explores the relationships between common practices in technical communication and the theories that legitimize those practices. Introduction to research and theories about fundamental issues in technical communication which may then become the basis for further graduate study in technical communication.

EH 502 - PROBS TECHNICAL EDITING

Semester Hours: 3

Advanced study of research and practice in common problems of technical editing, including documentation standards, document design, and management of complex editorial projects. Involves collaborative project with major professional writers in industry.

EH 503 - LITERARY CRITICISM AND THEORY

Semester Hours: 3

Major texts and approaches from Plato to the present. All 500-level courses are crosslisted with 400-level courses.

EH 504 - LITERARY RESEARCH

Semester Hours: 3

Introduction to the method and practice of advanced literary studies with emphasis on the development of literary critical research skills, the building of a critical lexicon, and the application of theory and criticism.

EH 508 - HISTORY OF THE ENGLISH LANG

Semester Hours: 3

History of the emergence and development of English from the pre-Anglo-Saxon period to the present. Emphasis on cultural contexts.

EH 509 - PROPOSAL WRITING

Semester Hours: 3

This course teaches effective strategies for writing successful proposals in business, academic, research, and non-profit contexts.

EH 510 - ADV FICTION WRITING

Semester Hours: 3

Practice in writing fiction from conception to revision. Students will read and write contemporary literary fiction. Student work will be commented on and critiqued in regular class workshops. The class culminates in a revision portfolio.

EH 511 - POETRY WRITING

Semester Hours: 3

Practice in writing poetry from conception to revision. Students will read and write contemporary poetry. Student work will be commented on and critiqued in regular class workshops. The class culminates in a revision portfolio.

EH 512 - SP TOPICS IN CREATIVE WRITING

Semester Hours: 3

Topics in creative writing, professional writing, or other advanced writing announced in advance.

EH 514 - CREATIVE NONFICTION WRITING

Semester Hours: 3

This composition class introduces students to the genre of creative non-fiction through exploring various approaches to the non-fiction writing; developing expertise in writing strategies such as revising, peer responding, prose modeling, and conferencing; and developing expertise in rhetorical writing concepts.

EH 515 - ANGLOPHONE/POSTCOLONIAL LIT

Semester Hours: 3

An introduction to major concepts, figures, and works with emphasis upon historical and cultural context. Specific focus will vary.

EH 520 - WRITING TECHNICAL PROFESSIONAL

Semester Hours: 3

Teaches students in disciplines such as science, engineering, nursing and user experience to improve their writing skills and produce important academic and professional documents.

EH 522 - STUDIES IN THE NOVEL

Semester Hours: 3

Focuses on varying topics in the novel with special attention to form. Texts may be drawn from diverse national and cultural origins.

EH 523 - CONTEMPORARY BRITISH LIT

Semester Hours: 3

Major works after 1945 with emphasis on historical and cultural contexts. Specific focus will vary.

EH 524 - POETRY AND POETICS

Semester Hours: 3

An attempt to answer (at least provisionally) the questions 'What is a poem?' and 'What is poetry?'. How to read a poem closely and carefully, with attention to theory, history of genres, and especially the technical aspects of poetry.

EH 530 - THE AMERICAN NOVEL

Semester Hours: 3

Topics announced in advance.

EH 533 - WILLIAM FAULKNER

Semester Hours: 3

Critical study of the major novels.

EH 534 - SCIENCE FICTION

Semester Hours: 3

Selected short stories and novels, exploring the thematic and narrative concerns of both classic and contemporary science fiction. In alternate years, the course may focus on a specific problem or concern in science fiction.

EH 538 - AFRICAN AMERICAN LITERATURE

Semester Hours: 3

Themes, concepts and imagery in the Black American literary tradition.

EH 540 - SP TOPICS IN ENGLISH STUDIES

Semester Hours: 1-3

Topics announced in advance.

EH 542 - USABILITY STUDIES

Semester Hours: 3

Introduces students to the theory and practices of usability, which involves designing useful, easy-to-use websites, software, and products. The course involves group projects conducting real-world usability testing.

EH 548 - THE BIBLE AS LITERATURE

Semester Hours: 3

An introduction to the major literary forms of the Bible. Material will be approached analytically, involving both socio-historical and literary-critical perspectives.

EH 550 - CHAUCER

Semester Hours: 3

A study of Geoffrey Chaucer's Middle English works including the early dream visions, Troilus and Criseyde, and the Canterbury Tales.

EH 551 - ARTHURIAN ROMANCE

Semester Hours: 3

A study of Arthurian Literature focused on medieval Welsh, Scottish, English, and French poetry and prose, as well as later early modern and modern adaptations of Arthurian stories in poetry, prose, drama, and film.

EH 552 - USER-CENTERED DESIGN

Semester Hours: 3

Introduces students to user-centered design principles that inform the practice of user experience design. Students will use visual thinking as they complete contextual inquiries and mapping exercises.

EH 553 - COMMUNICATING WITH USERS

Semester Hours: 3

This course teaches students how to effectively research user needs and produce technical communication documents to meet those needs.

EH 554 - NEW MEDIA WRITING & RHETORIC

Semester Hours: 3

This course teaches students to consider and implement rhetorical principles across a variety of media and includes an examination of communication strategies used widely in academic and industry settings. The course focuses on new media through an exploration of digital technologies and the way digital culture and new media have dramatically impacted reading, writing and research practices.

EH 560 - SIXTEENTH-CENTURY LITERATURE

Semester Hours: 3

Selected works from the reigns of Henry VIII and Elizabeth I. Close reading of texts in their historical, intellectual, and social contexts.

EH 565 - DRAMATIC LITERATURE

Semester Hours: 3

Studies in Drama and interpretive strategies for reading plays. May be organized nationally, by genre, or by theme/topic.

EH 570 - MILTON

Semester Hours: 3

A study of the development of Miltons thought and art as it appears in his early poems, selected prose, and later poetry, with particular attention given to Paradise Lost.

EH 571 - RENAISSANCE DRAMA

Semester Hours: 3

Non-Shakespearean drama of the sixteenth and early-seventeenth centuries in social, critical, and performative contexts. Specific focus will vary from term to term.

EH 573 - EARLY MODERN LITERATURE

Semester Hours: 3

This course will examine a particular theme, issue, and/or debate within the early modern period, roughly 1500-1700. The historical and geographical scope of the course will vary depending on the term, though the course will emphasize British literature. Within this literature, constructions of subjectivity and community vary greatly due to the influence of the European Renaissance, the Protestant Reformation, the exploration of the New World, as well as the rediscovery of the natural world through scientific investigation. While the course will introduce the complexities of early modern literary constructions of identity, the course will also illumine the ways in which these habits of thought were increasingly contested, sometimes to the point of violence. The course will likely include period-specific as well as modern scholarship.

EH 585 - THE ENLIGHTENMENT

Semester Hours: 3

The European Enlightenment was an intellectual and cultural movement in the seventeenth and eighteenth centuries that emphasized the importance of reasoned, open-eyed investigations into nature and human society. Stimulated by the Scientific Revolution, Enlightenment philosophes prized skepticism and decried superstition and unquestioned faith. They are often credited with providing a theoretical basis for the American and French Revolutions. Scholars have also counted among the Enlightenment's important legacies the scientific method, the valuation of universal human rights, and the emergence of such disciplines as economics and anthropology. Authors discussed in the course may include: Bacon, Behn, Hume, Swift, Voltaire, Montagu, Franklin, Jefferson, Equiano, and Wollstonecraft.

EH 601 - ACTION RESCH WRITING STUDIES

Semester Hours: 3

Analysis of research on writing in the workplace, the community, and educational settings.

EH 602 - PRACTICUM/TECHNICAL COMM

Semester Hours: 3

Designed to give technical communication graduate students on-the-job experience in industry or government, either through an internship or a major research project connected with an industry problem. Requires completion of a substantial research report. Prerequisites: EH 501 and EH 502.

EH 603 - EDITING FOR PUBLICATION

Semester Hours: 3

A comprehensive survey of best practices for editing documents for clarity, correctness, accuracy, style, design, and usability. Course involves working with writers to edit work for publication.

EH 615 - CRITICAL THEORY

Semester Hours: 3

Intensive study of a specific author or topic in literary or critical theory. Focus will vary.

EH 618 - STUDIES/WOMEN & LITERATURE

Semester Hours: 3

Selected authors, genres, and issues.

EH 629 - TWENTIETH-CENTURY LITERATURE

Semester Hours: 3

Selected poetry and prose with an emphasis on the Anglo-American Modernist tradition.

EH 630 - AMERICAN LITERATURE TO 1865

Semester Hours: 3

Major movements from Colonial times to 1865; selected major figures or special problems.

EH 631 - AMERICAN LITERATURE SINCE 1865

Semester Hours: 3

Major movements since 1865; selected major figures or special problems.

EH 639 - ETHNIC AMERICAN LITERATURE

Semester Hours: 3

Selected authors, concepts, histories, and cultures.

EH 649 - SPECIAL TOPICS

Semester Hours: 1-3

Study of significant issues in literature, technical communication, or composition studies, announced in advance.

EH 655 - MEDIEVAL LITERATURE

Semester Hours: 3

Topics in Medieval European and Eastern Literature.

EH 660 - SHAKESPEARE

Semester Hours: 3

Selected Shakespearean plays, with special attention to the major criticism, problems of interpretation, and current issues in Shakespearean study.

EH 662 - INFORMATION ARCHITECTURE

Semester Hours: 3

This class reviews research in technical communication, information science, cognitive science, semiotics, and computer science that helps students understand how communities represent, organize, retrieve, and ultimately use information.

EH 665 - RENAISSANCE LITERATURE

Semester Hours: 3

An in depth study of a major theme, debate or question in 16th and early 17th century literature. Includes Renaissance criticism and modern scholarship.

EH 670 - STUDIES SEVENTEENTH CENTURY LT

Semester Hours: 3

This course investigates one of the most volatile periods in Britain's history through a variety of literary and critical lenses, all geared toward a particular theme, issue, or debate. In this period, received bodies of knowledge and accompanying forms of authority - philosophical, religious, political and scientific - were increasingly called into question.

EH 680 - 18TH CENTURY STUDIES

Semester Hours: 3

Extensive and intensive study of various early modern texts, with attention to interdisciplinary contexts.

EH 695 - NINETEENTH-CENTURY LITERATURE

Semester Hours: 3

This class will investigate Anglophone cultural expression and literary critical traditions associated with long nineteenth century (1789-1919). Specific thematic concern or period of focus is left to the discretion of the instructor.

EH 698 - INDEPENDENT STUDY

Semester Hours: 3

Individual investigation into significant issues in linguistics, literature, technical communication, or composition studies under direct supervision of instructor. Prerequisites: Written approval by the instructor and the department chair of a project prospectus.

EH 699 - MASTER'S THESIS

Semester Hours: 3-6

Required each semester during which a student is working and receiving direction on a masters thesis. No more than 6 hours credit may be applied toward the degree. Prerequisites: approval of instructor.

English Linguistics (EHL)

EHL 505 - SURVEY OF GENERAL LINGUISTICS

Semester Hours: 3

Come to see the strange in familiar as you engage in the study of the system of language through focused analysis of the components of English. Language is usually the lens through which we observe and report on the world. In this course, it becomes the object of observations and discussion.

EHL 506 - CRITICAL ISSUES

Semester Hours: 3

Come to an understanding of the complex of policies, legislation, and practice that impact the progress of English Learners in elementary and secondary schools across the U.S. Understand the impact of federal, state, and local policies on classroom settings and teacher-student interactions.

EHL 507 - ADV ENGLISH GRAMMAR STUDIES

Semester Hours: 3

Through an in-depth analysis of the structure of sentences and discourse in contemporary English, you will understand more clearly the impact of the choices we make in the language we use in day-to-day conversations, instructional settings, political discourse, and beyond.

EHL 509 - SP STUDIES IN APPL LINGUISTICS

Semester Hours: 3

Special topics in linguistics. Focus and emphasis of topics announced in advance. Prerequisite: instructor permission.

EHL 610 - AP EH LI VI:PRACTICUM TESOL

Semester Hours: 3

Current issues, techniques, and materials in teaching English to speakers of other languages (TESOL). Direct and supervised teaching of English to non-native speakers of English.

Finance (FIN)

FIN 500 - INVESTMENT PRACTICUM

Semester Hours: 4

Small number of students work closely with finance faculty in the UAH Capital Management group (CMG) to manage actual investment portfolios. Emphasis is placed on individual stock selection and management of the portfolio to meet objectives. Prerequisite: FIN 560 and permission of instructor.

FIN 531 - ADVANCED CORPORATE FINANCE

Semester Hours: 3

The purpose of the course is to apply advanced corporate finance theories to solve practical corporate finance problems.

FIN 554 - INTERNATIONAL FINANCE

Semester Hours: 3

An introduction to international finance for tomorrow's global business leaders, with a focus on the financial management dimensions of leading a multinational enterprise.

FIN 560 - INVESTMENTS

Semester Hours: 3

A study of standard investment securities, as well as an overall view of the investment decision process. Securities covered include equities, fixed income, options, futures, and mutual funds. Associated topics include financial markets, valuation models, and fundamental portfolio theory.

FIN 561 - PORTFOLIO MANAGEMENT

Semester Hours: 3

A continuation of FIN 560 with an emphasis on the application of investment portfolio management. An understanding of the functional areas of portfolio management is stressed, including investment policy, investment strategy, portfolio construction, performance evaluation, and portfolio protection. Prerequisite: FIN 560.

FIN 595 - INTERNSHIP IN FINANCE

Semester Hours: 1-3

With the supervision of a faculty advisor the student serves as an intern in a position that enhances their disciplines educational goals. Subject to College's guidelines on internships.

FIN 601 - FIN DECIS UNDER UNCERTAINTY

Semester Hours: 3

Introduces students to financial decision-making in uncertain domestic and global markets and provides a set of tools and techniques for use in financial analysis. Topics include financial statement analysis, financial assessment of capital investments, cost of capital, and risk and return. Prerequisites: ACC 600 and ECN 600.

FIN 620 - SEMINAR IN BEHAVIORAL FINANCE

Semester Hours: 3

A study of the issues and anomalies related to the psychology of financial decision-making and the psychology of financial markets. The course content will consist of readings from the behavioral finance literature with an emphasis on student discussion.

FIN 650 - SELECTED RESEARCH TOPICS

Semester Hours: 3

Research in a particular topic in finance relevant to administrative science by one student or group of students. The research paper must be an original contribution showing a research design and results that meet the highest standards of social science research.

History (HY)

HY 501 - DAILY LIFE IN ANCIENT ROME

Semester Hours: 3

This course will re-create the daily lives of the ancient Romans using secondary readings, ancient literature, archaeology, and film. It focuses on the lives of ordinary people, with an eye to their struggles, everyday practices, beliefs, values and mentalities.

HY 510 - SPECIAL TOPICS PUBLIC HISTORY

Semester Hours: 3

Intensive examination of a particular problem, aspect, or methodology in public history.

HY 513 - THE OLD SOUTH

Semester Hours: 3

Southern society, economics, politics and culture concentrating on the nineteenth century South through Reconstruction.

HY 514 - THE NEW SOUTH

Semester Hours: 3

The post-Reconstruction South emphasizing the economic, social, and political readjustments made during the twentieth century.

HY 524 - THE ATLANTIC WORLD

Semester Hours: 3

Examines interactions across the Atlantic Ocean among Africans, Americans, and Europeans. This course meets the requirements for either American or non-American credit.

HY 526 - COLONIAL AMERICA

Semester Hours: 3

Explores the founding of New World colonies, including political, social, economic, and religious developments during the colonial period.

HY 527 - AGE OF AMERICAN REVOLUTI

Semester Hours: 3

Explores the multinational connections and conflicts that led some English colonists to revolt. Considers the political, social, and economic aspect of the time period.

HY 528 - EARLY AMERICAN REPUBLIC

Semester Hours: 3

Political, social and economic changes between the American Revolution and the nineteenth century that laid the foundation for the United States.

HY 529 - CIVIL WAR & RECONSTRUCTION

Semester Hours: 3

This course will examine the major historical events and modern historiographical interpretations of the Civil War and Reconstruction period in American history. Special focus will be given to the following themes: social, economic, military, political, constitutional, and intellectual.

HY 537 - THE RISE OF MODERN AMER

Semester Hours: 3

Economic and social changes, imperialism, and the growth of government in the United States from 1877 to the 1920s.

HY 538 - MODERN AMERICA

Semester Hours: 3

American society, politics, economics, and foreign affairs from the end of World War I to the origins of the Cold War.

HY 539 - RECENT AMERICAN HISTORY

Semester Hours: 3

Contemporary America from the 1950s to the present analyzing both domestic and foreign affairs.

HY 540 - FOREIGN REL U.S. SINCE 1920

Semester Hours: 3

The United States as a world power. American involvement in World War II, the Cold War, and in Asia, Latin America, and the Middle East.

HY 545 - COMPTVE MILITARY PLCY & STRAT

Semester Hours: 3

A comparative analysis of the military policy and strategy of states and empires in World History.

HY 572 - US MILITARY HISTORY SINCE 1920

Semester Hours: 3

The United States armed forces from 1920 to the present. The class will enhance understanding of the development and evolution of American strategy, doctrine, and operational issues.

HY 573 - US-LATIN AMERICAN RELATIONS

Semester Hours: 3

This class focuses on the history of political, economic, and cultural interactions between Latin America and the United States from 1800 to the present. Topics include military intervention, trade, cultural exchanges, the Cold War, the drug war, and immigration.

HY 574 - RENAISSANCE & REFORMATION

Semester Hours: 3

Selected topics in the Italian Renaissance and European Reformation.

HY 575 - SECTARIANISM ISLAMIC WORLD

Semester Hours: 3

This course focuses on sectarianism, the practice and rhetoric surrounding marginalization of certain social-religious groups in the Islamic world. It explores the historical foundations of sectarianism (from early 7th century to today) both within the Islamic world and across the globe.

HY 576 - BEING YOUNG MODERN MIDDLE EAST

Semester Hours: 3

This course focuses on the lives of young men and women of the Modern Middle East. It explores how children and youth experienced historical phenomena in the region, the ways in which these experiences affected the foundations of their adulthood, and how their actions shaped historical events.

HY 580 - ROMANS&BARBARIANS LATE ANTIQTY

Semester Hours: 3

This course explores the dynamic world of Late Antiquity including political developments, social and religious transformation, and exchange patterns in the Mediterranean. It is a history of cultural interaction, continuity, and change during a formative period in western civilization.

HY 581 - EMPIRES AND NATIONS

Semester Hours: 3

HY 582 - COMPARTVE SLAVERY & ABOLITION

Semester Hours: 3

Explore slavery around the world over time. Topics in the ancient world, Indian Ocean, Africa, the United States, and other locations from ancient times to the present.

HY 583 - WOMEN & GENDER LATIN AMERICA

Semester Hours: 3

Studies the history of women and gender relations in Latin America from the colonial period to the present.

HY 584 - LATIN AMERICAN HY THROUGH FILM

Semester Hours: 3

HY 585 - NAZI GERMANY AND THE HOLOCAUST

Semester Hours: 3

Seminar course on the historiography of Nazi Germany and the Holocaust.

HY 586 - COMMUNISM &LEGACY IN RUS/E-EUR

Semester Hours: 3

Overview and analysis of communist states and post-communist legacies in Russia and Eastern Europe.

HY 590 - RESEARCH SEMINAR IN HY

Semester Hours: 3

Research and writing, focusing on primary sources and historiography.

HY 592 - PUBLIC MEMORY & INTERP

Semester Hours: 3

Examines how public memory is created by looking at the social, political, and economic forces that shape public history and considers how historical knowledge is conveyed to the public.

HY 593 - FUNDAMENTALS OF ARCHIVES

Semester Hours: 3

Survey of basic archival theory and practice, with emphasis on the role of the archivist in contemporary society.

HY 594 - DEVELOPING DIGITAL ARCHIVES

Semester Hours: 3

Survey of the theory and practice of developing digital access tools in archives, libraries, and museums.

HY 595 - PUBLIC HISTORY INTERNSHIP

Semester Hours: 3

Students will participate in a semester-long public history internship and be responsible for completing a significant project using historical skills in a professional setting. Students must complete a minimum of 125 hours of work during their internship.

HY 598 - STUDIES IN HISTORY

Semester Hours: 1-3

A readings or research class on a particular problem, period or topic in history. This course may be repeated for credit.

HY 599 - INDEPENDENT STUDY

Semester Hours: 3

In exceptional circumstances, a student and professor may work together on a specialized topic.

HY 605 - RECENT INTERPRETA MOD HY

Semester Hours: 3

Development of the ability to appraise critical historical issues through study and discussion of recent interpretations of key historical problems in modern western history. Required for history graduate students. Fall only.

HY 614 - STUDIES IN SOUTHERN HY

Semester Hours: 3

Research, writing, and critical examination of selected topics in nineteenth- and twentieth-century southern history.

HY 618 - STUDIES EARLY AMER HY

Semester Hours: 3

Research, writing, and critical examination of selected topics in early American history from 1607-1800.

HY 619 - STUDIES 19TH CENT AM HY

Semester Hours: 3

Research, writing, and critical examination of selected topics in nineteenth-century American history.

HY 620 - STUDIES 20TH CENT AM HY

Semester Hours: 3

Research, writing, and critical examination of selected topics in twentieth-century American history.

HY 645 - READINGS AMERICAN MILITARY HY

Semester Hours: 3

Thematic course that will use readings and discussions to examine key historiographical issues in American military history from the colonial period to the present.

HY 650 - RESEARCH METHODS IN HY

Semester Hours: 3

Exploration of contemporary research methods such as archival research, paleography, quantitative methods, and state/local research techniques.

HY 680 - STUDIES/EARLY MOD EUROPE

Semester Hours: 3

Research, writing, and critical examination of selected topics in the field of early modern European history.

HY 685 - HISTORY OF SCIENCE

Semester Hours: 3

Research, writing and critical examination of selected topics in the history of science.

HY 686 - READING ANCIENT ROME HY

Semester Hours: 3

This seminar introduces the main historiographical debates in the study of ancient Rome, from the Republic to Late Antiquity. It covers the following topics: Roman institutions, politics, and strategy; Society and daily life; religious revolution and the integration of barbarians.

HY 687 - STUDIES MIDDLE EAST HISTORY

Semester Hours: 3

Research, writing, and critical examination of selected topics in modern Middle East history (late 1800s-present).

HY 690 - STUDIES IN MODERN EUROPE

Semester Hours: 3

Research, writing, and critical examination of selected topics in the field of modern European history.

HY 695 - STUDIES IN WORLD HISTORY

Semester Hours: 3

Research, writing and critical examination of selected topics in the study and teaching of world history.

HY 696 - SPECIAL TOPICS IN HISTORY

Semester Hours: 3

A readings or research class on a particular problem, period, region or topic in history. This course may be repeated for credit.

HY 698 - INDEPENDENT RESEARCH PROJECT

Semester Hours: 3

Supervised individual research project.

HY 699 - MASTER'S THESIS

Semester Hours: 1-3

Required each semester a student is working and receiving direction on a master's thesis. A minimum of two terms is required but no more than six hours credit is allowed for the thesis.

Industrial & Systems Engineering (ISE)

ISE 502 - INDUSTRIAL & ORGANIZA PSY

Semester Hours: 3

Application of basic principles of learning, motivation, and perception to typical industrial and organizational problems.

ISE 503 - HUMAN FACTORS PSYCHOLOGY

Semester Hours: 3

Study of human performance in human-technology-environment systems. Consideration of human capabilities and limitations as related to controls and displays, and the role of human cognition in decision-making and training effectiveness.

ISE 523 - INTR STATISTICAL QUALITY CONTR

Semester Hours: 3

This course introduces statistical theory and techniques to control quality of manufacturing products. This course will provide a solid foundation in Statistical Quality Control (SQC). The Six Sigma methodology is also introduced in this course. Students can take the certification exam to earn a Green Belt in Six Sigma. Prerequisites: ISE 690.

ISE 526 - DESIGN/ANALY OF EXPERIMENT

Semester Hours: 3

Advanced topics in statistical experiments with emphasis on design aspect. Confounding, fractional replication, factorial and nested design.

ISE 530 - MANUF SYS & FACILITIES DESIGN

Semester Hours: 3

Overview of modern manufacturing systems design with emphasis on facility location and plant layout. Includes classical systems, just-in-time systems, basic principles of integrated manufacturing systems design, as well as analysis of process flow, process productivity, and available space to determine plant layout. Includes laboratory exercises.

ISE 533 - PRODUCTION/INVENTORY CONTR SYS

Semester Hours: 3

Inventory models including classical optimal economic order quantity models, manufacturing resource planning (MRP) systems, master production scheduling, material requirements planning, and purchase order control. Emphasis on manufacturing system revision, continuous process improvement, and the implementation of lean principles. Prerequisite: ISE 690.

ISE 537 - ELECTRONICS MANUF PROCESSES

Semester Hours: 3

Current concepts, facilities, and technology utilized in the manufacture of electronic components and products. Includes printed wiring board fabrication and component mounting methods, automation, quality and reliability, product testing, and economic issues.

ISE 539 - SELECTED TOPICS/ISE

Semester Hours: 1-3

ISE 547 - INTRO TO SYSTEMS SIMULATION

Semester Hours: 3

Philosophy and elements of digital discrete-event simulation. Emphasis on modeling and analysis of stochastic systems, including probabilistic models, output analysis, and use of simulation software. Prerequisite: ISE 690.

ISE 623 - ENGR ECON ANALYSIS

Semester Hours: 3

This course is designed for graduate students in industrial engineering, systems engineering and engineering management. This course involves mathematical models for expenditure analysis under uncertainty; investment decision criteria; capital planning and budgeting; and decisions involving expansion, acquisitions, replacement, and disinvestment. Prerequisite: ISE 690.

ISE 626 - INTRO OPERATIONS RESEARCH

Semester Hours: 3

Philosophy and methodology of operations research. Includes linear programming, game theory, sequencing, and networks.

ISE 627 - ENGINEERING SYSTEMS

Semester Hours: 3

Development of a systems-scientific framework for the integration of systems theory, systems thinking, systems engineering, and systems management. Emphasis is on the conception, design, and management of systems to accommodate complex environments.

ISE 637 - SYSTEMS MODELING & ANALYSIS

Semester Hours: 3

System analysis and modeling of large complex systems using systems engineering fundamentals. Life cycle simulations developed as a focus for the multidisciplinary analysis integration using computational systems engineering techniques including probability, statistics, design of experiments, response surfaces, and optimization. State of the art software tools will be used for simulation development.

ISE 638 - ENGINEERING RELIABILITY

Semester Hours: 3

Methodology of reliability prediction including application of discrete and continuous distribution models. Reliability estimation, reliability logic diagrams, life testing, and reliability demonstrations.

ISE 639 - SELECTED TOPICS/ISE

Semester Hours: 1-6

ISE 641 - ADVANCED QUALITY CONTROL

Semester Hours: 3

This capstone course uses advanced statistical quality tools such as autocorrelated data, multi-variate quality controls charts, response surface methodology, ridge analysis, and evolutionary operations (EVOP). Advanced Six Sigma concepts will be taught and students will have the opportunity to earn a Black Belt in Six Sigma upon successful completion of the certification exam and an acceptable project.

ISE 690 - STATISTICAL METHODS FOR ENGR

Semester Hours: 3

Application of statistics for estimation and inference using parametric and nonparametric methods. Descriptive statistics, sampling distributions, point and interval estimates, tests of hypotheses, ANOVA, and linear regression.

ISE 696 - GRAD INTERN ISE ENGR

Semester Hours: 1-9

Active involvement in an engineering project in an engineering enterprise, professional organization, or government agency that has particular interest and relevance to the graduate student. Permission of ISE faculty member required.

ISE 697 - INDUS & SYSTEMS ENGR PROJECT I

Semester Hours: 3-9

Application oriented student project designed to show competence in Industrial and Systems Engineering.

ISE 698 - IND & SYSTEMS ENGR PROJECT II

Semester Hours: 3-9

Required each semester student is working and receiving direction on a master's thesis. Minimum of two semesters and 6 hours required for M.S.E. students. A maximum of 9 hours of credit is awarded upon successful completion of master's thesis. Prerequisite: ISE 697.

ISE 699 - MASTER'S THESIS

Semester Hours: 1-9

Required each semester student is working and receiving direction on a master's thesis. Minimum of two semesters and 6 hours required for M.S.E. students. A maximum of 9 hours of credit is awarded upon successful completion of master's thesis. The 1 hour option is only available to students who have successfully defended their thesis and submitted it for approval, but do not meet the deadlines for graduation in the semester submitted. Students may only use the 1 hour option once in their career.

ISE 726 - SYSTEMS MODELING

Semester Hours: 3

The capstone course for the operations research option studies the philosophy and methodology for modeling probabilistic systems. Includes Markov processes, queueing theory, and inventory theory. Team project required. Prerequisite: ISE 690 and (ISE 626 or ISE 627).

ISE 734 - DECISION ANALYSIS

Semester Hours: 3

Decision making for systems engineering and engineering management, with an emphasis on applications to complex systems. Builds a rigorous foundation in decision making under uncertainty using expected utility theory. Topics include decision trees, value models, predictive models, preferences and bias. Prerequisite: ISE 690.

ISE 739 - SELECTED TOPICS/ISE

Semester Hours: 1-6

ISE 761 - EVOL THRY ENG MGMT/IND SYS ENG

Semester Hours: 3

Development of applicable engineering management or industrial and systems engineering theory using classical concepts, contemporary studies and practices at successful technology-based organizations.

ISE 790 - ADV STATISTICAL APPLICATIONS

Semester Hours: 3

Continuation of ISE 690 with extension to regression models and nonparametric methods. Prerequisite: ISE 690.

ISE 799 - DOCTORAL DISSERTATION

Semester Hours: 3-9

Required each semester student is enrolled and receiving direction on doctoral dissertation.

Information Systems (IS)

IS 501 - CYBERSECURITY PRINCIPLES

Semester Hours: 3

This course is designed to provide a general overview of the concepts of information security to students, both from a management and a technology perspective. Students will be introduced to the complexity of the security issues facing today's networked organizations. Practices and standards will be presented to assess and plan for risks and the security needs to minimize the risks both technically and managerially. The integration of security concerns within the entire organizational planning and implementation processes and practices will be explored.

IS 512 - SYSTEMS ANALYSIS & DESIGN

Semester Hours: 3

Identifying, analyzing, developing and acquiring information systems are central to the information systems discipline. The course has to do with identifying, conceptualizing and analyzing business opportunities where information systems applications can add value followed by design, development, and implementation of such applications. Planning for and management of this core IS activity is a critical organizational competence. Prerequisites: IS 601.

IS 520 - WEB PORTALS & APPLICATIONS

Semester Hours: 3

This course bridges the boundary between consumer of Web applications and the ability of enterprises to derive value from web technologies and platforms by developing portals that integrate disparate organizational silos and databases. The course explores concepts in digital content and communication, technology infrastructure and social media. Utilization of SAP tools to develop an enterprise portal front end to organization's back-end business systems.

IS 522 - SUPPLY CHAIN MANAGEMENT SYS

Semester Hours: 3

This course presents the main concepts of supply chain management systems and software including ERP, CRM, and SCM systems as well as the underlying technologies and managerial implications. It provides hands on familiarity with SAP supply chain modules. Cross listed with IS 422. Prerequisite: Basic knowledge of information systems.

IS 540 - WEB PROG & DATABASE INTEGRATIO

Semester Hours: 3

Prerequisite: IS 520.

IS 550 - CYBERSECURITY MANAGEMENT

Semester Hours: 3

Examines the management issues associated with the control and audit of information systems. Specific emphasis is on IT controls and their evaluation, computer-based auditing techniques, encryption, and security policies. Recent developments in IT, such as client-server systems and the Internet and their impact on auditing control, and security, are also considered.

IS 560 - NETWORKING & IT INFRASTRUCTURE

Semester Hours: 3

An overview of the IT infrastructure in modern organizations. The course starts from basic networking concepts to digital platforms and ecosystems in the market.

IS 571 - BUSINESS ANALYTICS & AI

Semester Hours: 3

The course covers the use of data analytics to support decision making in organizations and gain insights to support tactics and strategy. In addition to analytics, students will also be introduced to Artificial Intelligence (AI) techniques for analytics. Students will use many Business Analytics tools and gain experience in mining data. The course is designed to develop data-analytic thinking in the era of big data. Prerequisite: Basic skills in computer programming.

IS 577 - NETWORK DEFENSE & SECURITY

Semester Hours: 3

Provides an introduction to the area of network security. Addresses security issues and practical applications related to Network Address Translation, packet filtering, proxy servers and firewalls, and Virtual Private Networks. This course assumes familiarity with the Internet and basic networking concepts such as TCP/IP, gateways, routers, and Ethernet. Prerequisites: IS 560.

IS 580 - SEMINAR IN MGT INFO SYSTEMS

Semester Hours: 3

Selected topics in Management Information Systems. Topics will reflect the contemporary issues and current technological advancements which impact the development, implementation and management of effective information systems in organizations.

IS 595 - INTERNSHIP INFORMATION SYSTEMS

Semester Hours: 1-3

Under the direction of a faculty advisor, student gains experience with information systems and technology professionals in industry.

IS 600 - INFORMATION SYSTEMS MANAGEMENT

Semester Hours: 3

Develops an understanding of how information technology (IT) can enable organizations to conduct business more effectively in a rapidly changing business environment. Includes strategies to manage and leverage the organization's IT capabilities to deploy digital business models and maintain efficient and profitable business operations. Students will use systems and business process thinking to create and analyze strategies for technology enabled organizational transformation. Students will also use Enterprise Systems like SAP and other technologies as part of the course to understand their integrative capabilities to meet the Information needs of an organization.

IS 601 - MANAGEMENT OF INFORMATION TECH

Semester Hours: 3

This course is designed to provide an understanding of how information technology (IT) can enable organizations to conduct business more effectively in a rapidly changing business environment and to leverage the organization's IT capabilities to maintain efficient and profitable business operations.

IS 640 - DATA MGT AND DATA MINING

Semester Hours: 3

Explores the theories, features, and capabilities of relational database management systems in a business environment. Examines how to read and interpret database design documents and how to query database driven business applications. Emphasizes the use of database management systems and data mining tools in real-world business settings and how these technologies can be applied effectively to solve business problems.

IS 650 - SELECTED RESEARCH TOPICS

Semester Hours: 3

Research in a particular topic relevant to management information systems by one student or a group of students. Each student's research paper must be an original contribution showing a research design and results that meet the highest standard of management information systems research.

IS 660 - CYBERSECURITY MANAGEMENT

Semester Hours: 3

Examines the management issues associated with the control and audit of information systems. Specific emphasis is on IT controls and their evaluation, computer-based auditing techniques, encryption, and security policies. Recent developments in IT, such as client-server systems and the Internet and their impact on auditing control, and security, are also considered.

IS 663 - COMPUTER FORENSICS

Semester Hours: 3

This course covers most of the important topics in computer forensics. It examines the problems and concerns related to computer investigations. It introduces systematic problem-solving techniques and applies them to computing investigations. It implements a variety of computer forensic tools in real-life scenarios.

IS 670 - BUSINESS CONTINGENCY PLANNING

Semester Hours: 3

Introduces the theories and concepts of business contingency planning through risk analysis and disaster recovery planning. This course is designed to provide a greater understanding of the assessment and management of risk and disaster recovery within the organization. The course will emphasize the nature of risk, risk assessment, risk management, and disaster recovery and how these concepts can be addressed effectively through business contingency planning. Prerequisite: IS 601.

IS 680 - ENTERPRISE RESOURCE PLNG SYS

Semester Hours: 3

This course examines the concepts, design, configuration and implementation of enterprise resource planning (ERP) systems with a view to integrate all aspects of an organization into one information system. Specific attention is given as to how ERP systems facilitate the flow of information supporting core business processes and the organization's supply chain. The course will emphasize the SAP configuration and strategic use of ERP systems to support the organizational structures and business processes of the particular company to efficiently and effectively manage a firm's business. Extensive use of SAP software is made in illustrating the configuration, implementation, and use of ERP systems in business and governmental organizations. Prerequisite: IS 601.

IS 691 - INFORMATION SYS STRATEGY & APP

Semester Hours: 3

This capstone course emphasizes the integration of various principles, theories, and techniques for developing, implementing and using information systems strategies and applications in organizations. It aims at providing a holistic view of Information Systems and Technology (IS/T) function in an organization with a view to serve an organization's mission and strategy throughout the value and supply chain. These skills will be placed in the context of business processes where they will be applied. Thus, in this course we will explore ways and means to help executives and managers make better decisions in the manufacturing and service sectors through a strategic use of IS/T. Normally taken during student's last semester. Must be completed with a grade of B or better. Prerequisites (with concurrency): IS 512, IS 560, IS 571, IS 640, and IS 680.

IS 692 - CYBERSECURITY PRACTICUM

Semester Hours: 3

A capstone course emphasizing the integration of various principles, theories, and techniques for developing, implementing and using cybersecurity tools and strategies and applications in organizations. Includes readings, lectures, situation analysis, cases, and the completion of a major practical project. Must be completed with a grade of B or better. Prerequisites: CS 585, CPE 549, IS 660, IS 663.

IS 699 - MASTER'S THESIS

Semester Hours: 3

Required each semester a student is working and receiving direction on a masters thesis. A minimum of two terms is required but no more than six hours credit is allowed for the thesis. Credit awarded upon successful completion of thesis.

Management (MGT)

MGT 501 - INTRO TO CONTRACT MANAGEMENT

Semester Hours: 3

General survey in contracting basics, covering procedures as described by Federal Acquisition Regulations, statutes, ethics, policies, and other pertinent authorities.

MGT 502 - CONTRACT EVALUATION & AWARD

Semester Hours: 3

This course introduces the student to topics related to the evaluation, award and post award portions of the contracting process. Elements of evaluation related to competitive acquisitions and past performance evaluation are reviewed. Steps related to the proposal receipt process such as contractor responsibility, debarred/suspended, and certificate of competency are covered. The award process is also covered by a discussion offeror, and preparation of award. Post award topics such as contract administration functions, contract closeout, contract modifications, remedies, claims, disputes and request for equitable adjustments are covered. Prerequisite: MGT 501.

MGT 503 - CONTRACT PRICING & COST ANALYSIS

Semester Hours: 3

Techniques for cost estimating, cost analysis, and price analysis. Sources of data, statutory requirements, rates, factors, and definitions, projection methods, factors affecting profit or fee, weighted guidelines technique, application of statistical analysis including regression analysis, and learning curve theory. Prerequisite: MGT 501 or ACC 540.

MGT 505 - NEW VENTURES STRATEGIES

Semester Hours: 3

Theory and application of both marketing and management strategies for start-up, operation and control of new ventures. The course also discusses the role of entrepreneurship in the economy.

MGT 508 - TEAMWORK & TEAM PROCESSES

Semester Hours: 3

This course provides an introduction to teams and teamwork processes. The foundation of the course is research-based; topics will be approached from the context of empirical research that has been conducted. The types of research designs that are typically used in team research are addressed. There are hands-on activities, so that students can put the theoretical material into context and into practice. This course is ideal for students who plan to work in business settings or in team-oriented fields (e.g., engineering, the military) or become involved in human resources or team training.

MGT 550 - INTERNATIONAL BUSINESS

Semester Hours: 3

This course combines theoretical and practical aspects of doing business in the global market. It addresses the complex environment of international business and the need to investigate its various economic, social, political, cultural, and legal dimensions from conceptual, methodological and applications perspectives. It then considers how these environmental factors would affect, and can be integrated into, business programs and strategies.

MGT 560 - EMPLOYEE STAFFING & DEVELOP

Semester Hours: 3

Study of the fundamental concepts, issues and tools of employee staffing and development. Topics include forecasting staffing needs, recruitment strategies, development and validation of selection procedures, placement, socialization, and development of employees, and the utilization of contingent workers.

MGT 561 - STRATEGIC COMPENSATION MGMT

Semester Hours: 3

Introduction to the management of employees compensation. Provides an overview of compensation practices, behavioral and economic theories of compensation, and research on compensation programs.

MGT 562 - EMPLOYMENT LAW FOR MANAGERS

Semester Hours: 3

Analysis of the impact of government regulation on the management of human resources. Examines the implications for employer responsibilities and employee rights of evolving public policies pertaining to separations, discrimination, compensation, occupational safety and health, privacy, union-management relations, and other terms of employment.

MGT 570 - SPEC TOPICS SEM MGT OF TECH

Semester Hours: 3

In depth study of a selected special topic relevant to the management of technology. Different sections of this course may address different topics.

MGT 595 - INTERNSHIP IN MANAGEMENT

Semester Hours: 1-3

Under the direction of a faculty advisor, student gains experience with an entrepreneur in a small business firm or a manager in a large firm.

MGT 600 - ORGAN THRY, BEHAV & ENVIRONMEN

Semester Hours: 3

Provides the conceptual tools to analyze the behavioral and organizational influences on systematic outputs such as quality, profitability, and employee well-being. Focuses both on macro-level issues (e.g. organizational design, culture, power and politics, and strategic leadership) and on micro-level issues (e.g. motivation, decision-making, socialization, and diversity). Covers these topics in the broader social, legal, regulatory, environmental, and ethical context.

MGT 601 - TECH & INNOVATION MGMT

Semester Hours: 3

This course covers the principles, theories, and practices to enhance an organization's competitive position through the management of technology and innovation. Topics include the environmental and industry drivers of technological change, organizational issues in the adoption of new technologies, innovation and disruption, development of technical core competencies, and leadership challenges posed by innovation and change. It includes readings, lectures, cases, and the completion of a major research/practical project.

MGT 611 - SUPPLY CHAIN MANAGEMENT

Semester Hours: 3

This course discusses the concepts and components of the entire supply chain from a system of systems perspective. Emphasis is on integration, collaboration and planning related to major functional areas required to organize the flow of products from inception through delivery to satisfy final customer needs. Information and communication technology as an enabler of supply chain management strategies is also discussed. Concepts are emphasized utilizing experiential learning and case studies. Prerequisite: MSC 600 Prerequisite with Concurrency: MSC 605.

MGT 622 - MANAGING HUMAN CAPITAL

Semester Hours: 3

An organization's people are one of the most important resources that affect organizational performance. This course examines techniques to manage a firm's human capital resources. Topics include organizational culture, incentive systems, employee motivation, team decision making, job design, evaluating performance, information systems for managers, employment law, selection, managing innovation, and career development.

MGT 629 - LEADERSHIP: THRY & PRACTICE

Semester Hours: 3

The course explores what is known about leadership with particular emphasis on those attributes and skills that allow leaders to be effective in a variety of organizational situations. The theories of leadership are explored in a framework that includes the relationship of the leader to followers and situations. Frequent appearances by guest speakers who are themselves leaders provide the critical linkage to real world practice and allow for student interaction.

MGT 631 - HRM & ORGANIZATIONAL BEHAVIOR

Semester Hours: 3

The major functions of human resource management are reviewed including performance management, employment law, staffing, HR planning, compensation, labor relations, and training. Behavioral management topics include motivation, leadership, communication, managing conflict, and managing teams.

MGT 640 - PRIN OF PROJECT MGMT

Semester Hours: 3

Conceptual foundation and organization of project management. The project life cycle, planning, control, marketing, utilization of human resources, and financial management.

MGT 650 - SELECTED RESEARCH TOPICS

Semester Hours: 3

Research in a particular topic relevant to a business discipline by one student or a group of students. The research paper must be an original contribution showing a research design and results that meet the highest standards of social science research. Permission of instructor required.

MGT 690 - SEMINAR IN TECH MANAGEMENT

Semester Hours: 3

Practical management of technology methods and techniques from current research and successful industrial practice. Examines the state of the art in industrial new product development management. Lectures, cases, readings, and an emphasis on student discussions, presentations and interactions. The course has a strong research orientation while at the same time focusing on management policies and principles.

MGT 693 - SUPPLY CHAIN STRATEGY & PRACT

Semester Hours: 3

This integrative course discusses the strategic role of supply chain management in organizations and develops a working knowledge of the process of formulating and implementing supply chain strategies to gain competitive advantage in a global environment. Topics covered include the linkage of supply chain strategies with corporate strategy, customer relationship and supplier relationship strategies, outsourcing strategies and related infrastructure needs to implement supply chain strategies. A team based practicum project helps students apply concepts and methods to real world problems. Prerequisites: MGT 611, ACC 600 and MSC 605. Normally taken the last semester of the program. Must be completed with a grade B or higher.

MGT 694 - MANAGEMENT PRACTICUM

Semester Hours: 3

This course will serve as the capstone for the M.S. in Management degree. Students will work with faculty on either a research or consulting project which will allow the student to explore an area of interest in greater depth or gain additional experience by applying the concepts they have learned in the degree program to a real world challenge faced by an organization. Prerequisites: Completion (or concurrent enrollment in) all other required courses. Normally taken during the last semester of the program. Must be completed with a B grade or higher.

MGT 695 - STRATEGIC HUMAN RESOURCE MGT

Semester Hours: 3

This course will serve as the capstone for the M.S. in Management degree. This integrative course discusses the strategic role of human resources in organizations and teaches students how to formulate and implement HR strategies to gain competitive advantage. Topics covered include strategic management, labor relations, global HRM, social responsibility and HRM, and evidence-based HRM. A team based project helps students apply concepts and methods to real world problems. Normally taken during the last semester of the program. Must be completed with a B grade or higher.

MGT 698 - STRATEGIC MANAGEMENT

Semester Hours: 3

Administrative decision making with emphasis on analyzing a complex business situation, evaluating historical trends, current operational conditions, and environmental settings, in order to establish a unifying strategy; implementation of integrated functional policies; and a plan of action to achieve established objectives. Normally taken during the last semester of a student's program. Prerequisites: ACC 602, ECN 626, FIN 601, and MSC 600.

MGT 699 - MASTER'S THESIS

Semester Hours: 1-3

Required each semester that student is working and receiving direction on a masters thesis. A maximum of 6 hours credit may be applied toward degree.

MGT 770 - ORGANIZATIONAL RESEARCH METHOD

Semester Hours: 3

Theory and practice of research methodology for study of administrative, industrial, and consumer behavior and organizations; questionnaire, field, and laboratory experimentation and statistical analysis of pre-gathered time-series and cross-sectional data; and examples of good and poor research in business disciplines. A completed project of potentially publishable nature is formally presented in class.

Management Science (MSC)

MSC 500 - DEC SUPPORT SYS/EXPT SYS

Semester Hours: 3

Analysis of information support systems which aid the manager in the decision-making process.

MSC 510 - TRANSPORTATION & LOGISTICS

Semester Hours: 3

An analysis of transportation and logistical services to include customer service, distribution operations, purchasing, order processing, facility design and operations, carrier selection, vehicle routing, and transportation costs. Understanding of business statistics is required. Prerequisite: MGT 600.

MSC 512 - ARMY SENIOR LOGISTICIAN-ADV

Semester Hours: 3

The Senior Logistician Advanced Course (SLAC) is part of the U.S. Army's Master Logistician Certificate Program for logistics management specialists within the 0346 occupational series. SLAC is an 80-hour academic learning experience designed to improve senior logistician competencies at the strategic level. The program is organized around the logistics management specialist's 12 competencies, and the coursework is specially designed to better develop and further enrich the thinking and skills of the Army's Senior Logisticians. Special approval and enrollment in CPCS U.S. Army Senior Logistician Advanced Course required.

MSC 550 - INTRO ANALYTICS & PROGRAMMING

Semester Hours: 3

This course will have an overview on business analytics. Students will learn tools commonly used in business analytics such as R and Python. This is a prerequisite for several business analytics courses.

MSC 570 - SPECIAL TOPICS IN MGMT SCI

Semester Hours: 3

In depth study of a selected topic relevant to contemporary management science. Different sections of this course may address different topics.

MSC 595 - INTERNSHIP IN MANAGEMENT SCIEN

Semester Hours: 1-3

Active involvement in a project in a business enterprise, professional organization or government agency that has particular interest and relevance to the student.

MSC 600 - QUANTITATIVE METHODS

Semester Hours: 3

An introduction to and application of several fundamental quantitative methods and business analytics tools in business. Topics include probability distributions, sampling distributions, confidence interval estimation, hypothesis testing, ANOVA, linear regression, linear optimization, and simulation. Basic proficiency in Excel is required.

MSC 605 - OPERATIONS MANAGEMENT

Semester Hours: 3

This course discusses the management of the operations function for the creation of goods and services and its relationship with other business functions in service, manufacturing, and government organizations. Topics include operations strategy and infrastructure decisions, merging process technologies, planning and scheduling, inventory management, just-in-time systems, quality management, six sigma and lean operations. Concepts are illustrated using the SAP software. Prerequisite: MSC 600.

MSC 610 - MODELING & SIMULATION

Semester Hours: 3

Broad-based introductory survey of modeling and simulation intended to provide an overview that exposes those who will be using modeling and simulation to the full range of the discipline. Surveyed items include identification, categorization, and comparison of modeling methods, applications, architectures, and environments. Also covered are appropriate applications for different simulation paradigms, and relative advantages and disadvantages of each. Model testing and validation approaches, distributed simulation, graphics and visualization, and other topics are introduced. Case studies are discussed. Prerequisite: MSC 600.

MSC 615 - DECISION MODELING

Semester Hours: 3

This course focuses on tools and methods for modeling, analyzing and solving problems involving business decision-making. Spreadsheet analysis, optimization, and simulation techniques will be covered. Topics include linear and nonlinear optimization, network models, decision analysis and simulation of complex models in a spreadsheet environment as well as using other commercial software packages. Proficiency in Excel is required. Prerequisite with Concurrency: MSC 600.

MSC 622 - ANALYTICS FOR MANAGERS

Semester Hours: 3

Data has quickly become one of the most important corporate assets for many firms and should be leveraged to gain a competitive advantage. This course will teach managers to leverage data using statistical techniques including predictive modeling to improve data-driven decision-making. Prerequisite: MSC 600.

MSC 641 - ADVANCED ANALYTICS

Semester Hours: 3

This course focuses on concepts and methods in business analytics. Topics include data quality and cleaning, predictive modeling, design of experiments, segmentation, forecasting, usage and limitations of models, and interpretation and presentation of results. This course provides a hands-on environment using real data to prepare students to apply these techniques in business environments. Proficiency in Excel is required. Prerequisite: MSC 600, Basic skills in computer programming.

MSC 650 - SELECTED RESEARCH TOPICS

Semester Hours: 3

Research in a particular topic relevant to management science by one student or a group of students. Each student's research paper must be an original contribution showing a research design and results that meet the highest standard of management science research.

MSC 690 - MANAGING TECH DEVELOPMENT

Semester Hours: 3

MSC 692 - BUSINESS ANALYTICS PRACTICUM

Semester Hours: 3

A capstone course emphasizing rigorously interpreting the results of analytic models and intuitively communicating the derived business insights to business clients and corporate executives. The majority of this course is devoted to a major practical project in which students apply skills learned from previous analytics courses to a real world business problem, preferably in cooperation with a local organization. Prerequisite: Completion (or concurrent enrollment in) all other required courses. Normally taken during the student's last semester of studies.

MSC 699 - MASTER'S THESIS

Semester Hours: 1-3

Required each semester a student is working and receiving direction on a master's thesis. A minimum of two terms is required, but no more than six hours credit is allowed for the thesis.

Marine Science (MS)

MS 501 - INTRO TO OCEANOGRAPHY

Semester Hours: 4

Physics, chemistry, biology, and geology of oceans. For graduate students and those preparing for graduate school or intending to enter marine sciences professionally.

MS 502 - MARINE BOTANY

Semester Hours: 4

Survey of marine algae, vascular, and nonvascular plants associated with marine environment. Distribution, identification, structure, ecology, and reproduction.

MS 503 - MAR INVERTEBRATE ZOO I

Semester Hours: 4

Local examples of principal groups of marine invertebrates. Reproduction, distribution, taxonomy, systematics, and ecology. Lecture, laboratory, and fieldwork. Opportunity to acquire collection of local fauna.

MS 505 - MARINE VERTEBRATE ZOO

Semester Hours: 4

Marine fishes, reptiles, and mammals. Comprehensive treatment of their systematics, zoogeography, and ecology. Lectures on nonregional basis. Field and laboratory work on vertebrate fauna of northern Gulf of Mexico. Most of course on fishes. Opportunity to assemble collection of vertebrate species.

MS 509 - MARINE ECOLOGY

Semester Hours: 4

Bioenergetics, community structure, population dynamics, predation, competition, and speciation in marine ecosystems. Lecture, laboratory, and fieldwork. Students admitted without previous marine courses. For engineers and other non-biologists interested in marine environment. Individual species as they relate to ecological principles exemplifying taxonomic and ecologic backgrounds.

MS 510 - MARSH ECOLOGY

Semester Hours: 4

Basic understanding of ecology of salt marsh. Habitat analysis, natural history studies, and population dynamics of selected vertebrates. Specific field problem terminated by a technical paper assigned to each student. For advanced undergraduates and graduate students.

MS 515 - COASTAL ORNITHOLOGY

Semester Hours: 4

Coastal and pelagic birds with emphasis on ecology, taxonomy, and distribution. Food habits, field identification, and population dynamics.

MS 520 - MARINE GEOLOGY

Semester Hours: 4

Sampling techniques, laboratory analysis of sediments, application of research process to problems in identifying sedimentary environments, topography, sediments, and history of world oceans. Beneficial for understanding sedimentary substrate on or in which a large percentage of marine organisms live. Lecture, laboratory, and fieldwork.

MS 525 - MARINE BIOL FOR TEACHERS

Semester Hours: 6

MS 599 - RESEARCH ON SPECIAL TOPICS

Semester Hours: 1-4

Enrollment by special arrangement in any subjects listed.

MS 691 - SPECIAL TOPICS IN MARINE SCIEN

Semester Hours: 1-4

Marketing (MKT)

MKT 505 - NEW VENTURE STRATEGIES

Semester Hours: 3

Theory and application of both marketing and management strategies for start-up, operation and control of new ventures. The course also discusses the role of entrepreneurship in the economy. Same as MGT 505.

MKT 515 - INTERNATIONAL MARKETING

Semester Hours: 3

Procedures and problems associated with establishing and carrying out marketing operations in or with foreign countries and companies. Institutions, principles, and methods involved in solving these business problems. Effect of national differences in business practices and regulation.

MKT 520 - SERVICES MARKETING

Semester Hours: 3

The course focuses on the unique challenges of managing services and delivering quality service to customers. The course is equally applicable to organizations whose core product is services (e.g., banks, hospitals, aerospace and defense firms, non-profit organizations) and to organizations that depend on service excellence and services for competitive advantage (high technology firms, industrial firms).

MKT 565 - NEW VENTURE CHALLENGE

Semester Hours: 3

It is the intent of this course to create teams of students who will take a technology to the next level with the potential for the creation of a venture team. The course will take students through the process of conceiving and creating a new business. The goal is to provide a solid background with practical applications of important concepts for non-business majors or business majors with limited or no experience in an entrepreneurial environment. Finance, accounting, marketing and management will be addressed from a hands-on, entrepreneurial perspective. The course will rely on Podcast discussion, participation, case analysis, and the creation of a business plan. Prerequisite: MKT 505 and MKT 604.

MKT 575 - ADVANCED MARKETING SEMINAR

Semester Hours: 3

Investigation of advanced marketing topics that are relevant to contemporary marketing practices. The course will focus on current issues related to marketing in a high technology environment, relationship marketing, channel design and strategy, transportation, and logistics. Prerequisite: MKT 600.

MKT 580 - MARKETING MANAGEMENT

Semester Hours: 3

Management of marketing function of the firm: determination of objectives, organization and controls for effective utilization of marketing resources in coordinated effort with other major functional areas. Identification and selection of market opportunities. Competitive strategies and development of marketing policies and programs.

MKT 590 - SPECIAL PROJECTS

Semester Hours: 3

Independent study in an area of interest to the student in the field of marketing.

MKT 595 - INTERNSHIP IN MARKETING

Semester Hours: 3

Active involvement in a project in a business enterprise, professional organization, or in a government agency that has particular interest and relevance to the student.

MKT 600 - SURVEY OF MARKETING MGMT

Semester Hours: 3

Seminar format with case analysis is used to introduce students to the tools and concepts necessary for planning, organizing, and controlling marketing activities. Typical topics include market analysis and segmentation, market planning, market research, and product pricing, promotion, and distribution strategies.

MKT 601 - MARKETING STRATEGY & ANALYSIS

Semester Hours: 3

A seminar format with case analysis is used to introduce students to the tools and concepts necessary for planning, organizing and controlling marketing activities. Typical topics include market analysis and segmentation, market planning, market research, product, pricing, promotion and distribution strategies.

MKT 602 - MARKETING RESEARCH DESIGN

Semester Hours: 3

Application based course exploring the principles and purposes of marketing research. Covers research design, questionnaire development, sample selection, data collection, data analysis, and report generation. Focus is on the gathering and use of information for better decision making.

MKT 604 - NEW PRODUCT DEVELOPMENT

Semester Hours: 3

Practical management of new product development methods and techniques from current research and successful industrial practice. An in-depth review of concepts, empirical findings, and paradigms that collectively form the foundation for the design and marketing of new products. An overview of emerging concepts, analytical techniques, empirical findings and paradigms that alter the nature, scope, and practice of marketing emerging technologies.

MKT 606 - MKT IN HIGH TECH ENVIRON

Semester Hours: 3

Investigation of the many functions, strategies, systems, environmental forces, and competitive activities involved in the marketing of ideas, goods, and services to organizational customers which include businesses, industries, institutions, and governments. These issues will be evaluated within the context of a high technology environment. Using a seminar format, case analysis and class participation will be important dimensions of the course. Prerequisite: MKT 604.

MKT 650 - SELECTED RESEARCH TOPICS

Semester Hours: 3

Research on a particular topic relevant to marketing by one student or a group of students. The research paper must be an original contribution showing a research design and results that meet the highest standards of social science research.

Materials Science (MTS)

MTS 601 - NATURE OF MATERIALS

Semester Hours: 3

Fundamental chemistry and structure of metals, ceramics, semiconductors, and polymers. Mol%, wt%, ppx, number densities, and polymer molecular weights. Covalent, ionic, metallic, and intermolecular bonding. Crystallography and disorder. Point, line, and volume defects. Phase diagrams.

MTS 602 - PROPERTIES OF MATERIALS

Semester Hours: 3

Properties of metals, ceramics, semiconductors, and polymers. Elastic or plastic deformation, fracture, and strengthening. Oxidation and corrosion. Dielectrics, semiconductors, and conductors. Thermal conductivity and heat capacity. Transmission, adsorption, and reflection. Magnetic susceptibility. Prerequisites: MTS 601.

MTS 603 - STRUC COMP PROP MATLS I

Semester Hours: 3

How structure and composition determine a materials mechanical properties and performance. Topics covered include bonding and crystal structure, disorder, defects, phase diagrams, phase transitions, diffusion and other kinetic processes, deformation, fraction mechanics, strengthening processes as applied to metals, ceramics, semiconductors, polymers and composites.

MTS 604 - STRUC COMP PROP MATLS II

Semester Hours: 3

How reactive, electronic, magnetic, thermal and optical properties of metals, ceramics, semiconductors, and polymers are influenced by their structure and composition. Topics considered include corrosion, oxidation, degradation process, band structure, electrical and optical dielectric constants, magnetic susceptibility, electrical and thermal conductivity and superconductivity.

MTS 607 - MAT PROCESSING IN SPACE

Semester Hours: 3

Extensive review of solidification physics with emphasis on the role of fluid transport and its effects on the process in order to develop rationales for processing materials in space.

MTS 613 - SYNTHESIS & PROC OF MATL

Semester Hours: 3

Metals, semiconductors, polymers, ceramics and composite materials are included.

MTS 646 - THERMODYNAMICS OF MATRLS

Semester Hours: 3

Fundamental thermodynamic review, phase equilibrium, chemical reaction equilibrium, free energy, binary and ternary phase transformations, solution models and selected topics.

MTS 649 - POLYMER SYNTHESIS & CHARACTERI

Semester Hours: 3

Synthesis of commercially relevant and novel polymers. Polymer characterization and discussion of the structural dependence of polymer properties.

MTS 650 - PRINC LIQUID/SOLID INTER

Semester Hours: 3

Applies basic principles in thermodynamics and kinetics to characterize surfaces and surface phenomena. Fundamental properties of gas-liquid, liquid-liquid, solid-liquid, and solid-gas interfaces and phenomena occurring at these interfaces.

MTS 651 - INTRO QUANTUM MECH I

Semester Hours: 3

Waves and particles; Bohr's model of the atom; de Broglie waves, wave-packets and the uncertainty principle; postulates of quantum mechanics; Schrodinger's equation; simple systems in one, two and three dimensions; the hydrogen atom.

MTS 652 - INTRO QUANTUM MECH II

Semester Hours: 3

Angular momentum and spin; atomic structure and spectrum; time-independent perturbation theory, variational methods; time-dependent perturbation theory and interactions of light with matter; scattering theory; electronic structure of solids; relativistic quantum mechanics. Prerequisite: PH 551 or CH 553.

MTS 660 - INTRO SOLID ST PHY I

Semester Hours: 3

Crystal binding and crystal structure. Crystal structure determination. Phonons and lattice vibrations. Free electron gas. Electronic energy band theory. Prerequisite: PH 551 or CH 553 or MTS 651 or OSE 555.

MTS 661 - INTRO SOLID ST PHY II

Semester Hours: 3

Thermal properties of solids. Electronic properties, optical properties, electronic properties in a magnetic field, semiconductor devices, magnetism, superconductivity, defects and alloys, dislocations and crystal growth, non-crystalline solids, surfaces and interfaces. Prerequisite: MTS 660 or PH 560.

MTS 690 - SP TPS/MATERIAL SCIENCE

Semester Hours: 3

Advanced selected topics of interest in such areas as materials processing, properties, analysis and testing. Prerequisites: MTS 501 and MTS 502.

MTS 699 - MASTER'S THESIS

Semester Hours: 3-6

Required each semester that a student is enrolled and receiving direction on a master's thesis. Minimum of two semesters required.

MTS 701 - FUND SOLID ST MAT PREP I

Semester Hours: 3

Equilibrium concepts and applications. Overview of solid state preparation (crystal growth) techniques. Treats appropriate thermodynamics, chemical equilibrium solid-liquid-vapor phase diagrams and application in materials preparation; segregation and applications (doping, normal freezing, zone refining, macro and micro distributions).

MTS 721 - FUND ELECTRON/X-RAY OPTICS

Semester Hours: 3

Fundamentals of materials characterization using electron and x-ray techniques. Topics include advanced crystallography, electron optics, and interactions of energetic electrons with solids. Some applications of x-ray diffraction (SRD) will be addressed.

MTS 722 - ELECT MICROSCOPIES/X-RAY DIFF

Semester Hours: 4

Applications of materials characterization using electron and x-ray techniques. Topics include imaging and x-ray spectroscopy (EDXA) using scanning electron microscopy (SEM); imaging, diffraction, and x-ray spectroscopy using transmission electron microscopy (TEM); and advanced x-ray diffraction (XRD) techniques.

MTS 723 - ELECTRON SPECTROSC SUR CHAR

Semester Hours: 4

Principles and operation of electron spectroscopies used in surface characterization. Techniques covered include Auger electron spectroscopy (AES), x-ray photoelectron spectroscopy (XPS), and other photoemission spectroscopies, such as ultraviolet photoelectron spectroscopy (UPS) and the use of synchrotron radiation. Students will carry out analysis of samples, prepare a written report, and present the results orally as part of the laboratory assignment.

MTS 724 - INSTR METH/BIO-MTSL CHARACTERI

Semester Hours: 3

MTS 747 - POLYMER PHYSICAL CHEM

Semester Hours: 3

Introduction to structure, properties and processing of polymers. Structural types, structure property relationships, thermodynamics and kinetics of polymerization and depolymerization, polymer characterization, thermodynamics of polymer solutions and blends, and mechanical evaluation of polymers. Prerequisite: CH 540.

MTS 780 - MATERIALS SCIENCE SEMINAR

Semester Hour: 1

Required of doctoral students during each semester of residence. This course may not be used to meet minimum degree requirements.

MTS 790 - SPECIAL TOPICS/MTS

Semester Hours: 3

Offered upon demand. Advanced selected topics of interest in materials science in such areas as materials processing, materials properties and analysis, testing.

MTS 799 - DOCTORAL DISSERTATION

Semester Hours: 3-9

Required each semester student is enrolled and receiving direction on a doctoral dissertation. A minimum of 18 hours is required.

Mathematics (MA)

MA 502 - INTRO TO REAL ANALYSIS

Semester Hours: 3

Individualized special projects in mathematics and its applications for inquisitive and well prepared senior level undergraduate students. No credit allowed toward a major or minor in mathematics.

MA 503 - INTRO COMPLEX ANALYSIS

Semester Hours: 3

Complex algebra, analytic functions, Cauchy-Riemann equations, exponential, trigonometric, and logarithmic functions, integration, Cauchy integral theorem, Morera's theorem, Liouville's theorem, maximum modulus theorem, residue theory, Taylor and Laurent series, and applications.

MA 506 - METHODS PARTIAL DIFF EQUA

Semester Hours: 3

Survey of theory and methods for solving elementary partial differential equations. Topics include first-order equations and the method of characteristics, second-order equations, reduction to canonical form, the wave equation, the heat equation, Laplace's equation, separation of variables, and Fourier series.

MA 508 - APPLIED LINEAR ALGEBRA

Semester Hours: 3

Fundamental concepts of linear algebra are developed with emphasis on real and complex vector spaces, linear transformations, and matrices. Solving systems of equations, finding inverses of matrices, determinants, vector spaces, linear transformations, eigenvalues and eigenvectors, normal matrices, canonical forms of matrices, applications to systems of linear differential equations, and use of computer software such as MATLAB.

MA 515 - INTRO NUMERICAL ANALYSIS

Semester Hours: 3

Rigorous analysis and derivation of numerical methods for the approximate solution of nonlinear equations; interpolation and integration of functions, and approximating solutions of ordinary differential equations.

MA 520 - INTERM DIFFERENTIAL EQUATIONS

Semester Hours: 3

This is a second course in differential equations. Course topics include series solutions for second order differential equations and the method of Frobenius; eigenvalue and eigenvector methods for solving systems of linear first order equations; the qualitative theory of nonlinear equations; boundary value problems and the Sturm-Liouville theory. No credit given to students who have successfully completed MA 524.

MA 524 - DYNAMICAL SYSTEMS I

Semester Hours: 3

Scalar autonomous equations; existence, uniqueness, stability, elementary bifurcations; planar autonomous equations; general properties and geometry, conservative systems, elementary bifurcations linear systems, reduction to canonical forms, stability and instability from linearization. Liapunov functions, center manifolds, Hopf bifurcation.

MA 526 - PARTIAL DIFF EQUA I

Semester Hours: 3

Introduction to the theory for solving partial differential equations. No graduate credit given to students who have completed MA 506 for graduate credit. Topics include second-order equations, reduction to canonical form, well-posedness, the classical equations (wave, heat, and Laplace's) in one and several dimensions, separation of variables, Fourier series, general eigenfunction expansions, Sturm-Liouville theory, first-order linear and quasilinear equations, and shocks. Prerequisite: MA 502.

MA 536 - INTRO P-ADIC ANALYSIS

Semester Hours: 3

Introduction to p-adic analysis. Topics include rings; fields; ideals; congruences; valued fields; non-archimedean valued fields; field of p-adic numbers; field of complex p-adic numbers; ultrametric Banach spaces; p-adic Hilbert space; p-adic functions; strictly differentiable functions; Volkenborn Integral; Benoulli numbers; p-adic Gamma function; p-adic Riemann function; and p-adic Zeta function.

MA 538 - METRIC SPACES W/APPLICA

Semester Hours: 3

Metric spaces, continuous functions, compactness, connectedness, completeness, Arzela-Ascoli theorem, Stone-Weierstrass theorem, Hilbert spaces, contraction mappings, applications to existence and uniqueness of solutions of differential and integral equations. Prerequisites: MA 502.

MA 539 - MULTIDIMENSIONAL ANALYSIS

Semester Hours: 3

Finite-dimensional Euclidean space and sequential approach to its topology, continuous functions and their properties, differentiability and implicit function theorem, Riemann integral, elements of vector calculus, flows and their generating vector fields, introduction to metric spaces. Prerequisite: MA 544.

MA 540 - COMBINATORIAL ENUMERATION

Semester Hours: 3

Counting, pigeonhole principle, permutations and combinations, generating functions, principle of inclusion and exclusion, Polya's theory of counting.

MA 542 - ALGEBRA

Semester Hours: 3

Topics from group theory and ring theory: subgroups, normal subgroups, quotient groups, homomorphisms, isomorphism theorems, ideals, principal ideal domains, Euclidean domains, fields, extension fields, elements of Galois theory.

MA 544 - LINEAR ALGEBRA

Semester Hours: 3

Vector spaces over a field, bases, linear transformations, matrices, determinants, eigenvalues, similarity, Jordan canonical forms, dual spaces, orthogonal and unitary transformations.

MA 561 - INTRO TO FOURIER ANALYSIS

Semester Hours: 3

See MA 460. This course is taught as MA 460/561. Course completion and/or grade requirements for the MA 561 course will differ from those for the MA 460 course.

MA 562 - INTERMEDIATE FOURIER ANALYSIS

Semester Hours: 3

(Formerly MA 560). Brief review of classical Fourier analysis, Parseval's equality, Gaussian test functions. Introduction to generalized functions, the generalized transform, the generalized derivative, sequences and series of generalized functions, regular periodic arrays of delta functions, sampling, the discrete transform, the fast Fourier transform (other topics as time and interest permit).

MA 565 - INTERM MATH MODELING

Semester Hours: 3

Designed for beginning graduate students. No prior experience in formal mathematical modeling is required. In-depth discussion of some types of models from physics, the life sciences, and/or the social sciences, with formulation, analysis, and criticism of the models. Process of and factors involved in formulating a model is of prime importance. Content is divided into approximately one-half deterministic modeling and one-half stochastic modeling.

MA 585 - PROBABILITY

Semester Hours: 3

Course topics include probability spaces, random variables, conditional probability, independence, modes of convergence, and an introduction to sigma-algebras and measurability; distributions, including discrete, continuous, joint and marginal distributions, transformations of random variable, distribution and quantile functions, and convergence in distribution; expected value, including properties of general expected value, mean, variance, covariance, generating functions, and conditional expected value; special models and distributions, including Bernoulli trials and the binomial and negative binomial distributions, the Poisson model and the Poisson and gamma distributions, the normal distribution, finite sampling models and the hypergeometric distribution; the law of large numbers and the central limit theorem.

MA 590 - SELECTED TOPICS IN MATH

Semester Hours: 3

Requested selected topics.

MA 607 - MATHEMATICAL METHODS I

Semester Hours: 3

Review of vector calculus and coordinate systems, introduction to tensors, matrices, infinite series, complex variables with applications to calculus of residues, partial differential equations, and Sturm-Liouville theory. Orthogonal functions, gamma functions, Bessel functions, Legendre functions, special functions, Fourier series, integral transform and equations. (Same as PH 607.).

MA 609 - MATHEMATICAL METHODS II

Semester Hours: 3

Continuation of MA 607. (Same as PH 609.) Prerequisite: MA 607.

MA 614 - NUM METHODS/LINEAR ALGEBRA

Semester Hours: 3

Norms and vector spaces, matrix factorizations and direct solution methods, stability and conditioning, iterative methods for large linear systems, the algebraic eigenvalue problem. Prerequisites: MA 515 and either MA 508 or MA 544.

MA 615 - NUM METHODS PARTIAL DIFF EQ

Semester Hours: 3

Finite difference methods for parabolic, elliptic, and hyperbolic partial differential equations, error analysis, stability, and convergence of finite difference methods. Prerequisites: MA 515 and (either MA 506 or MA 526) and (either MA 508 or MA 544 or MA 614).

MA 624 - DYNAMICAL SYSTEMS II

Semester Hours: 3

Brief review of linear systems; local theory for nonlinear systems; existence, uniqueness, differentiability, asymptotic behavior, the stable manifold theorem, Hartman-Grobman theorem, Hamiltonian systems; global theory for nonlinear systems; limit sets and attractors, the Poincare map, the Poincare-Bendixson theorem; some aspects of bifurcation theory and chaos; bifurcations at nonhyperbolic fixed points and periodic orbits, homoclinic bifurcations, Melnikov's method, chaos. Prerequisite: MA 524 and either MA 508 or MA 544.

MA 626 - PARTIAL DIFF EQUA II

Semester Hours: 3

Continuation of MA 526. Qualitative results for solutions to the classical equations (energy inequalities, propagation of discontinuities, maximum principles, smoothness of solutions, existence and uniqueness, etc.), non-homogeneous equations, Poisson's equation, Green's functions, and the Cauchy-Kowalewski theorem. Prerequisite: MA 526.

MA 633 - GEOMETRY

Semester Hours: 3

Axioms of incidence and order, affine and metric properties, isometries, similarities, transformation groups, projective planes.

MA 638 - GENERAL TOPOLOGY

Semester Hours: 3

Set theory, logic, well-ordering principle, axiom of choice, topological spaces, product spaces, quotient spaces, continuous functions, connectedness, path connectedness, local connectedness, compactness, local compactness, countability and separation, generalized products, Tychonoff theorem.

MA 640 - GRAPH THEORY

Semester Hours: 3

Graphs, subgraphs, trees, connectivity, Euler tours, Hamilton cycles, matchings, edge colorings, independent sets, vertex colorings, planar graphs, Kuratowski's theorem, four color theorem, directed graphs, networks, cycle and bond spaces. Prerequisite: MA 540 or MA 542.

MA 643 - GROUP THEORY

Semester Hours: 3

MA 644 - MATRIX THEORY

Semester Hours: 3

Functions of matrices, invariant polynomials, elementary divisors, similarity of matrices, normal forms of a matrix, matrix equations, generalized inverses, non-negative matrices, localization of eigenvalues. Prerequisites: MA 508 or MA 503 or MA 544.

MA 645 - COMBINATORIAL DESIGN

Semester Hours: 3

Systems of distinct representatives, difference sets, coding theory, block designs, finite geometries, orthogonal Latin squares, and Hadamard matrices. Prerequisite: MA 540 and MA 544.

MA 653 - REAL ANALYSIS I

Semester Hours: 3

Countable sets, characterization of open and closed sets, Heine-Borel theorem, Riemann integral, Lebesgue measure and outer measure, measurable functions, Lebesgue integral, Fatou's lemma, and Lebesgue-dominated convergence theorem. Prerequisite: MA 538.

MA 654 - REAL ANALYSIS II

Semester Hours: 3

Differentiability of monotone functions, functions of bounded variation, absolute continuity, convex functions, Minkowski and Holder inequalities, L_p spaces, Riesz-Fischer representation theorem, Fubini's theorem and selected topics. Prerequisite: MA 653.

MA 656 - COMPLEX ANALYSIS I

Semester Hours: 3

Topology of the complex plane, analytic functions of one complex variable, elementary functions and their mapping properties, power series, complex integration, Cauchy's theorem and its consequences, isolated singularities, Laurent series, residue theory.

MA 658 - INTRO TO FUNCTIONAL ANALYSIS

Semester Hours: 3

Normed and inner product spaces, finite dimensional spaces, product and quotient spaces, equivalent norms, Hahn-Banach theorem, principle of uniform boundedness, open mapping theorem, Riesz representation theorem, complete orthonormal sets, Bessel's inequality, Parseval's identity, and conjugate spaces. Prerequisite: MA 538.

MA 661 - SPECIAL FUNCTIONS

Semester Hours: 3

MA 662 - ASYMPT/PERTURBATION METHOD

Semester Hours: 3

Asymptotic series, regular and singular perturbation theory, asymptotic matching, Laplace's method, stationary phase, steepest descents, WKB theory. Prerequisites: MA 502, and one of the following: MA 503, MA 504, MA 624.

MA 667 - CALC VAR/OPTIMAL CONTROL

Semester Hours: 3

Euler necessary condition for local extremum, Euler-Lagrange equation, Weierstrass necessary condition, Jacobi's necessary condition, corner conditions, problems of optimal control, Pontryagin maximum principles, transversality conditions, applications.

MA 685 - STOCHASTIC PROC/APPLI I

Semester Hours: 3

Discrete and continuous Markov chains, Poisson processes, counting and renewal processes, and applications. Prerequisite: MA 585.

MA 686 - STOCHASTIC PROC/APPLI II

Semester Hours: 3

Gaussian and Wiener processes, general Markov processes, special types of processes from queueing and risk theory, and selected advanced topics. Prerequisite: MA 685.

MA 690 - SP TOPICS IN MATHEMATICS

Semester Hours: 3

Offered upon demand. Advanced selected topics of interest in areas such as discrete mathematics, numerical analysis, differential equations, and stochastic processes.

MA 695 - GRADUATE SEMINAR

Semester Hour: 1

Selected topics in advanced mathematics, conducted as a research seminar.

MA 699 - MASTER'S THESIS

Semester Hours: 3-9

Required each semester a student is receiving direction on a master's thesis. A minimum of two terms is required. Maximum of nine hours credit awarded upon successful completion of the master's thesis.

MA 715 - NUM METHODS PART DIFF EQ II

Semester Hours: 3

Finite element methods for parabolic, elliptic, and hyperbolic partial differential equations; error analysis stability, and convergence. Prerequisites: MA 538 and MA 615.

MA 726 - THRY PART DIFFERNTL EQUA

Semester Hours: 3

Hilbert space theory of existence, uniqueness, and regularity for partial differential equations.

MA 740 - COMBINATORIAL ALGORITHMS

Semester Hours: 3

Linear, polynomial and exponential graph theoretic algorithms, generating combinatorial objects, and NP-completeness.

MA 756 - COMPLEX ANALYSIS II

Semester Hours: 3

Applications of residue theory, harmonic functions and their applications, Mittag-Leffler theorem, infinite products, Weierstrass product theorem, conformal mapping and Riemann mapping theorem, univalent functions, analytic continuation and Riemann surfaces, Picard's theorems, and selected topics.

MA 785 - ADV PROBABILITY THEORY

Semester Hours: 3

Measure and integration, probability spaces, convergence concepts, law of large numbers, random series, characteristic functions, central limit theorem, random walks, conditioning, Markov properties, conditional expectations, and elements of martingale theory.

MA 790 - SPECIAL TOPICS

Semester Hours: 3

Offered upon demand. Advanced selected topics of interest in areas such as discrete mathematics, numerical analysis, differential equations, and stochastic processes.

MA 795 - GRADUATE SEMINAR

Semester Hour: 1

Selected topics in advanced mathematics, conducted as a research seminar.

MA 799 - DOCTORAL DISSERTATION

Semester Hours: 3-9

Required each semester a student is receiving direction on a Ph.D. dissertation.

Mechanical & Aerospace Engineering (MAE)

MAE 520 - COMPRESSIBLE AERODYNAMICS

Semester Hours: 3

Principles of compressible flow including area change, friction, and heat transfer. Fundamentals of acoustic waves, one and two-dimensional shock and expansion waves, shock-expansion theory, and linearized flow with applications to inlets, nozzles, wind tunnels, and supersonic flow over aerodynamic bodies and wings. (Same as MAE 420.).

MAE 530 - FUNDAMENTALS OF AERODYNAMICS

Semester Hours: 3

Application of the principles of fluid mechanics and thermodynamics to the prediction of aerodynamic performance of aircraft, missiles and other flight vehicles. Topics include lift and drag, thrust and power, and the influence of wing loading, power loading, zero-lift drag, wing geometry, high lift devices Mach number, etc., on the performance and design trades of flight vehicles. (Same as MAE 430.).

MAE 531 - INTRO TO PLASMA DYNAMICS

Semester Hours: 3

MAE 540 - ROCKET PROPULSION I

Semester Hours: 3

Introduction to the operation, analysis and design of liquid and solid rockets. The course incorporates an experience in design and realization of a thermal system in which students work in teams to design a rocket motor or component.

MAE 541 - AIRBREATHING PROPULSION

Semester Hours: 3

Survey of airbreathing propulsion systems with special emphasis on gas turbine engines for aircraft and rotorcraft. Thermodynamic power cycles, design of components, and overall engine performance analysis. Discussion of practical design and operations considerations including engine controls, reliability, and durability. The course incorporates an experience in design and realization of a thermal system in which students work in teams to design a turbine engine. Students majoring in Aerospace Engineering must take either MAE 440 or MAE 441 to satisfy the Aerospace propulsion elective. Prerequisite: MAE 520.

MAE 544 - INTRO TO ELECTRIC PROPULSION

Semester Hours: 3

Elements of electrically-driven rocket propulsion for applications from low earth orbit to the outer planets. The physics of ionizing and heating gases and plasmas for electrothermal, electrostatic and electromagnetic acceleration. Characteristics of Resistojet, Arcjet, Magnetoplasmadynamic thrusters, Electrothermal, Pulsed plasma, Electrostatic, and Hall thrusters. Review thruster system performance, power requirements, and selection for space missions. Overview of current research efforts, including thruster systems, physics, and performance. Prerequisite: MAE 520.

MAE 545 - HEAT DISTRIB SYS DESIGN

Semester Hours: 3

Design of hydronic and air distribution systems used in heating and air conditioning. Piping design, pump selection, heat coils, room air distribution, ducting design, fan selection, controls, and complete systems.

MAE 548 - ENERGY CONVERSION & POWER GEN

Semester Hours: 3

Application of principles of thermodynamics, heat transfer, and fluid mechanics to combustion engines and turbines. Basic engine types, engine components, idealized cycles, combustion, fuels, engine variables, testing, exhaust gas analysis, and air pollution as related to spark-ignition, compression-ignition, and turbine engines.

MAE 552 - COMPRESSIBLE AERODYNAMICS

Semester Hours: 3

Principles of compressible flow including area change, friction, and heat transfer. Fundamentals of acoustic waves, one and two-dimensional shock and expansion waves, shock-expansion theory, and linearized flow with applications to inlets, nozzles, wind tunnels, and supersonic flow over aerodynamic bodies and wings.

MAE 561 - VIBRATIONS ELASTIC SYS

Semester Hours: 3

Formulation of the equations of motion of discrete and continuous systems, analytical and numerical methods of solution, eigenvalue problems, and dynamic response. (Same as MAE 461 and CE 461/561.).

MAE 563 - INTERMEDIATE DYNAMICS

Semester Hours: 3

Kinematics and dynamics of particles, system of particles, and rigid-bodies. Variational principles and Lagrangian mechanics.

MAE 568 - ELEMENTS OF SPACECRAFT DESIGN

Semester Hours: 3

Fundamentals of spacecraft engineering and design. Topics include: orbital mechanics, space environment, attitude determination and control, communications, space structures, thermal control, propulsion and power, and systems and mission design. (Same as MAE 468.) Prerequisite: MAE 520.

MAE 574 - APP MECHANICS OF SOLIDS

Semester Hours: 3

Stresses and strains at a point, theories of failures, stress concentration factors, thick-walled cylinders, torsion of noncircular members, curved beams, unsymmetrical bending, and shear center. (Same as MAE 474 and CE 474/574.).

MAE 576 - COMP MATLS: FABRIC/DES/ANALY

Semester Hours: 3

Introduction to the mechanics of advanced composite materials. Design and analysis of composite structures. Analysis of orthotropic and transversely isotropic materials and systems. Hands on fabrication of a composite structure. (Same as MAE 476.).

MAE 577 - EXP TECH SOLID MECHANICS

Semester Hours: 3

Experimental methods to determine stress, strain, displacement, velocity, and acceleration in various media. Theory and laboratory applications of electrical resistance strain gages, brittle coatings, and photoelasticity. Application of transducers and experimental analysis of engineering systems. (Same as MAE 477 and CE 477/577.).

MAE 580 - AIRCRAFT STABILITY & CONTROL

Semester Hours: 3

Stability and control of aerodynamic vehicles. Design of aircraft to obtain good flying characteristics. Complete governing equations and analog solutions of linearized equations. (Same as MAE 480.) Prerequisite: MAE 530.

MAE 585 - NUM METH & ENGR COMPUTAT III

Semester Hours: 3

Advanced topics in numerical methods and engineering computation including: finite elements and finite differences in solving various engineering problems; Gaussian quadrature; interpolation, integration, and differentiation; and stability and convergence analysis of iterative methods. Numerical applications to fluid mechanics, heat transfer, structural mechanics, and machine design.

MAE 589 - COMPUTER AIDED ENGR

Semester Hours: 3

Application of computer methods in the analysis and design of structural, thermal, and dynamical systems. Use of state-of-the-art finite element and finite difference computer programs. Practical guidelines for discrete modeling; analysis of modeling errors. Comparison of exact and approximate solutions to boundary value problems. Use of microcomputers in engineering design and analysis. (Same as MAE 489.).

MAE 593 - ROCKET DESIGN

Semester Hours: 3

Design, build, test and fly a high-powered rocket with a payload to a specified altitude. Students work on multi-disciplinary teams to design payloads, avionics, recovery systems, structures and other sub-systems and then integrate them into the final vehicle. Course may be used for senior design credit.

MAE 594 - AIRCRAFT DESIGN

Semester Hours: 3

Design and build an unmanned aircraft to meet specified requirements, and then verify design through ground and flight tests. Students work on multi-disciplinary teams to address configuration aerodynamics, avionics, structures, propulsion/power and payloads. Systems engineering aspects including simulation, fabrication, integration, scheduling and cost estimation are also emphasized. Course may be used for senior design credit.

MAE 595 - SELECTED TOPICS MECH & AERO EG

Semester Hours: 1-6

MAE 610 - AERODYNAMICS

Semester Hours: 3

Fundamental concepts in aerodynamics including conservation laws, complex potential theory, thin airfoil theories, finite-wing lifting-line theory, boundary layers and Von Karman momentum integral equations.

MAE 620 - COMPRESSIBLE FLOW

Semester Hours: 3

Study of compressible subsonic, transonic and supersonic flows as described by the Euler equations. Linear and nonlinear theories of shockwaves, expansion waves, and their interactions. Applications to wind tunnels, nozzles, diffusers and aerodynamic bodies.

MAE 623 - COMPUTATIONAL FLUID DYNAMICS I

Semester Hours: 3

Formulations by finite difference, finite element, finite volume, and spectral element methods for incompressible and compressible flows. Explicit and implicit methods, Von Neumann error analysis, consistency, convergence, and accuracy.

MAE 631 - ROTORCRAFT DESIGN I

Semester Hours: 3

Conceptual design of rotorcraft systems with an emphasis on multidisciplinary design. Comprehensive methodologies for vehicle synthesis and sizing including consideration of aerodynamics, propulsion, materials and structures, flight performance and control, and operations. Integration of advanced technologies. Rotorcraft Design I and II are the capstone design courses for the MSE (Aerospace) program of study in Rotorcraft Systems Engineering. Corequisite: MAE 657.

MAE 632 - ROTORCRAFT DESIGN II

Semester Hours: 3

Continuation of Rotorcraft Design I including higher fidelity simulations and trade studies. Consideration of maneuverability, structural dynamics, drive train and hub design, advanced flight control system design, sensors, weapons, component integration, packaging, and life-cycle cost. Rotorcraft Design I and II are the capstone design courses for the MSE (Aerospace) program of study in Rotorcraft Systems Engineering.

MAE 633 - TACTICAL MISSILE DESIGN I

Semester Hours: 3

Conceptual design of missile systems with an emphasis on multi-disciplinary design. Comprehensive methodologies for vehicle synthesis and sizing including consideration of aerodynamics, propulsion, materials and structures, flight performance and control, and operations. Integration of advanced technologies. Tactical Missile Design I and II are the capstone design courses for the MSE (Aerospace) program of study in Missile Systems Engineering. Prerequisite with concurrency: MAE 755.

MAE 634 - TACTICAL MISSILE DESIGN II

Semester Hours: 3

Continuation of Tactical Missile Design I including higher fidelity simulations and trade studies. Consideration of trajectory modeling and simulation, open-loop flight control system design, sensors, component integration and packaging, and life-cycle cost. Tactical Missile Design I and II are the capstone design courses for the MSE (Aerospace) program of study in Missile Systems Engineering. Prerequisite: MAE 633.

MAE 635 - AEROSPACE SYSTEMS ENGINEERING

Semester Hours: 3

Introduction to Integrated Product and Process Development (IPPD) and life cycle analysis with application to Aerospace Systems. Systems engineering and quality engineering methods and tools. Top-down design decision support process. Computer integrated environment and robust design simulation will be addressed. Prerequisite: ISE 601 or ISE 690.

MAE 639 - SYSTEM SAFETY

Semester Hours: 3

The process of system safety?from the creation and management of a safety program on a system under development to the analysis that must be performed as this system is designed and produced to assure acceptable risk in its operation. Full discussion of the management and analysis processes and procedures. Incorporates the safety procedures used by the Department of Defense and NASA. Basic statistical methods and network analysis methods which provide an understanding of the engineering analysis methods that follow are covered.

MAE 640 - ROCKET PROPULSION II

Semester Hours: 3

MAE 641 - ADV THERMODYNAMICS

Semester Hours: 3

Application of classical thermodynamics. Treatment of problems involving nonideal gases and liquids, phase equilibrium, and chemical equilibrium. (Same as CHE 641.).

MAE 643 - ADVANCED HEAT & MASS TRANSFER

Semester Hours: 3

Continuation of MAE 450 in the study of conductive, convective, and radiative heat transfer and mass transfer. Emphasis is placed on heat transfer in turbulent flows and high speed flows, combined mode heat transfer, and mass transfer in reacting flows.

MAE 644 - ADVCD SOLID ROCKET PROPUL

Semester Hours: 3

Overview of the design, manufacture and testing of solid rocket propulsion systems. Specific topics include propellant ballistics and combustion, grain design, motor case and nozzle design, thermal protection, motor performance, and reliability and failure. Prerequisite: MAE 540.

MAE 645 - COMBUSTION I

Semester Hours: 3

Combustion chemistry, introduction to mass transfer, chemical kinetics, reactors, simplified governing equations for chemically reacting flow, laminar diffusion and premixed flames.

MAE 646 - COMBUSTION I

Semester Hours: 3

Combustion chemistry, introduction to mass transfer, chemical kinetics, reactors, simplified governing equations for chemically reacting flow, laminar diffusion and premixed flames.

MAE 647 - UNCERTAINTY ANAL IN EXPER

Semester Hours: 3

Uncertainty analysis concepts and techniques; application in planning, design, construction, debugging, execution, data analysis and reporting phases of experimental programs. Discussion of national and international standards and current engineering uncertainty analysis literature.

MAE 649 - TRANSPORT PHENOMENA

Semester Hours: 3

Mass, energy, and momentum transport in steady and transient motions in real and rheological substances. (Same as CHE 649.).

MAE 651 - VISCOUS FLUID MECHANICS

Semester Hours: 3

Fundamentals of incompressible viscous fluid motion, including development of Navier Stokes equation. Exact and approximate solutions for both large and small Reynolds number. Laminar and turbulent boundary layers.

MAE 657 - HELICOPTER THEORY

Semester Hours: 3

Vertical flight, forward flight, performance, design, mathematics of rotating systems, rotary wing dynamics, rotary wing aerodynamics, helicopter aeroelasticity, stability and control, stall, and noise. Prerequisite: MAE 530.

MAE 658 - ROTORDYNAMICS

Semester Hours: 3

Torsional and transverse rotor vibration, critical speed and stability analysis, response to unbalance, rotor balancing. Rotordynamic phenomena including: gyroscopic effects, fluid film bearings, annular seals, stiffness asymmetry.

MAE 660 - STRUCTURAL DYNAMICS

Semester Hours: 3

Application of the theory of vibrations to discrete and continuous models of structures. Numerical methods of analysis for both spatial and temporal variables. Modal synthesis and step-by-step time integration methods. Finite element applications; substructuring techniques. (Same as CE 660.).

MAE 661 - ADVANCED DYNAMICS

Semester Hours: 3

Variational methods, optimization, and dynamic stability. Lagrangian and Hamiltonian formulation for dynamical systems and Hamilton-Jacobi methods to orbital mechanics.

MAE 662 - NONLINEAR DYNAM & CHAOS

Semester Hours: 3

Nonlinear and chaotic dynamical systems, phase plane, periodic and strange attractors, stability analysis, critical points, Poincaré exponents, bifurcation points, solitons, logistic maps, Poincaré and Henon iterative maps, fractals, Mandelbrot and Julia sets, chaos in complex dynamical systems.

MAE 663 - ASTRODYNAMICS

Semester Hours: 3

Astronomical coordinates and time systems; the many-body problems and disturbing functions. General perturbation methods, and application of classical mechanics and Hamilton-Jacobi methods to orbital mechanics.

MAE 664 - ROBOTICS I

Semester Hours: 3

This course prepares students to analyze three-dimensional coordinate transforms, three-dimensional kinematic and dynamic modeling of multi-body systems, as applied to robotic manipulators. Topics are: Spatial descriptions and transformations, manipulator kinematics, inverse manipulator kinematics, Jacobians: velocities and static forces, manipulator dynamics, trajectory generation.

MAE 665 - ROBOTICS II

Semester Hours: 3

This course prepares students to analyze advanced robotic systems, as applied to redundant robots (highly flexible robots acting like an elephant trunk), mobile robots (self-driving cars), unmanned surface vessels (boats/ships), and unmanned aerial vehicles (drones). Topics are: Redundant and hyper-redundant manipulators, applied nonlinear control for manipulators, obstacle avoidance and path planning in 2D workspace for mobile robots, kinematics and control of mobile robots, marine robotic surface vessels dynamic modeling and control, aerial robotic vehicles dynamic modeling and control.

MAE 671 - CONTINUUM MECHANICS

Semester Hours: 3

Kinematics and kinetics, various coordinate systems, constitutive equations for continuous media; governing partial differential equations from first and second laws of thermodynamics; applications to solids, liquids, and gases. (Same as CE 671.).

MAE 672 - ELASTICITY

Semester Hours: 3

Formulation of boundary-value problems of classical elasticity. Application to plane problems, prismatic members, and axisymmetric problems. Introduction to three-dimensional problems. (Same as CE 672.).

MAE 673 - PLASTICITY

Semester Hours: 3

Fundamentals of mechanical behavior of metals and nonmetals for stress states greater than the yield stress state. Deformation and flow theories. Stress-strain relations and yield criteria. Solution of boundary value problems with plastic bodies. Limit analysis of structures. (Same as CE 673.).

MAE 674 - FINITE ELEMENT ANALYSIS I

Semester Hours: 3

Finite element theory, variational methods, weighted residuals; applications to linear partial differential equations in continuous media; solution of boundary-value and initial-value problems. (Same as CE 674.).

MAE 676 - VISCOELASTICITY

Semester Hours: 3

Mechanical behavior of materials having time-dependent and temperature-dependent material properties. Creep and relaxation phenomena. Elastic-viscoelastic analogies. Formulation of stress-strain laws. Solution of boundary value problems for viscoelastic bodies. (Same as CE 676.).

MAE 677 - OPTICAL TECH IN SOLID MECH

Semester Hours: 3

Overview of conventional methods for experimental stress analysis. Introduction to applied optics with emphasis on non-destructive, laser-based testing methods, fiber optic recording systems, photoelectronic-numerical data acquisition, and computer aided analysis. (Same as CE 677.).

MAE 678 - MECH COMPOSITE MATERIALS

Semester Hours: 3

Introduction to composite materials, micro- and macro-mechanical behavior of laminae; bending, buckling and vibration of laminated plates. (Same as CE 678.) Prerequisites: MAE 671 and MAE 672.

MAE 680 - PERFORMANCE FLIGHT TESTING

Semester Hours: 3

Fundamentals of rotorcraft test and evaluation. Topics include: test planning, requirements analysis, helicopter performance evaluation, fundamentals of propulsion testing, aviation safety, use of modeling and simulation in flight testing, Department of Defense and Federal Aviation Administration requirements and procedures.

MAE 681 - MISSILE TRAJECTORY ANALYSIS

Semester Hours: 3

Methods for generating trajectories of missiles and projectiles are studied as well as control mechanisms. Point mass approximations are developed using approximations and exact representations of drag and atmospheric conditions. Full six degree-of-freedom models are developed and solved numerically. Aerodynamic models are developed for both slowly spinning missiles and spin stabilized projectiles. Projectile linear theory is developed and used to discuss gyroscopic and dynamic stability and introduce rapid trajectory generation. Prerequisite: MAE 580.

MAE 683 - GRAD SEMINAR MECH ENGR

Semester Hour: 1

Professional activities designed to promote the skills required to organize and deliver oral technical presentations and to broaden the individual's awareness of technical issues. Required for all students pursuing a graduate degree. Students will be graded 'S' (satisfactory) or 'U' (unsatisfactory) based upon their performance and attendance. Students who do not receive an 'S' grade must register for the course until an 'S' is obtained.

MAE 684 - AEROSPACE SYSTEMS SEMINAR

Semester Hour: 1

Seminar course for students in the MSE (Aerospace) Rotorcraft Systems Engineering and Missile Systems Engineering programs of study. Students participate in seminars on specific aspects of rotorcraft and missile systems engineering including system integration, modeling and simulation, operations, and advanced technologies.

MAE 692 - GRAD ENGR ANALYSIS I

Semester Hours: 3

Ordinary differential equations (ODEs), Bessel functions, Legendre polynomials, Laplace transformations, simultaneous differential equations, application of ODEs to mechanical systems, partial differential equations (PDEs) and boundary-value problems, application of PDEs to mechanical systems.

MAE 693 - GRAD ENGR ANALYSIS II

Semester Hours: 3

Green's functions, Fourier series and integrals, linear algebra, vectors, vector analysis and integral theorems, introduction to tensor analysis, analytical functions of a complex variable, Taylor and Laurent expansions, the residue theorem, stability criteria, and Calculus of Variations. Prerequisite: MAE 692.

MAE 695 - SELECTED TOPICS MECH & AERO EG

Semester Hours: 1-9

MAE 696 - GRAD INTERN MECH & AERO ENGR

Semester Hours: 1-9

Active involvement in an engineering project in an engineering enterprise, professional organization, or government agency that has particular interest and relevance to the graduate student. Permission of MAE faculty member required.

MAE 698 - PLAN II MASTER'S PAPER

Semester Hours: 3

Required Plan II paper for a Plan II Masters degree. Completion of 18 semester hours of graduate course work required.

MAE 699 - MASTER'S THESIS

Semester Hours: 1-9

Required each semester in which a student is working and receiving direction on a master's thesis. Minimum of two semesters and 6 hours required for M.S.E. students. A maximum of 9 hours of credit is awarded upon successful completion of master's thesis. Requires thesis advisor permission. The 1 hour option is only available to students who have successfully defended their thesis and submitted it for approval, but do not meet the deadlines for graduation in the semester submitted. Students may only use the 1 hour option once in their career.

MAE 723 - COMPUTATIONAL FLUID DYNA II

Semester Hours: 3

Continuation of Computational Fluid Dynamics I, advanced topics in finite difference, finite element, finite volume, and spectral element methods. Prerequisite: MAE 623.

MAE 724 - COMPUTATIONAL FLUID DYNAMI III

Semester Hours: 3

Grid generation techniques with structured and unstructured meshes, adaptive meshes, domain decompositions, and parallel processing. Applications of generated meshes to any one of the following problems: turbulence, combustion, acoustics, radiation, multiphase flows, or magnetohydrodynamics. Prerequisite: MAE 723.

MAE 726 - ROTORCRAFT COMPUT FLUID DYNA

Semester Hours: 3

Full potential, Euler, Navier-Stokes approaches, structural and unstructured grids, wake capturing, turbulence, and acoustics.

MAE 740 - AEROTHERMODYNAMICS

Semester Hours: 3

Description of the dynamic and thermal fluid flow environments associated with hypervelocity vehicles and propulsion systems with emphasis on thermochemical nonequilibrium behavior. Topics include thermostistical basis for internal energies, specific heats and shock strengths in dissociated and ionized gases; formulation of reacting flow conservation equations; and recent experimental advances in aerothermodynamics.

MAE 741 - STATIS THERMODYNAMICS

Semester Hours: 3

Statistical ensembles; Maxwell-Boltzmann, Bose, Einstein, and Fermi-Dirac statistics. Application of statistical mechanics to thermodynamic processes. Information theory and its formalism.

MAE 745 - COMBUSTION II

Semester Hours: 3

Droplet evaporation and burning, introduction to turbulent flow, turbulent diffusion and premixed flames, burning of solids, pollutant emissions, and detonation. Prerequisite: MAE 645.

MAE 746 - CONVECTIVE HEAT TRANSFER

Semester Hours: 3

Advanced theory of convective transport processes in fluids, including transport of momentum and energy in laminar flow, boundary layers and turbulent transport in shear flow. Engineering applications include boiling and two phase processes.

MAE 748 - RADIATIVE TRANSFER

Semester Hours: 3

Physics and modeling of radiative transfer. Scattering, remote sensing, and absorption in participating media. Infrared through optical wave lengths. Computational methods in radiative transfer.

MAE 749 - MASS TRANSPORT

Semester Hours: 3

Mass transfer in solid and fluid systems under steady and transient conditions. Integration of momentum, heat and mass transfer equations with application to reactive, rheological and multicomponent systems.

MAE 751 - BOUNDARY LAYER THEORY

Semester Hours: 3

Development of boundary layers using singular perturbation theory. Curvature and compressible effects and the order of their importance. Modern applications and computational approaches.

MAE 752 - MECH OF RARIFIED GASES

Semester Hours: 3

Application of kinetic theory to rarefied gas-flow problems. Boltzmann statistical distribution; gas-surface interaction, transport properties, free molecule flow; heat-free molecule flow; procedures for non-equilibrium flows. Offered upon demand.

MAE 753 - MAGNETO-GAS DYNAMICS

Semester Hours: 3

Equations of motion for ionized gases with critical analysis of transport properties in steady and varying electric and magnetic fields. MHD shock waves and radiation effects.

MAE 754 - HYPERSONIC FLOW

Semester Hours: 3

Theories for treating the laminar and turbulent boundary layers of reacting fluids, mixtures, related chemical, thermodynamic, and physical phenomena in hypersonic flows. Leading edge bluntness, shock wave interactions, and vorticity effects.

MAE 755 - ADVANCED AERODYNAMICS

Semester Hours: 3

Transonic, supersonic, and hypersonic flows. Application of compressible potential theory, similarity rules, slender body theory and Newtonian flow theory to the analysis of aerodynamics of aircraft, missiles, re-entry vehicles, and other flight vehicles.

MAE 756 - NUM SIM OF MAGNETOHYDRODYNAMIC

Semester Hours: 3

Finite difference methods for simulation of MHD flows. Methods include explicit scheme, FICE methods, LBL, ADI, artificial damping and projected characteristics for multidimensional timedependent flow.

MAE 757 - OPT TECH/FLUID MECHANICS

Semester Hours: 3

Laser sources, molecular interactions with light and diatomic spectroscopy needed fluorescence, Brillouin scattering, four wave mixing, CARS and other applications in optical fluid diagnostics. (Same as CHE 757.).

MAE 758 - TURBULENCE

Semester Hours: 3

Turbulence in gases and liquids; boundary layers, atmospheric phenomena. Prerequisites: MAE 651 and MAE 671.

MAE 760 - ANALY METH NONLIN DYNAM

Semester Hours: 3

Application of averaging methods and perturbation methods to vibrations of nonlinear systems. Analysis of linear systems with periodic coefficients (Floquet theory). Elements of stability theory, Liapunov functions, and Liapunov's direct method. Prerequisites: MAE 660 and MAE 661.

MAE 762 - WAVE MOT/CONT ELAS BODIES

Semester Hours: 3

Elements of stress wave propagation in bounded elastic media. Propagation of elastic waves in infinite and semi-infinite bodies, cylinders, rods and beams. (Same as CE 762.).

MAE 765 - RANDOM VIBR/ELASTIC SYSTEMS

Semester Hours: 3

Dynamic analysis of elastic systems including the response of complex structures to random excitations. Typical excitations include random wind, thermal, earthquake, aerodynamic, and ocean wave phenomena. Probabilistic mechanics methods. Concepts of reliability. Stationary and ergodic processes.

MAE 768 - DYN AEROSPACE VEHICLES

Semester Hours: 3

Elements of advanced rotational kinematics of rigid bodies. Attitude motion of space vehicles in circular and elliptic orbits. Methods of gravitation and spin stabilization of gyrost.

MAE 772 - THEORY STRUCT STABILITY

Semester Hours: 3

Energy criterion for stability of elastic structure under conservative loading. Stability concept for general continuous systems. Rigorous and approximate methods of analysis. Buckling of structural elements under impulsive and nonconservative loading. Postbuckling behavior. Prerequisite: MAE 671.

MAE 773 - THEORY OF SHELLS

Semester Hours: 3

Analysis of thin plates and shells including higher order approximation theories and transverse shear deformations. Illustration of theories by selected problems. (Same as CE 773.).

MAE 774 - FINITE ELEM ANALY II

Semester Hours: 3

Advanced topics in finite element analysis; application to nonlinear partial differential equations in continuum mechanics; theoretical studies of convergence and stability of solutions. (Same as CE 774.) Prerequisite: MAE 674.

MAE 776 - TH FIN ELAST FIN VISCOEL

Semester Hours: 3

Theory of finite deformation analysis for elastic and viscoelastic materials. Constitutive models are developed for a functional analysis approach leading to models based on the Cauchy-Green Deformation Tensor and the Strain Energy Density Function. Models discussed include: Mooney-Rivlin and Bernstein-Kearsley-Zappas.

MAE 778 - FRACTURE MECHANICS

Semester Hours: 3

Theory of crack propagation, stress intensity factors, mapping techniques, series expansion, asymptotic approximations, field singularities, integral transforms, numerical solutions. (Same as CE 778.) Prerequisite: MAE 672.

MAE 780 - THEORY OF ACOUSTICS

Semester Hours: 3

Simple harmonic oscillators, damped and forced oscillators, 1-D wave equation, vibration of a string, 2-D wave equation, vibration of membranes, the acoustic wave equation, plane waves, cylindrical and spherical waves, reflection and transmission, radiation and reception of acoustic waves, absorption and attenuation of sound, cavities and wave guides, and architectural acoustics. Prerequisite: MAE 692.

MAE 781 - NONLINEAR EFFECTS/PLASMA

Semester Hours: 3

Fundamental physical concepts and methods of estimating various nonlinear interactions in plasmas. Analytical and numerical methods to deal with these problems.

MAE 782 - PLASMA TURBULENCE

Semester Hours: 3

Methodology that deals with plasma turbulence together with current numerical techniques to solve these problems approximately, via super-computing.

MAE 795 - SELECTED TOPICS MECH & AERO EG

Semester Hours: 1-9

MAE 799 - DOCTORAL DISSERTATION

Semester Hours: 3-9

Required each semester student is enrolled and receiving direction on doctoral dissertation.

Music Applied (MUA)

MUA 511 - STUDIO INSTR - VOICE

Semester Hour: 1.5

For Music Majors' principal instrument.

MUA 521 - STUDIO INSTR - ORGAN

Semester Hour: 1.5

For Music Majors' principal instrument.

MUA 531 - STUDIO INSTR - PIANO

Semester Hour: 1.5

For Music Majors' principal instrument.

MUA 551 - STUDIO INSTR - STRINGS

Semester Hour: 1.5

For Music Majors' principal instrument.

MUA 561 - STUDIO INSTR - WOODWINDS

Semester Hour: 1.5

For Music Majors' principal instrument.

MUA 571 - STUDIO INSTR - BRASS

Semester Hour: 1.5

For Music Majors' principal instrument.

MUA 581 - STUDIO INSTR - PERCUSSION

Semester Hour: 1.5

For Music Majors' principal instrument.

MUA 598 - GRADUATE RECITAL

Semester Hour: 1.5

For Music Majors' principal instrument. Prerequisite: One of the following: MUA 511, MUA 521, MUA 531, MUA 551, MUA 561, MUA 571, MUA 581.

Music Education (MUE)

MUE 527 - TEACHING GENERAL MUSIC

Semester Hours: 3

Materials and methods. Emphasis on developing teaching competencies in general music, with an emphasis on the elementary school level.

Prerequisite: MU 301.

MUE 528 - VOCAL/CHORAL METH SEC SCH

Semester Hours: 3

Includes principles of breathing, posture and resonance; repertoire for both vocal and choral students; organizational methods for leading choral programs, rehearsal techniques; classroom management skills.

Music Ensembles (MUX)

MUX 591 - UAH CHAMBER CHOIR

Semester Hour: 1

Preparation of the finest literature for choral forces. Open to all students by audition with the conductor. Required attendance at rehearsals and performances. Ensemble participation is essential for all music majors and minors, and music majors are expected to participate in an appropriate ensemble each semester the student is enrolled for degree requirements.

MUX 599 - UAH WIND ENSEMBLE

Semester Hour: 1

Preparation of the finest literature for wind ensemble and concert band. Open to all students by audition with the conductor. Required attendance at rehearsals and performances. Ensemble participation is essential for all music majors and minors, and music majors are expected to participate in an appropriate ensemble each semester the student is enrolled for degree.

Nursing (NUR)

NUR 500 - SPECIAL TOPICS

Semester Hours: 2-4

Advanced study of selected area of interest in nursing.

NUR 518 - GLOBAL HEALTH: INTERN'L STUDY

Semester Hours: 3

This course will focus on a selected international health care system. The international system will be compared with the US Health Care System in relation to economic, social, cultural, policy, and environmental influences. Culmination of the course will center on international experiences with health care facilities, policy making bodies, historical, and cultural introductions in another country.

NUR 524 - HEALTH CARE AND THE LAW

Semester Hours: 3

Introduction to basic health law in the context of application to nursing practice. Content relates to involvement with legal principles in nursing and healthcare. Federal, state and local aspects of law are included. (Cross listed with NUR 424).

NUR 525 - HUMAN SEXUALITY

Semester Hours: 3

Theory and issues related to human sexuality in health and illness. Emphasis on theory and values, clarification of human sexuality needs. Elective, open to all university students. (Cross listed with NUR 425).

NUR 527 - INTRO TO FORENSICS IN NURSING

Semester Hours: 3

This course is designed to provide basic theoretical knowledge related to nursing care of the donor/transplantation client and their families. Course content focuses on historical and current issues in donor/transplantation nursing including the impact of legal, ethical, political, economic, and socio-cultural issues. Students will examine the roles of the professional nurse and the interdisciplinary team in the management of care for the donor/transplant client and their families. Topics of future research and critical thinking will be discussed.

NUR 528 - GERONTOLOGICAL NURSING

Semester Hours: 3

Nursing care of older adults in multiple settings. Issues and trends are incorporated.

NUR 534 - PALLIATIVE CARE

Semester Hours: 3

Palliative care is when there is no longer a medical treatment or cure for a physical problem. This palliative care course includes meeting the physical, emotional, social, cultural, and spiritual needs of individual and their families. A course focus will be on coping, grief, bereavement, pain relief and managing living implications for individuals with life-threatening illnesses. There will be recognition of the importance of individuality, vulnerability, and resilience in the quality of living during the dying process.

NUR 537 - NURSING AS A POLITICAL FORCE

Semester Hours: 3

The course explores the historical, current, and future impact of nursing on the political process. Local, state, national, and international aspects of nursing as a political force are analyzed. Emphasis is on political systems, regulatory processes, and organizational issues influencing health care delivery. Elective, open to all university students.

NUR 539 - NURSING MEDICAL MISSIONS

Semester Hours: 3

This course will focus on global health and humanitarian concepts and issues, and the nursing care needed to impact those issues. These issues will be examined and analyzed in relation to the mission country's economic, social, cultural, policy, and environmental influences. Culmination of the course will center on international experiences with supervised nursing care for a medical mission in another country. This course is an accepted elective in the Nursing Program. Additional work is required for graduate credit.

NUR 540 - ONCOLOGY NURSING

Semester Hours: 3

This course provides a holistic approach to the nursing care of people with cancer. The nursing process is used as the basis for promoting health and facilitating adaptation in the person with cancer. The course includes clinical experiences in selected agencies.

NUR 550 - ISSUES IN TRANSPLANTATION

Semester Hours: 3

This course is designed to provide basic theoretical knowledge related to nursing care of the donor/transplantation client and their families. Course content focuses on historical and current issues in donor/transplantation nursing including the impact of legal, ethical, political, economic, and socio-cultural issues. Students will examine the roles of the professional nurse and the interdisciplinary team in the management of care for the donor/transplant client and their families. Topics of future research and critical thinking will be discussed.

NUR 602 - SCHOLARLY INQ ADV NUR PRAC

Semester Hours: 3

This course explores research methods, evidence-based practice, ethical research and frameworks to guide scholarly inquiry. The learner will analyze quality improvement studies, clinical practice guidelines, and research studies. Synthesis of learning will involve developing a clinical question, evaluating evidence, and disseminating an interprofessional scholarly product with practice recommendations.

NUR 605 - ADVANCED HLTH ASSESSMENT

Semester Hours: 3

This course provides an opportunity for the advanced practice nurse to utilize theoretical and evidence-based clinical practice guidelines to conduct a comprehensive and systematic assessment as a foundation for decision making in caring for clients across the lifespan.

NUR 605L - CLINICAL

Semester Hours: 0

NUR 606 - ADV PATHOPHYSIOLOGY

Semester Hours: 3

Expands upon previous knowledge of anatomy, physiology, and developmental disease processes. Anticipated physiological alterations are discussed as they affect individuals throughout the lifespan.

NUR 607 - PHARMACOLOGY IN ADV PRAC

Semester Hours: 3

This course is designed to provide the advanced practice nursing student with clinical reasoning skills necessary to analyze data obtained from findings of the patient health history, advanced physical and pharmacological assessment of patients across the lifespan. The student will utilize the findings to determine the appropriate treatment regimen based on the individual needs of the patient.

NUR 610 - FAMILY NURSE PRACTITIONER I

Semester Hours: 6

This clinical course introduces the roles of the advanced practice nurse in direct and indirect health services for assessment, health promotion, illness prevention, and health management of patients across the lifespan. Prerequisite with concurrency: NUR 605, NUR 606 and NUR 607.

NUR 610L - CLINICAL EXPERIENCE

Semester Hours: 0

NUR 611 - FAM NURS PRACTITIONER II

Semester Hours: 6

This course encourages the advanced practice nurse to integrate principles of advanced practice nursing into broad organized, culturally appropriate planning, delivery, management, and evaluation in prevention and services of health through the lifespan/identified populations. Prerequisite: NUR 610.

NUR 611L - CLINICAL

Semester Hours: 0

NUR 612 - FAMILY NUR PRACTITIONER III

Semester Hours: 6

This course encourages the advanced practice nurse to define principles of advanced practice nursing including interventions that influence favorable health outcomes for common conditions through the lifespan/identified populations in collaboration with other health professionals. Prerequisites: NUR 611.

NUR 612L - CLINICAL EXPERIENCE

Semester Hours: 0

NUR 613 - FAM NURS PRACTITIONER IV

Semester Hours: 6

This is the culminating primary care clinical course in which the advanced practice student initiates and maintains effective working relationships, appraises policy development and systems organization, establishes respectful communication within inter-professional groups with skills and care coordination, delegation and conflict resolution. Prerequisite: NUR 612.

NUR 613L - CLINICAL EXPERIENCE

Semester Hours: 0

NUR 620 - ADLT GER ACUTE CR NUR PRACT I

Semester Hours: 6

Clinical course that introduces advanced nursing skills necessary for the assessment, health promotion, disease prevention, and health management of the complex, acute, critically and chronically ill patient across the entire spectrum of adulthood. Prerequisites with concurrency: NUR 602, NUR 605, NUR 606, NUR 607.

NUR 620L - CLINICAL EXPERIENCE

Semester Hours: 0

NUR 621 - ADLT GER ACUTE CR NUR PRACT II

Semester Hours: 6

This course allows the advanced practice nurse to refine principles of advanced practice nursing into the delivery of broad, organized, culturally appropriate planning, delivery, management, and evaluation of evidence based care of complex, acute critically and chronically ill diverse patients across the entire spectrum of adulthood. Prerequisites NUR 620.

NUR 621L - CLINICAL EXPERIENCE

Semester Hours: 0

NUR 622 - ADLT GER ACUTE CR NUR PRAC III

Semester Hours: 6

Establish competency and proficiency in the delivery of advanced practice nursing including comprehensive system and role integration. Prerequisites: NUR 621.

NUR 622L - CLINICAL EXPERIENCE

Semester Hours: 0

NUR 623 - ADLT GER ACUTE CR NUR PRAC IV

Semester Hours: 6

This is the culminating adult-gerontology acute care clinical course in which the advanced practice student initiates and maintains effective working relationships, establishes respectful communication within inter-professional groups with skills and care coordination, delegation and conflict resolution. Prerequisite: NUR 622.

NUR 623L - CLINICAL EXPERIENCE

Semester Hours: 0

NUR 629 - US HEALTHCARE SYSTEM

Semester Hours: 3

The focus of this course is to explore the structure and complexity of the US health care system. Content will include underlying values, major historical developments, reimbursement methods, stakeholders, and issues driving reform. Prerequisite w/ concurrency: NUR 630.

NUR 630 - FND CONCEPTS NURSING ADMINATOR

Semester Hours: 3

This course focuses on the Nurse Administrator's relationships and roles in a variety of health care systems. Theories of management and organization are analyzed from the perspective of structure, communication, dynamics, trends, and key management, responsibilities, and functions in health care delivery systems.

NUR 631 - LEADERSHIP HUMAN RESRC MGMT

Semester Hours: 3

This course focuses on the role of the nurse leader in resource allocation and management in health care systems and related organizations. Content related to human resource management includes workforce development, the healthcare workforce, recruitment, selection, retention, development, and labor relations.

NUR 632 - ECONOMIC AND POLICY IMPLICATIONS FOR LEADERS IN HEALTH CARE SYSTEMS

Semester Hours: 3

This course focuses on economic and financial implications for nurse administrators with emphasis on executive level budget management and business planning skills. The course is designed to assist nurse administrators in gaining conceptual knowledge regarding budgeting in health systems and policy factors impacting cost, quality and access to healthcare.

NUR 634 - INTERNSHIP IN NURS LEADERSHIP

Semester Hours: 3

This is the culminating course that provides opportunities to synthesize leadership learning, administrative theory, and operational skills in budgeting and finance, and resource management. This knowledge is applied through the identified nurse executive competencies in selected health care related organizations. Course objectives reflect the AONE competencies and QSEN standards. Clinical hours 3, Contact hours 135.

NUR 634L - CLINICAL EXPERIENCE

Semester Hours: 0

NUR 638 - INFORMATICS NRSE ADMINISTRATOR

Semester Hours: 1-6

The focus of this course is on the structuring and processing of health information for making decisions in health care.

NUR 640 - CURRICULUM DEV IN NURSING

Semester Hours: 3

Principles and concepts of curriculum development are examined with respect to their application to development of both the theoretical and clinical components of nursing programs. Includes principle regarding theories of learning, the changing nature of knowledge and societal needs as basic considerations directing curricular planning and revision.

NUR 641 - TEACHING/LEARNING IN NURSING

Semester Hours: 3

Emphasis is on the development of classroom and clinical laboratory teaching skills and includes a critical appraisal of specific teaching strategies. The student is provided the opportunity to acquire knowledge in the use and design of common and innovative teaching methods including web-based and interactive delivery systems.

NUR 642 - TESTING & EVALUATION IN NURS

Semester Hours: 3

Major emphasis on the development of classroom and clinical skills in appraisal and evaluation methods of student performance. The student is provided with the opportunity to acquire skills in constructing various types of testing and evaluation (formative and summative) procedures as they relate to nursing education.

NUR 643 - FACULTY ROLE DEV IN NURSING

Semester Hours: 3

Role theory serves as the basis for the discussion and practice in developing teaching, service and research role of a faculty member in a nursing program. Discussion on legislative and professional agencies issues and policies impinging on the teaching role.

NUR 644 - PRACTICUM IN TEACHING

Semester Hours: 3

Opportunities to do practice teaching with nursing students in various phases of their basic educational programs. Learning activities will be planned on an individual basis and based on the specific teaching responsibilities of their primary course assignment. Selected baccalaureate degree and/or associate degree programs will be used as practice sites. Prerequisites with concurrency: NUR 640, NUR 641, NUR 642.

NUR 645 - CAPSTONE NURS EDUC CERTIF CRS

Semester Hours: 3

The major emphasis of this capstone education course is the development of the professional teaching role within an institutional setting. The focus is on the student's ability to function as a professional leader utilizing knowledge gained to promote change, engage in professional activities; promote continuous improvement; and serve as a mentor in an educational environment. Prerequisites: NUR 640, NUR 641, NUR 642, NUR 643, NUR 644.

NUR 646 - INSTRUC TECH NURSING EDUC

Semester Hours: 3

The appropriate use of educational technology can afford faculty an opportunity to engage learners and bring concepts to life while supporting formative and summative assessment. This course will examine instructional technology, the design and integration of educational strategies, and methodological tools to engage learners to meet course and curriculum goals.

NUR 647 - STRATEGIC PLANNING

Semester Hours: 3

The focus of this course is to prepare Nursing Administration graduate students to comprehend and actively engage in organizational strategic planning. Emphasis is on the development of organizational blueprints, tracking current trends, forecasting, and innovative strategies in healthcare to achieve an organization's mission and vision, thus remaining competitive in the healthcare industry. Prerequisite w/ concurrency: NUR 630.

NUR 648 - CONCEPTS OF HLTH ASSMNT & PROM

Semester Hours: 3

This course focuses on concepts in health assessment and health promotion for individuals and populations. This course is designed for nurses preparing for leadership roles in health care organizations. Prerequisite w/ concurrency: NUR 630.

NUR 649 - QUALITY, SAFETY, & RISK MGMT

Semester Hours: 3

This course focuses on the quality, safety, and risk management concepts for nurse leaders. Content includes the use of quality tools and use of data to evaluate and promote quality outcomes. Prerequisite w/ concurrency: NUR 630.

NUR 650 - INDEPENDENT STUDY

Semester Hours: 2-4

Planning, implementation, and evaluation of related phenomena of special interest observed in nursing practice.

NUR 670 - HUMAN FACTORS HEALTHCARE COMPU

Semester Hours: 3

Overview of epidemiologic methods with discussion of application to diagnosis and choice of therapy. Concepts and mechanisms related to transmission, acquisition of disease, trends and distribution of patterns of disease discussed. The application of epidemiology to human health problems and rural settings is emphasized. Prerequisite: NUR 638.

NUR 671 - USABILITY EVAL HEALTHCARE I.T.

Semester Hours: 3

This course examines usability methods for the design and testing of healthcare information technology including health information websites, electronic health records, clinical decision support systems, and medical equipment with an emphasis on the user experience. The iterative nature of user-centered design and usability testing of health IT will be emphasized. Prerequisite: NUR 679.

NUR 698 - PLAN II: OTHER RES ACTIVITIES

Semester Hours: 1-4

Application of activities appropriate to student program of study. Intended to expand student knowledge and enhance track specific content.

NUR 699 - PLAN I: THESIS

Semester Hours: 1-4

Independent research investigation related to practice of nursing under faculty guidance. Minimum of six hours required. Prerequisite: NUR 602.

NUR 700 - CLINICAL DATA MGT & ANALYSIS

Semester Hours: 3

This course provides students with the knowledge to understand, collect, manage, and measure clinical data. Students will explore data collection and management processes, level of measurement, basic statistics, and measurement for improvement in order to effectively use clinical data. Data entry exercises employed through analytical tools and statistical software packages will allow the students practice and apply the basic data management and analysis skills needed for the evaluation of clinical data and evidence-based practice.

NUR 701 - WRITING FOR PUBLICATION

Semester Hours: 3

This course concerns the development of skills in writing, editing, and preparing manuscripts for publication from initial idea to submission of a publishable manuscript. The course emphasizes a writing process that encourages productivity and collegial peer review. Legal and ethical aspects of authorship prepare students for responsible practices expected of scholars. Students should have mastered basic writing skills, e.g. grammar, syntax, and computer skills, prior to enrolling in this course.

NUR 729 - EVID BASED PRACT DESGN & TRANS

Semester Hours: 3

The purpose of this course is to provide students with models for evidence-based practice (EBP) design and improvement science. Students learn to formulate clinical questions in answerable format and search for and identify best research evidence. The focus of the course is to evaluate and critically appraise evidence for rigor and applicability to a clinical problem and the impact on the improvement of clinical outcomes. Students will translate evidence into practice environments for safe, quality care. Students will gain access to information that will support optimal clinical decision-making. All content and assignments are applied by the student to begin development of the DNP Project. Prerequisite: NUR 700.

NUR 731 - PHIL/THEOR/CONC FOUN FOR APN

Semester Hours: 3

This course assists students to use theory and conceptual models to guide the advanced nursing practice and scholarship at the doctoral level. The content is derived from the philosophical and scientific underpinnings of nursing, natural and psycho-social sciences. Prerequisite: NUR 701.

NUR 733 - INFORMATICS FOR APN

Semester Hours: 3

This course focuses on the collection, organization, and analysis of information in nursing and health care. Students are introduced to the speciality of nursing informatics, the information system life-cycle, telemedicine, and the use of technology to enhance nursing care delivery and patient safety. Students will also learn how to manipulate large and small patient databases for the analysis of patient outcomes. Prerequisite with concurrency: NUR 729.

NUR 734 - ADVANCED EXPERIENTIAL CLINICAL

Semester Hours: 1-7

This course is designed to validate Master's level competencies in clinical and organizational leadership. The course is required for post-master's DNP students who are graduates of Master of Science in Nursing program with less than 500 clinical hours.

NUR 735 - POPULATION HEALTH IN APN

Semester Hours: 3

This course prepares students to implement population-based health promotion and disease prevention activities. The course applies an epidemiologic framework and focuses on a spectrum of issues affecting health which includes emerging infectious diseases, emergency preparedness, disparities in health and healthcare services, and the impact of exposomics on population health. Prerequisite with concurrency: NUR 729.

NUR 737 - INTDIS LDRSH/ROLE DEV PRA EXC

Semester Hours: 3

This course focuses on organizational and systems leadership and skills critical to role development in independent and interprofessional practice. Content includes communication, conflict resolution, collaboration and negotiation, leadership, and team functioning to enhance the experience and outcomes of patient care and to reduce the cost of care.

NUR 738 - DNP PROJECT DEVELOPMENT

Semester Hours: 3

This course is designed to assist the student in finalizing the DNP project plan and developing an application to the Institutional Review Board (IRB) for the protection of human subjects. The student will document previously acquired abilities and competencies in a professional portfolio. Students will participate in the seminar sessions to obtain guidance and receive peer suggestions about the portfolio and project plans. Prerequisites: NUR 734, NUR 742 and NUR 743.

NUR 739 - DNP PROJECT

Semester Hours: 1-7

The DNP project is planned, implemented, and evaluated by the DNP student in consultation with the DNP committee. The student writes a manuscript suitable for publication and makes a scholarly presentation of findings to peers and faculty. A minimum of seven credit hours for this course are distributed across several semesters as determined by the chair. Prerequisite with concurrency: NUR 738.

NUR 740 - HLH POLIC/POLIT:IMPLICATION HC

Semester Hours: 3

This course focuses on the unique challenges of engaging and influencing health care policy at local, state, national or international levels. It is designed to develop skills, techniques, and approaches to the critical analysis of health policy proposals, health policies, and to identify stakeholders in policy development. The health policy framework is analyzed from a governmental, institutional, and organizational perspective. Prerequisite: NUR 729.

NUR 742 - PROGRAM EVAL & METHODS

Semester Hours: 3

The purpose of this course is to synthesize knowledge related to translation/implementation science models and strategies to improve health outcomes. The emphasis in the course is the use of program evaluation as a tool to achieve positive changes in health status, initiate and manage quality improvement, engage in risk anticipation, and facilitate organizational and system level changes. Prerequisite with concurrency: NUR 729.

NUR 743 - EVID BASED PRACT STRATEGIES

Semester Hours: 3

This course expands on evidence-based design to refine a problem statement a clinical question. Content includes conducting a systematic review of the literature to guide the selection of methods, strategies, tools and metrics needed to complete a successful DNP project. Students will develop and have approved a proposed DNP project plan. Prerequisite: NUR 742.

Nursing Science (NUS)

NUS 750 - PHILOSOPHY OF SCIENCE

Semester Hours: 3

The purpose of this course is to explore the evolution of philosophy and science. Epistemology, knowledge generation, knowledge acquisition, and ways of knowing will be examined. Scientific inquiry will include reasoning, logic, and persuasive argument development.

NUS 752 - INFORMATICS HEALTHCARE SCH INQ

Semester Hours: 3

The purpose of this course is to prepare nurse scientists to use informatics, electronic tools, and healthcare technologies for the purposes of nursing research. The course will focus on the use of informatics in the data management of individuals, groups and organizations as the nurse scientist plans and executes a program of research.

NUS 754 - ETHICAL CONDUCT LGL RESEARCH

Semester Hours: 3

The purpose of this course is to introduce the student to doctoral scholarship in support of beginning a program of responsible conduct of research. This course explores current ethical and legal issues in the science of nursing research. The course will delve into best practices in research design with regard to ethics, authorship, data management and record keeping, intellectual property and ownership of data, and human subjects research. In addition, the course will cover conflicts of interest, mentoring, collaborations, peer review, research misconduct, and current ethical issues in research.

NUS 756 - APPL OF THEORETICAL MODELS

Semester Hours: 3

The purpose of this course is to provide students a foundation for contributing to theory development processes, analyzing and critiquing theoretical foundations of research, and applying theoretical models to nursing research. This course addresses the relationship between theory and research and provides an understanding of the use of theoretical models and conceptual foundations to guide nursing research and practice. Prerequisites: NUS 750.

NUS 758 - QUANTITATIVE RESEARCH METHODS

Semester Hours: 3

This course provides students with foundational knowledge and skills in the development of experimental and nonexperimental quantitative designs. Topics will include training in the choice of research questions/aims/hypotheses and a responsive approach; the development of an ethical, strategic design; the implementation of a strategic sampling plan; the choice of suitable measurements (reliable and valid) and analytic plans; issues in research such as treatment fidelity; and the drafting of research proposals. Additional content will briefly introduce more advanced concepts such as mixed methods research or community-based participatory research. Special emphasis will be placed on clinical nursing designs, such as repeated-measures intervention studies. Prerequisites: NUS 750.

NUS 760 - STATISTICS I

Semester Hours: 3

The purpose of this course is to provide the student with the skills to conduct and interpret statistical data. Emphasis will be placed on describing types of variables, testing hypotheses, selecting appropriate parametric and nonparametric statistical tests, analyzing data, and interpreting results. Prerequisite: NUS 758.

NUS 762 - HLTH POLICY UNDERSERVED POPUL

Semester Hours: 3

The purpose of this course is to explore the policy environment that influences and shapes public health and health care service delivery, including rural and medically underserved communities. Students will develop skills, techniques, and approaches to identify gaps, critically analyze and research health related issues. Utilization and delivery of data to promote and impact healthcare policy changes will be an important measure of outcome. Students will develop the ability and confidence to critically assess current health policy issues in a thoughtful, comprehensive and rigorous manner and to engage in the policy process.

NUS 764 - SCIENTIFIC WRITING

Semester Hours: 3

The purpose of this course is to develop writing skills to produce scientific writing that is clear, concise, and logical. This course will also explore the publication to include abstract and manuscript development and the submission process. Additional pathways to dissemination of nursing content will be explored as well.

NUS 766 - EPIDEMIOLOGY RURAL POP

Semester Hours: 3

The purpose of this course is to introduce epidemiological methods for measuring population health, designing and implementing observational and experimental studies, critically reading the public health literature, and applying research findings to global and community health. Prerequisite: NUS 760.

NUS 768 - STATISTICS II

Semester Hours: 3

This course provides advanced coursework in applied statistical approaches to data management and analysis. With an emphasis on multivariate statistical approaches, the purpose of the course is to help nursing students to develop improved skills in conceptualizing, executing, analyzing, and interpreting advanced analytic strategies and to enhance their ability to propose strong, tailored analytic approaches for specific study designs and research aims. Students will also gain proficiency in using R software, a freely available and powerful statistical package. They will enhance their knowledge of regression, OMANOCOVE, MANOVA/MANCOVA, discriminant analysis, exploratory and confirmatory factor analysis, structural equation modeling, multilevel modeling, and advanced categorical approaches. Understanding the mathematics, logic, application of these techniques is emphasized. Prerequisite: NUS 760.

NUS 770 - GRANT WRITING

Semester Hours: 3

The purpose of this course is to prepare students in the foundations of writing grants for federal external funding. This course will help students identify a step-wise process to develop a grant proposal through federal funding sources. Strategies for successful grant writing include identifying funding sources for the topic, writing a competitive grant application, developing a collaborative team of researchers for the project, and understanding the review process. Prerequisite: NUS 764.

NUS 772 - QUALITATIVE RESEARCH METHODS

Semester Hours: 3

The purpose of this course is to assist the student in using selected qualitative research methods. Learning modules will explore qualitative approaches, sampling, data collection, data analysis and dissemination. The course will review and explore the use of technology to assist the qualitative researcher. Prerequisites: NUS 750, NUS 756, and NUS 758.

NUS 776 - ADVANCED RESEARCH METHODS

Semester Hours: 3

The purpose of this course is to assist the student in developing the knowledge and skills to design a mixed methods study. The course will explore a nursing phenomenon using both quantitative and qualitative research methods. The student will utilize prior work developed in the previous research methods courses. This course will culminate in a developed prospectus that will be presented to a dissertation committee. Prerequisites: NUS 752, NUS 758, NUS 760, NUS 768, and NUS 772.

NUS 780 - INTRODUCTION TO OMICS

Semester Hours: 3

The purpose of this course is to introduce the revolution of omics and discuss the role nurse scientists can play in precision health development. Nurse scientists are in a position to provide a unique contribution to person-centered health approaches by broadening their understanding of molecular advances to improve health outcomes. A variety of different omics will be explored and the practical advantages, limitations, and challenges in individualized health promotion will be discussed.

NUS 781 - OMICS IN NURSING RESEARCH

Semester Hours: 3

The purpose of this course is to provide an overview of advanced concepts of omics research by utilizing a biobehavioral systems approach in nursing science. The National Institute of Nursing Research's strategic plan for Genomic Nursing Science is used as the framework for integrating omics and nursing research. Practical application in omics theories, methodologies, technology, bioinformatics, and responsible conduct of research is discussed. Additionally, resources in building capacity for the next generation of omics scientists are review. Prerequisite: NUS 780.

NUS 782 - CURRIC DEV PROG EVL FOR NUR ED

Semester Hours: 3

The purpose of this course is to examine the procedures for designing, implementing, and evaluating nursing education curriculum. The process will be examined beginning with the program mission. Educational theories, philosophy, concepts, and program evaluation will be explored. The nurse educator's role in curriculum design and program evaluation is assessed.

NUS 783 - INSTR MTHD ASSESS IN NURS ED

Semester Hours: 3

The purpose of this course is to discover teaching styles and implement instructional technologies to promote learning in diverse populations of students. Throughout the semester, students will explore didactic and clinical learning activities and evaluation strategies to demonstrate transfer of learning. Prerequisite: NUS 782.

NUS 784 - DATA SCIENCE EMERGING TECH HLT

Semester Hours: 3

The purpose of this course is to apply concepts associated with data analytic methods and the use of burgeoning technologies in healthcare. The course prepares the nurse scientist to engage with other researchers in the areas of data analytics, simulation, telehealth, and robotics. The appropriate integration of health care technologies to support nursing research will be emphasized.

NUS 785 - R&D INNOV HEALTHCARE TECH

Semester Hours: 3

The purpose of this course is to develop the scientific skills to move an idea from concept to product following a research and development (R&D) process. The course prepares the nurse scientist to engage with researchers inside and outside health care fields, solicit input from end-users early and often, create patentable intellectual property, and fund the development of products with federal grants or investors. Prerequisite: NUS 784 or permission of professor.

NUS 798 - COMPETENCY ASSESSMENT

Semester Hours: 0

NUS 799 - DOCTORAL DISSERTATION

Semester Hours: 1-9

Optical Science Engineering (OSE)

OSE 506 - COMMUNICATION THEORY

Semester Hours: 3

Review of elementary signals and systems including the Hilbert transform, cross and auto correlation, power density spectrum, and the Wiener-Khinchine theorem. Butterworth and Chebyshev lowpass filters. Bandpass signals and systems. The lowpass equivalent of a bandpass signal/system. Commonly used forms of linear and nonlinear modulation. Demodulation methods and circuits. Phase lock and frequency feedback techniques.

OSE 534 - OPTICAL FIBER COMMUNICATIONS

Semester Hours: 3

Introduction to optical fibers and their transmission characteristics, optical fiber measurements, sources and detectors, noise considerations for digital and analog communications, optical fiber systems.

OSE 541 - GEOMETRICAL OPTICS

Semester Hours: 3

Foundations and physics of geometrical optics, Fermat's principles and Huygen wavelets, refraction and reflection. The many forms of Snell's Law. Optical path lengths, geometrical wavefronts and rays. Ray tracing, ynu-chart and matrix methods. Gaussian imagery and paraxial optics, conjugate elements, cardinal points, and image-object relations. Stops and pupils, chief and marginal rays, vignetting, and the optical or Lagrange invariant. The y-bar diagram, design of common systems: objectives, magnifiers, microscopes, collimators and detectors. Optical glasses and chromatic aberrations, wavefront and transverse aberrations, spot diagrams and ray fan plots.

OSE 542 - PHYSICAL OPTICS

Semester Hours: 3

Scalar and electromagnetic waves, polarization, coherence, reflection and refraction; two beam and multiple beam interference, interferometers, Fabry-Perots, thin films, diffraction, and absorption and dispersion. (Same as OSE 542 and EE 542.) Fall, Spring.

OSE 546 - RADIOMETRY, DETECTORS & SOURCE

Semester Hours: 3

Theory and practice of radiometry and photometry. Blackbody radiation and Lambertian sources. Propagation of radiant energy in free space and through optical systems. Detector classes, responsivity, bandwidth and noise, power spectral density, properties of sources, photon noise.

OSE 555 - INTRO QUANTUM MECHANICS I

Semester Hours: 3

Waves and particles; Bohr's model of the atom; de Broglie waves, wave packets and the uncertainty principle; postulates of quantum mechanics; Schrodinger's equation; simple systems in one, two and three dimensions; the hydrogen atom.

OSE 570 - OPT & PHOTONIC SYSTEMS DESIGN

Semester Hours: 3

Review of paraxial optics, ray tracing codes, aberration and diffraction calculations; acousto- and electro-optic modulators, spatial light modulators; fibers, fiber splicers and connectors; gratings and diffractive optical elements; laser and light emitting diodes, photodetectors and CCD arrays; correlator systems; optical communication networks; signal processing systems design.

OSE 632 - FOURIER OPTICS

Semester Hours: 3

Introducing the optical system as an invariant linear system, convolution, Sommerfield's diffraction integral, Fourier Transform, angular spectrum, coherent & incoherent imaging, optical transfer function.

OSE 634 - OPTICAL COMMUNICATIONS

Semester Hours: 3

Optical communication systems; counting statistics; the optical detector response process; direct detection; heterodyne detection parameter estimation in optical communications; pointing, spatial acquisition and tracking.

OSE 645 - LASERS

Semester Hours: 3

Resonant optical cavities. Atomic radiation. Laser oscillation and amplification. General characteristics of lasers. Laser excitation. Semiconductor lasers. Gas discharge phenomenon. Transition rates. Spectroscopy of common lasers. Detection of optical radiation.

OSE 653 - OPTICAL TESTING LAB

Semester Hour: 1

Provides students with hands-on experience via the in-depth testing of an aerial reconnaissance photographic lens. The main measurement tools are a 168-inch Collimator/T-Bar nodal slide for image plane measurements, and a Fizeau phase shifting interferometer for exit pupil measurements. Measurements include: effective focal length, F-number, axial color, spherical aberration, field curvature, distortion, astigmatism, transmission, relative illumination falloff, resolution, modulation transfer function, on-axis interferometry, fringe analysis. Prerequisite: OSE 654.

OSE 654 - OPTICAL TESTING

Semester Hours: 3

Spherometry; refractive index measurements; optical bench measurements of imaging systems via T-bar nodal slide (effective focal length, f-number, axial color, field curvature and distortion, transverse ray aberrations); illumination falloff; image resolution tests (finite object); modulation transfer function; star image testing; knife edge tests; Hartmann tests; Fizeau interferometer and testing configurations; null lens testing of aspheres; wavefront measurements (point diffraction interferometer, radial shear interferometer). Prerequisites: OSE 541 and OSE 542.

OSE 655 - APPLIED QUANTUM MECHANICS

Semester Hours: 3

Application of quantum mechanics in solid state, electronics, materials science and optics. Topics to include: Hydrogen atom and molecule, excitons, phonons, Bloch's theorem, periodic boundary conditions, electrons and holes, band structure of simple semiconductors, dipole transitions, optical constants, absorption and emission processes, introduction to device physics.

OSE 656 - LENS DESIGN

Semester Hours: 3

Design of refractive imaging systems. Skills acquired include thin lens pre-design, first and third order analytical methods, and computer-based design using Zemax. Designs include: Wollaston and Chevalier landscape lenses, a 10X microscope objective, the Rapid Rectilinear and Celor lenses, Cooke triplet and Petzval portrait lenses, and a telephoto lens. Prerequisites OSE 541 or EE 541 or PH 541 or Permission of Instructor.

OSE 670 - OPT DESIGN & MANUFACTURING

Semester Hours: 3

Practical aspects of optomechanical design, material selection, fabrication and integration of precision optical components and systems for commercial, space, and military application. Topics include: fixture design, tolerance analysis, machining methods, thermal stabilization, integrated computer-aided design and analysis, diamond machining, finishing and plating techniques.

OSE 690 - SEL TOPICS IN OPT SCI & ENGR

Semester Hours: 1-3

Sample topics include optical thin films and optical instrument systems analysis.

OSE 710 - OPTICAL SYSTEM DESIGN

Semester Hours: 3

Integrated view of what it actually takes to build a real optical system. All the tools of the ?trade? are utilized, including conceptual design and computer modeling (optical and mechanical), control system design, fabrication issues, cost/schedule and system testing. Use of geometric and physical optics, radiometry, sources and detectors, electro-optics controlled positioning and feedback, environmental influences, optical systems architecture, opto-mechanical design, precision optics fabrication technologies, optical metrology, and operational and survivability testing.

OSE 742 - OPTICAL SCATTERING THEORY

Semester Hours: 3

Scattering and absorption of radiation by particles with spherical symmetry and arbitrary shapes described using Maxwell's equations, vector Helmholtz equations, the Jones and Mueller calculus, and numerical techniques. Prerequisites: PH 631, or EE 609, or ATS 561.

OSE 755 - QUANTUM DEVICES

Semester Hours: 3

Quantum aspects of optical, electronic, and semiconductor devices approached from a phenomenological/physical point of view. Topics will include: Quantum well devices, optical modulators, optical detectors, quantum Stark effects, electrooptic devices, high speed optical devices, frequency chirping in high speed devices and system applications.

OSE 790 - SEL TOPICS IN OPT SCI & ENGR

Semester Hours: 1-3

Sample topics include optical thin films and optical instrument systems analysis.

OSE 792 - OSE SEMINAR

Semester Hours: 0

This 'brown bag' monthly seminar series is conducted jointly with the Huntsville Electro-Optical Society which sponsors the speakers. Presentations are given on a diverse range of optics and optics-related topics. All OSE students are expected to attend three of these seminars per semester.

OSE 799 - DOCTORAL DISSERTATION

Semester Hours: 3-9

Required each semester student is enrolled and receiving direction on a doctoral dissertation. The following optics courses are also available to students in the OSE program. See listings under indicated departments.

Physics (PH)

PH 531 - INTRO TO PLASMA DYNAMICS

Semester Hours: 3

Single-particle motion in magnetic fields; fluid equations and fluid theory wave modes; MHD theory, stability, and wave modes; introduction to kinetic theory and hot plasma wave modes. (Same as MAE 531).

PH 541 - GEOMETRICAL OPTICS

Semester Hours: 3

Foundations and physics of geometrical optics, Fermat's principles and Huygen wavelets, refraction and reflection. The many forms of Snell's Law. Optical path lengths, geometrical wavefronts and rays. Ray tracing, ynu-chart and matrix methods. Gaussian imagery and paraxial optics, conjugate elements, cardinal points, and image-object relations. Stops and pupils, chief and marginal rays, vignetting, and the optical or Lagrange invariant. The y-ybar diagram, design of common systems: objectives, magnifiers, microscopes, collimators and detectors. Optical glasses and chromatic aberrations, wavefront and transverse aberrations, spot diagrams and ray fan plots. (Same as OSE 541 and EE 541.) Fall.

PH 542 - PHYSICAL OPTICS

Semester Hours: 3

Scalar and electromagnetic waves, polarization, coherence, reflection and refraction; two beam and multiple beam interference, interferometers, Fabry-Perots, thin films, diffraction, and absorption and dispersion. (Same as OSE 542 and EE 542.) Fall, Spring.

PH 544 - OPTOELECTRONICS

Semester Hours: 3

Review of polarized light, the Jones and Mueller calculi. Propagation of light in birefringent material. Modulation of light using electro-optic effect, Kerr effect, acousto-optic effect, and Faraday effect. Elements of photodetection and detectors, signal processing, and signal-to-noise. Design and analysis of beam scanners, optical rf-spectrum analyzer, optical sensors, and optical communication systems. (Same as OPT 444 and OPE 451.) Fall even years.

PH 546 - RADIOMETRY, DETECTORS & SOURCE

Semester Hours: 3

Theory and practice of radiometry and photometry. Blackbody radiation and Lambertian sources. The propagation of radiant energy in free space and through optical systems. Detector classes, responsivity, bandwidth, and noise. Power spectral density, properties of sources, photon noise. (Same as OPT 446, OSE 546.) Spring even years.

PH 551 - QUANTUM MECHANICS I

Semester Hours: 3

Waves and particles; wave packets and the uncertainty principle; Schrodinger's equation and wave mechanics; postulates of quantum mechanics; simple systems in one, two and three dimensions; the hydrogen atom; angular momentum and spin; numerical solutions of the Schrodinger equation. Prerequisites require undergraduate quantum mechanics course(s).

PH 553 - INTRO TO PARTICLE PHYSICS

Semester Hours: 3

Survey of elementary particle physics with emphasis on the Standard Model of quarks, leptons and gauge bosons. Lorentz transformations, four-vectors and relativistic kinematics, angular momentum and spin. Lifetimes, cross-sections and Feynman rules. Quantum electro- and chromo-dynamics, Dirac equation and renormalization. Physics beyond the Standard Model. Prerequisite: PH 551 or PH 651.

PH 560 - INTRO TO SOLID STATE PHYSICS I

Semester Hours: 3

Crystal binding and crystal structure. Crystal structure determination. Phonons and lattice vibrations. Free electron gas. Electronic energy band theory. Prerequisite with concurrency: PH 551. (Same as MTS 660.) Fall, even years.

PH 561 - INTRO TO SOLID STATE PHYSIC II

Semester Hours: 3

Thermal properties of solids. Electronic properties, optical properties, electronic properties in a magnetic field, semiconductor devices, magnetism, superconductivity, defects and alloys, dislocations and crystal growth, non-crystalline solids, surfaces and interfaces. (Same as MTS 661.) Spring, odd years. Prerequisite: PH 560.

PH 570 - OPT & PHOTONIC SYSTEMS DESIGN

Semester Hours: 3

Review of paraxial optics, ray tracing codes, aberration and diffraction calculations; acousto- and electro-optic modulators, spatial light modulators; fibers, fiber splicers and connectors; gratings and diffractive optical elements; laser and light emitting diodes, photodetectors and CCD arrays; correlator systems; optical communication networks; signal processing systems design. Fall, even years. Prerequisite: PH 541.

PH 571 - STELLAR ASTROPHYSICS

Semester Hours: 3

Structure and physical processes of stars from the interior to the atmosphere: energy production and transfer, atmospheric properties, and observed spectral features. Models for stellar structure. Star formation and evolution, including the effects of a companion. Prerequisites: upper level undergraduate astrophysics course, and upper level undergraduate E&M course.

PH 572 - GALAXIES & COSMOLOGY

Semester Hours: 3

Galactic structure; Oort's constants; rotation curves; galaxy types; structure formation and evolution; Hubble expansion; Friedmann equation; cosmic microwave background; radiation and matter eras; primordial nucleosynthesis; dark matter/energy issues; development of structure in the early universe; horizon & flatness problems; inflation. Prerequisite: PH 571 or advanced undergraduate Astrophysics course, suggested PH 553, PH 621. Spring, odd years.

PH 574 - INTRO TO GENERAL RELATIVITY

Semester Hours: 3

An introductory course on general relativity and gravitational physics. General relativistic phenomena as inferred from the behavior of particles and light rays for a selection of spacetimes. Major properties of such objects as black holes, wormholes, gravitational waves, and the universe as a whole. Prerequisites: Undergraduate level special relativity and classical mechanics.

PH 579 - OBSERVATIONAL ASTROPHYSICS

Semester Hours: 3

Astronomical coordinate systems and time; spherical astronomy; telescope designs; basic optics; CCDs; infrared arrays; observational calibration and noise; high resolution imaging techniques (e.g., adaptive optics); spectroscopy; and high and low energy observational techniques (e.g., X-ray telescopes, radio interferometry). Students will also conceive their own projects, write observing proposals, and convene as a Time Allocation Committee to review proposals and schedule telescope time. Students will acquire, reduce, analyze and interpret data from one of the allocated projects, and present the results in a short paper. Prerequisites: upper-level undergraduate astrophysics courses.

PH 589 - SELECTED TOPICS

Semester Hours: 3

PH 601 - CLASSICAL DYNAMICS I

Semester Hours: 3

Variational principles and Lagrangian mechanics, rigid body motion, Hamilton's equations, and theory of small oscillations. Aspects related to modern physics. Fall.

PH 607 - MATHEMATICAL METHODS I

Semester Hours: 3

Review of vector calculus and coordinate systems, introduction to tensors, matrices, infinite series, complex variables with applications to calculus of residues, partial differential equations, and Sturm-Liouville theory. Orthogonal functions, gamma functions, Bessel functions, Legendre functions, special functions, Fourier series, integral transforms and equations. Prerequisite: upper level undergraduate differential equations courses (s). (Same as MA 607.) Fall.

PH 609 - MATHEMATICAL METHODS II

Semester Hours: 3

Continuation of PH 607. (Same as MA 609.) Spring. Prerequisite: PH 607.

PH 615 - INTRO TO RADIOLOGICAL PHYSICS

Semester Hours: 3

Prerequisite: PH 551.

PH 616 - PHYSICS OF RADIATION THERAPY

Semester Hours: 3

Operation of X-ray tubes, electron linear accelerators, cobalt-60 units, cyclotrons. Principles of accelerating waveguides, klystrons, magnetrons, electron scattering foils, flattening filters, monitor chambers, collimators. Percent-depth-dose (PDD), tissue-phantom-ratio (TPR), tissue-air-ratio (TAR), peak scatter factor (PSF). Equivalent squares, calculation of monitor units for specific dose rates, collimator scatter factor (S_c), phantom scatter factor (S_p). Principles of brachytherapy: calibration of sources, absorbed dose using AAPM TG-43 protocol. Calculation of isodose distributions: convolution/superposition, Monte Carlo calculations. Intensity modulated radiation therapy (IMRT), stereotactic radiosurgery, tomotherapy, total-body irradiation. Prerequisite: PH 615.

PH 621 - STAT MECH KINETIC THRY I

Semester Hours: 3

Statistical methods, systems of particles, statistical thermodynamics, applications of thermodynamics, methods of statistical mechanics, applications of statistical mechanics, equilibrium between phases of chemical species. Summer.

PH 622 - STAT MECH KINETIC THEORY II

Semester Hours: 3

Addresses the statistical description of collective processes in gases, plasmas, and fields based on the use of transport theory. The course provides the basis for the mathematical description of the basic kinetic and continuum models used in all fields of solar, space and astrophysics. Addresses specifically the transport of gases and Chapman-Enskog theory, magnetohydrodynamics in a collisional description, energetic particle transport in collisionless plasma, the transport of low-frequency turbulence, and if time permits, the transport of radiation. Prerequisite: PH 621.

PH 631 - ELECTROMAGNETIC THEORY I

Semester Hours: 3

Electrostatic and magnetostatic fields in vacuum and materials, Maxwell's equations, electromagnetic waves. Prerequisites: upper level undergraduate E&M course(s), PH 607. Fall.

PH 632 - FOURIER OPTICS

Semester Hours: 3

Introducing the optical system as an invariant linear system, convolution, Sommerfield's diffraction integral, Fourier Transform, angular spectrum, coherent and incoherent imaging, optical transfer function. Prerequisite PH 542 (Same as OSE 632 and EE 632.) Spring.

PH 636 - INTRO TO SPACE PLASMA PHYSICS

Semester Hours: 3

Electromagnetic fields and particles in space; solar wind and solar energetic particles; currents and plasma waves in space; shocks and particle acceleration mechanisms; solar flares and coronal mass ejections. Spring, even years. Prerequisite: PH 531.

PH 642 - OPTICAL PHYSICS

Semester Hours: 3

Fundamental physics of optics and optical phenomena. Electromagnetic fields, sources and propagation. Coherence, interference, polarization, scattering, reflection, refraction, and diffraction. Optical properties of conductors and insulators. Introduction to quantum optics, lasers, and optical device physics. Offered Spring, even years. Prerequisite: PH 551.

PH 645 - LASERS I

Semester Hours: 3

Incoherent light sources; atomic and molecular energy levels; equation of motion for probability amplitudes using first-order time dependent perturbation theory; electric dipole interaction. Einstein rate equations and the Planck radiation law; induced dipole moments and frequency dependent susceptibility. Homogeneous and inhomogeneous line broadening mechanisms; laser cavities and modes, elementary laser theory, practical lasers. Prerequisite: upper level undergraduate E&M courses. (This course may be substituted for OSE 645.) Summer.

PH 651 - QUANTUM MECHANICS I

Semester Hours: 3

Free particle motion. Principles of wave mechanics. The Schrodinger equation and one-dimensional potentials. Approximation techniques: WKB, variational method, perturbation theory. Numerical methods. Prerequisites: undergraduate quantum mechanics or modern physics, some high-level programming (e.g., C++, Fortran, Mathematica) experience. Prerequisite with concurrency: PH 607.

PH 652 - QUANTUM MECHANICS II

Semester Hours: 3

Spherically-symmetric potentials, angular momentum, spin. Identical particles. Time-dependent perturbation theory. Scattering. Atomic structure. Prerequisite: PH 651 and PH 609.

PH 654 - OPTICAL TESTING

Semester Hours: 3

Spherometry; refractive index measurements; optical bench measurements of imaging systems via T-bar nodal slide (effective focal length, f-number, axial color, field curvature and distortion, transverse ray aberrations); illumination falloff; image resolution tests (finite object); modulation transfer function; star image testing; knife edge tests; Hartmann tests; Fizeau interferometer and testing configurations; null lens testing of aspheres; wavefront measurements (point diffraction interferometer, radial shear interferometer); (Same as OSE 654.) Spring.

PH 655 - APPLIED QUANTUM MECHANICS

Semester Hours: 3

Application of quantum mechanics in solid state, electronics, materials science, and optics. Topics to include: Hydrogen atom and molecule, excitons, phonons, Bloch's theorem, periodic boundary conditions, electrons and holes, band structure of simple semiconductors, dipole transitions, optical constants, absorption and emission processes. Introduction to device physics. (Same as OSE 655) Prerequisite: PH 651 or OSE 555.

PH 661 - DATA ANAL/STAT METH PH/ASTROPH

Semester Hours: 3

Moments of a distribution, linear and non-parametric correlation, central limit theorem, error estimation, least squares modeling, estimating model parameters, Monte Carlo techniques. Bayes' theorem and likelihood methods. Energy and temporal spectral analyses. Power density spectra: periodic and quasi-periodic systems. Prerequisite: upper level undergraduate mathematics courses. Fall, even years.

PH 670 - OPTOMECHANICAL DESIGN & MANUF

Semester Hours: 3

Practical aspects of optomechanical design, material selection, fabrication and integration of precision optical components and systems for commercial, space, and military applications. Topics include: fixture design, tolerance analysis, machining methods, thermal stabilization, integrated computer-aided design and analysis, diamond machining, finishing and plating techniques. (Same as OSE 670.) Fall, even years. Prerequisite: OSE 541.

PH 671 - OPTICAL FABRIC & TESTING

Semester Hours: 3

Fabrication and testing techniques of optical components and systems. Component measurements: refractive index, curvature, focal lengths, cardinal points and field curvature. Wavefront aberration and transverse aberration function measurements: geometric tests, interferometric tests, null tests. Basics of grinding, figuring, polishing and optical coating. Laboratory experience in manufacturing, polishing, testing, and coating reflective or transmissive optics. Offered on demand.

PH 673 - HIGH ENERGY ASTROPHYSICS

Semester Hours: 3

Radiative Transfer: Blackbody, scattering and diffusion, bremsstrahlung, synchrotron emission, Compton scattering. Relativistic electromagnetism. Plasma effects and introduction to magnetohydrodynamics. Observational aspects of white dwarves, neutron stars and black holes. Accretion and astrophysical jets. Active galactic nuclei and gamma-ray bursts. Offered Fall of odd years.

PH 674 - GEN RELATIVITY & GRAVITATION I

Semester Hours: 3

Special and general relativity: vector and tensor calculus; curved manifolds; elements of differential geometry; physics in curved spacetime; the Einstein equations; simple solutions of the Einstein equations; Schwarzschild geometry and the Kerr spacetime; black holes; sources, propagation, and detection of gravitational waves; a variational approach to general relativity; special topics.

PH 679 - EDUCATION CAPSTONE COURSE

Semester Hours: 3

Capstone experience for student pursuing secondary education certification option for MS degree. Student develops 1 credit, 100 level physics course on instructor-approved topic. Development includes syllabus, textbook evaluation, representative homework assignments, midterm, final, lecture outline, and lecture notes.

PH 689 - SELECTED TOPICS

Semester Hours: 1-3

Offered upon demand. Topics include: optical surface characterization, superconductivity, aeronomy, properties of solids, laser propagation, collision theory, magnetohydrodynamics. Fall, Spring, Summer.

PH 699 - MASTER'S THESIS

Semester Hours: 3-6

Minimum of 6 credit hours required for Plan I M.S. students. Maximum of nine hours credit toward Ph.D. course requirements awarded upon successful completion of master's thesis. Fall, Spring, Summer.

PH 731 - ADVANCED PLASMA THEORY

Semester Hours: 3

Vlasov theory; electrostatic and electromagnetic waves in a hot plasma; wave damping processes; micro-instabilities; quasilinear theory; numerical simulation of plasmas; applications to space and astrophysics. Spring, odd years.

PH 732 - ELECTROMAGNETIC TH II

Semester Hours: 3

Continuation of PH 631. Radiation from accelerated charges; Hamiltonian formulation of electrodynamics; covariant formulation of electrodynamics. Spring Prerequisite: PH 631.

PH 733 - QUANTUM DEVICES

Semester Hours: 3

Quantum aspects of optical, electronic, and semiconductor devices approached from a phenomenological/physical point of view. Topics will include: Quantum well devices, optical modulators, optical detectors, quantum Stark effects, electrooptic devices, high speed optical devices, frequency chirping in high speed devices and system applications. (Same as OSE 755.) Fall, odd years. Prerequisite: PH 551 or PH 651 or OSE 555.

PH 742 - OPTICAL SCATTERING THEORY

Semester Hours: 3

Scattering and absorption of radiation by particles with spherical symmetry and arbitrary shapes described using Maxwell's equations, vector Helmholtz equations, the Jones and Mueller calculus, and numerical techniques. Prerequisites: PH 631, or EE 609, or ATS 561.

PH 745 - LASERS II

Semester Hours: 3

The propagation of optical beams in homogeneous and lens-like media, optical resonators, interaction between radiation and atomic systems, laser oscillations and specific laser systems, switching and mode-locking of lasers, noise in laser amplifiers and oscillators, modulation of optical radiation. Fall, even years. Prerequisite: PH 645.

PH 746 - NON-LINEAR OPTICS

Semester Hours: 3

PH 751 - COMPUTATIONAL QUANTUM MECH

Semester Hours: 3

Numerical methods for solving the Schrodinger equation. Numerical approximation techniques: Rayleigh-Ritz theory. Quantum scattering from a spherically-symmetric potential. Multi-electron atoms: Hartree self-consistent field theory, Hartree-Fock theory, density functional theory. Electronic structure of diatomic molecules. Ab initio treatment of molecular structure. Additional extensive application to problems in molecular, atomic, and nuclear physics. Prerequisites: PH 652, high-level programming (e.g. C++, Fortran, Mathematica) experience. Offered on demand.

PH 752 - QUANTUM MECHANICS II

Semester Hours: 3

PH 753 - QUANTUM FIELD THEORY

Semester Hours: 3

Formalism of quantum field theory, construction and evaluation of Feynman diagrams for quantum electrodynamics and the weak interaction, first-order processes, renormalization, particle scattering and decay, nucleon structure, introduction to quantum chromodynamics, accelerator experiments, and astrophysical applications. Prerequisites: PH 609 and PH 652.

PH 789 - SELECTED TOPICS

Semester Hours: 1-3

Topics include superconductivity, advanced plasma theory, properties of solids, laser propagation, collision theory, quantum electronics, gravitational theories. Fall, Spring, Summer.

PH 792 - PHYSICS SEMINAR

Semester Hour: 1

Students attend seminars by invited speakers. Two semesters are required for all M.S. students and three semesters for Ph.D. students. Does not count toward minimum degree requirements. Fall, Spring.

PH 795 - ADV PHYSICS PROJECT LAB

Semester Hours: 3-6

Advanced laboratory research in one of the departmental research groups. Student works on an independent or group project. Completion of the course requires a written report that becomes part of the student's record. Fall, Spring, Summer.

PH 799 - DOCTORAL DISSERTATION

Semester Hours: 3-9

Prerequisites: Students must have passed the comprehensive examination at Ph.D. level and have Ph.D. advisor's approval. No more than 9 hours may be taken prior to passing the qualifying examination. Fall, Spring, Summer.

Political Science (PSC)

PSC 520 - FEDERALISM & INTERGOV RELATION

Semester Hours: 3

Designed to help students navigate complex relationships among the 90,000+ government in the U.S., this course examines the framework of federalism and the tools available to governments to influence public policy outcomes. Students will investigate the impacts of these relationships on policy.

PSC 540 - REGIONAL STUDIES

Semester Hours: 3

An examination of the politics of Asia, Latin America, the Middle East, or Africa, depending on the term. We focus on select countries or themes within each region as part of our study of political structures, history, and culture, for a deeper understanding of each area.

PSC 551 - LAW, COURTS & PUBLIC POLICY

Semester Hours: 3

Examines the role of the courts in the making of public policy in the United States, with an emphasis on the use of the courts by interest groups seeking to achieve specific policy goals.

PSC 561 - ECONOMIC DEVELOPMENT

Semester Hours: 3

Understand economic development in the developing world. Examine economic transformation & social change towards addressing poverty, inequality, & social justice. Highlight domestic & international institutional, structural, & political sources of economic dynamism/lack thereof in the Global South.

PSC 562 - DECISION-MAKING FORGN & SEC PLY

Semester Hours: 3

An examination of the history, culture, policies, and structures shaping the development of U.S. foreign and national security policies. Special attention will be placed on the roles of Congress, the National Security Council, Defense Department, State Department, and the intelligence community.

PSC 564 - AMERICAN FOREIGN POLICY

Semester Hours: 3

An examination of the substance of the contemporary U.S. foreign policies and the goals the country seeks to achieve around the world. Students will attempt to evaluate the effectiveness of those policies and examine why it is often difficult for the country to achieve its goals.

PSC 566 - NATIONAL SECURITY STRGY & PLY

Semester Hours: 3

An examination of current U.S. national security strategy and policy. The course will review current strategy and policy documents, examine specific responses to the variety of threats facing the United States, and evaluate whether those policies are effective at achieving their goals.

PSC 570 - ISSUES IN SECURITY POLICY

Semester Hours: 3

Examination of select security-related policy issues. The content of this course will vary during different terms, and students may take the course multiple times so long as the content differs.

PSC 580 - SPECIAL TOPICS IN POLITICAL SC

Semester Hours: 1-3

Selected topics in local, state, national and world politics. This course may be repeated for credit as long as content of course has changed.

PSC 600 - THE AMERICAN POLITY

Semester Hours: 3

Comprehensive and intensive review of the philosophical foundations; formal institutions; and social, economic, and political dynamics of the American polity, with particular emphasis on their relationship to the making of public policy.

PSC 601 - THE PUBLIC POLICY PROCESS

Semester Hours: 3

This course offers an analytical framework for critical thinking about public policy in the U.S.- the inputs, processes, and outputs of governmental activity. Also considers factors that influence policy processes, as well as impacts of decisions by different governments and actors.

PSC 610 - PUBLIC MANAGEMENT PROFESSIONS

Semester Hours: 3

Introduction to public management as a field of study and practice. Review of basic literature. Emphasis on ethics in public service.

PSC 611 - PUBLIC PERSONNEL ADMINIS

Semester Hours: 3

Purposes, functions, and processes of personnel management at the national, state, and local levels.

PSC 612 - BUDGETARY PROCESS

Semester Hours: 3

Governmental revenue and expenditure policies. Budget as a method of administrative and fiscal control.

PSC 615 - SPEC TOPICS IN PUBLIC AFFAIRS

Semester Hours: 3

Special and advanced topics in public affairs and public policy. Students must have complete 12 hours in the Public Affairs and Policy program. Instructor permission required. This course may be repeated for credit as long as content of this course has changed.

PSC 630 - PUBL VALUES/PUBL POLICY

Semester Hours: 3

Critical examination of the value assumptions of social theoretical paradigms that influence the formation, implementation, and evaluation of public policies. Major themes include ideological biases, ethics of social policies, and moral problems of economic distribution and redistribution.

PSC 635 - PROGRAM EVALUATION AND METHODS

Semester Hours: 3

This course focuses on program evaluation and methods of social science research. By learning the logic and practice of research design and methods, students will be equipped with the necessary skills and techniques to critically evaluate public policy programs and to design and execute research projects.

PSC 690 - CAPSTONE

Semester Hours: 3

Capstone projects give students the opportunity to integrate classroom learning with relevant problem solving they might face in a professional work situation. Students will conduct independent research on a policy question and formulate recommendations based on their findings. Prerequisite: Instructor Permission.

PSC 695 - INTERNSHIP IN GOVERNMENT

Semester Hours: 1-6

Students may receive academic credit for an internship with a local, state, or federal governmental agency, or with a political, legal, or public policy related organization. Students must have completed 12 hours in the Public Affairs program. Prerequisite: Instructor Permission.

PSC 698 - DIRECTED READINGS & RESEARCH

Semester Hours: 3

Supervised in-depth readings and/or individual research in an area of specialized interest to both student and instructor.

PSC 699 - MASTER'S THESIS

Semester Hours: 1-3

Required every semester a student is writing and receiving direction on a master's thesis. A minimum of two terms and six thesis hours is required for the thesis option. No more than six hours credit may be applied toward the degree.

Psychology (PY)

PY 500 - INTRO CLINICAL & COUNSELING

Semester Hours: 3

PY500 introduces clinical/counseling psychology and professional psychology. History of diagnosis and treatment, theoretical models in counseling, contemporary practice models, research basis of clinical/counseling psychology, empirically validated techniques, and doctoral program models are covered.

PY 502 - INDUSTRIAL & ORGANIZA PSY

Semester Hours: 3

Application of basic principles of learning, motivation, and perception to typical industrial and organizational problems. Same as ISE 502.

PY 503 - HUMAN FACTORS PSYCHOLOGY

Semester Hours: 3

Study of human performance in human-technology-environment systems. Consideration of human capabilities and limitations as related to controls and displays, and the role of human cognition in decision-making and training effectiveness. Same as ISE 503.

PY 504 - THEORIES OF COUNSELING

Semester Hours: 3

This course is designed to introduce theories of psychotherapy and the process of psychotherapy and counseling. This course is a survey of counseling/psychotherapy models and techniques with emphasis on Empirically Validated Therapies (EVT) and traditional models with substantial support in the research and clinical literature.

PY 505 - PSYCHOPHARMACOLOGY

Semester Hours: 3

Introduction to drug classification and action with emphasis on physiological and psychological interactions. Same as BYS 505.

PY 506 - PSYCHOLOGY OF WOMEN

Semester Hours: 3

Examines theory and research in the psychological functioning of women, both in the United States and other nations. Topics include achievement and education, mental and physical health issues, biological influences on women's behavior, and victimization of women.

PY 507 - CROSS-CULTURAL PSYCHOLOGY

Semester Hours: 3

Examines psychological similarities and differences between members of industrialized and non-industrialized cultures. Comparisons will include development, social interaction, personality, cognition, psychological health and treatment, work, and acculturation.

PY 508 - TEAMWORK & TEAM PROCESSES

Semester Hours: 3

This course provides a basic introduction to teams and teamwork processes. The foundation of the course is research-based; topics will be approached from the context of empirical research that has been conducted. The types of research designs that are typically used in team research are addressed.

PY 509 - PSYCHOLOGY OF AGING

Semester Hours: 3

PY 509 examines psychological processes in adulthood and aging. Emphasis is placed on contemporary theories, methodological issues and how psychological, biological, social and environmental factors interact to predict growth, maintenance or decline in abilities throughout adulthood and aging.

PY 510 - TASK ANALYSIS & PROTOTYPING

Semester Hours: 3

This course introduces students to methods for analyzing user actions as they interact with software and tools to complete tasks. Students apply a range of prototype techniques from fast, low-fidelity prototypes to interactive high-fidelity prototypes.

PY 514 - ADVANCED LEARNING

Semester Hours: 3

Analysis of learning principles from simple relationships with animals to the complexities of human language and problem solving.

PY 515 - ADV. DEVELOPMENTAL PSYCHOLOGY

Semester Hours: 3

PY 520 - SPECIAL TOPICS

Semester Hours: 3

Pre-announced special areas in seminar discussion, laboratory work, or practicum. May be taken twice for credit.

PY 530 - PSYCHOMETRICS

Semester Hours: 3

History and development of psychological testing with special emphasis given to both theory and process of effective evaluation.

PY 533 - PSYCHOPATHOLOGY

Semester Hours: 3

Selected disorders such as depression, anxiety disorders, and personality disorders from different theoretical orientations with emphasis on cognitive behavioral theory.

PY 534 - PSYCHOLOGY AND LAW

Semester Hours: 3

This seminar is a survey of the major topics represented in the field of Psychology and Law. We will focus on how psychological research can contribute to a better understanding of issues related to law.

PY 537 - PSYCHOBIOLOGY OF STRESS/ILLNES

Semester Hours: 3

Overview of physiological stress responses and their influence on health behavior and illness. Same as BYS 537.

PY 580 - PROSEMINAR: COGNITIVE

Semester Hours: 3

Critical examination of the cognitive approach to areas of study within psychology. Students are responsible for library research, writings, and presentation of selected topics.

PY 607 - PROFESSIONAL DEV IN RES & TCHG

Semester Hour: 1

Focus on developing knowledge and skills relevant to future goals, such as career exploration, internship opportunities, resume writing, and graduate program exploration. Required of first year students.

PY 608 - GRAD PRACT TCHG & CAREER EXPLO

Semester Hour: 1

Focus on developing knowledge and skills relevant to future goals, such as career exploration, internship opportunities, resume writing, and graduate program exploration. Required of first year students.

PY 610 - EXPERIMENTAL DESIGN

Semester Hours: 3

Design and use of the experiment as an inferential tool. Issues pertaining to reliability, validity, manipulation of independent variables and sampling will be examined. Statistical techniques for analysis of data generated by experimental designs.

PY 611 - STAT FOR EXPERI METHODS

Semester Hours: 4

Statistical techniques for analysis of data generated by experimental designs.

PY 612 - MULTIVARIATE ANALYSIS

Semester Hours: 3

Covers how to conduct, interpret, and summarize multivariate analyses. Prerequisite: PY 611 (B- or better).

PY 615 - GRADUATE SEMINAR

Semester Hours: 3

Intensive analysis of selected theoretical or applied topics relating to psychological development. May be taken more than once for credit.

PY 624 - HUMAN FACTORS IN SYSTEM DESIGN

Semester Hours: 3

Introduces basic principles of methods analysis and ergonomics. Methods analysis topics include: work measurement tools, work sampling, job analysis, job evaluation, and development and use of flow and activity charts for methods improvement. Same as ISE 624.

PY 641 - CONC READ/RES SPECIALIZ AREA

Semester Hours: 3

Independent readings and/or experiments in an area within the student's field of specialization. One requirement is a research proposal, which will be reviewed by the faculty advisor. May be taken more than once for credit. Prerequisite: Instructor approval.

PY 650 - SUPERVISED RESEARCH

Semester Hours: 3-6

Laboratory or applied research concerning a particular topic, approved and supervised by a PY faculty member. The student may work on an independent or group project. May be taken more than once for credit.

PY 675 - INTERNSHIP IN APPLD PSYCHOLOGY

Semester Hours: 1-3

Students are placed in a field setting under the supervision of a faculty member and a site supervisor. Students receive site-specific training, experience, and individual supervision. Prerequisites: PY 502, PY 607, PY 608, PY 610, and PY 611.

PY 699 - MASTER'S THESIS

Semester Hours: 1-6

Required each semester a student is working and receiving faculty direction on a master's thesis. Prerequisites: PY 641, a minimum of two terms is expected. Credit awarded upon successful completion of the thesis.

PY 762 - PERFORM MEASUR/PRODU IMPROVEMT

Semester Hours: 3

Productivity and performance defined and used to analyze current competitive position of important sectors of US industry with respect to national and international competition.

Space Science (SPA)

SPA 522 - INTRODUCTION TO PLASMA PHYSICS

Semester Hours: 3

Provides students with an introduction to the basic physical processes associated with plasmas, which permeate all space environments. Both particle and fluid approaches are introduced, and a variety of elementary drift and wave phenomena are derived. Applications of the theory to various plasma instabilities are explored, along with specific examples of where these may occur in space science. While the goal of this course is to prepare students for more advanced topics in space physics, many of the fundamentals covered are equally relevant for students interested in plasma confinement and its associated engineering challenges.

SPA 526 - SPACE WEATHER

Semester Hours: 3

Physics of solar active regions, physics of solar flares and coronal mass ejections (CMEs), the propagation of CMEs, the acceleration and propagation of solar energetic particles, CME interaction with earth's magnetosphere.

SPA 532 - SPACE ORIENTATION EDUCATORS

Semester Hours: 3

A weeklong course at the U.S. Space and Rocket Center in Huntsville, Alabama for pre-service and in-service teachers. The inquiry based workshops are taught around the theme of space exploration include activities to be done across the curriculum. All activities are correlated to National Math, Science, Technology, Social Studies, and Reading Standards. Activities based on curriculum developed by NASA, CAP, NSATA, and the USSRC. Topics include moon, mars, rocketry, propulsion, hydroponics, math, biology, history and literature.

SPA 582 - SCIENCE CAREER PREP

Semester Hour: 1

This course will review many of the soft skills necessary to function as a successful scientist, whether in an academic career, in a federal laboratory, a for-profit research career in a company, or even a commercial career. Your career begins with graduate school, and learning the skills for a successful graduate career will carry over to your professional career. The goal of the course is impart wisdom from successful graduate students and career scientists, providing both a basis for a successful graduate career and your subsequent career. The course will help students reduce the learning things 'the hard way' approach by providing guidance for your career path. Each week will focus on a different skill that a career scientist requires.

SPA 610 - ADV MATH METHDS FOR SPA SCI

Semester Hours: 3

This course will focus on analytical methods for a series of advanced topics with an emphasis on practical applications to space science, such as Vector and Fourier Analysis, ODEs/PDEs in space science, and Green's functions, Spherical Harmonics, Spectral Analysis, Wavelet Transforms, Fractals and Complexity, and Inverse Problems.

SPA 622 - CLASSICAL & QUANTUM STATISTICS

Semester Hours: 3

Statistical methods, systems of particles, statistical thermodynamics, kinetic theory, methods of statistical mechanics, equilibrium between phases of chemical species. Quantum statistics of identical particles. Spin and statistics. Bose-Einstein and Fermi-Dirac distributions.

SPA 623 - TRANSPORT PROCESSES IN SPACE

Semester Hours: 3

Course presents a systematic treatment of classical and anomalous transport theory for gases, plasmas, energetic particles, and low frequency turbulence. The Chapman-Enskog approach is used to derive transport coefficients for neutral gases and collisional plasmas. The relationship between multi-fluid and MHD models is presented. Weak solutions and shock waves are discussed. The transport of energetic particles that experience scattering by magnetic field fluctuations is presented, together with basic models of the turbulence responsible for scattering turbulence transport in expanding flows such as the solar wind. Prerequisite: SPA 622 and SPA 522.

SPA 624 - SPACE PHYSICS I

Semester Hours: 3

A broad introduction to particle, MHD, and kinetic phenomena in space. This course is intended for all students interested in space, astro-, and plasma physics. Course covers fusion processes inside the Sun, solar neutrinos, solar atmosphere, coronal magnetic fields, physical mechanisms of magnetic field line reconnection and magnetic dynamo, the interaction between the solar wind with planets and the interstellar medium, corotating and merged interaction regions, collisional and collisionless shock waves in space. Includes an introduction to charged particle acceleration in the heliosphere. Examines differences between planetary magnetospheres, solar-terrestrial relationships, solar activity, climate, and culture. Prerequisite: SPA 522, SPA 631 (w/concurrency).

SPA 625 - SPACE PHYSICS II

Semester Hours: 3

The course develops a deeper understanding and knowledge of plasma instabilities, kinetic dispersion relations, microinstabilities, electrostatic and electromagnetic instabilities; advanced magnetohydrodynamics including MHD turbulence, reconnection; wave-particle interactions, including basic quasi-linear theory; weak and strong wave turbulence; nonlinear waves; collisionless shock waves. Prerequisite: SPA 624.

SPA 627 - HIGH ENERGY RADIATION DET&MSRM

Semester Hours: 3

This course will provide students with basic understanding of radiation detection for space-based missions. This course will cover the basic nuclear processes in radioactive sources and the interaction of radiation with matter. The statistical treatment of experimental data will be reviewed. General characteristics common to all types of detectors will be given. We will then cover specific classes of detectors focusing on ionization, scintillation and semiconductor detectors. Light collection and detection techniques will follow. The student will then be introduced to basic signal processing and timing techniques important to a successful instrument design. This course will be taught from a physicist point of view emphasizing the physical processes and interactions that make detection of radiation possible. This course is suitable for those students interested in detector development or astrophysical data analysis using state-of-the-art technology.

SPA 628 - SOLAR PHYSICS

Semester Hours: 3

The workings of the sun, from its interior to the outer reaches of the corona with emphasis on the observations. Energy release in core of the Sun and its transport to the solar atmosphere. Dynamo process and the 11 year solar activity cycle. Formation of active regions and structure of sunspots. The structure of corona, with particular details on the active region corona and its heating to several million kelvin. Energy release processes including solar flares and coronal mass ejections.

SPA 629 - ASTROPHYSICAL FLUID DYNAMICS

Semester Hours: 3

Covers astrophysical phenomena occurring outside the boundaries of the solar system. Subjects include stellar structure and rotation, waves and instabilities in astrophysical plasmas, the physics of spherical and disk accretion, supernova blast waves, and charged particle transport and acceleration in cosmic plasmas. Introduction to the principles of stellar formation, helioseismology, stellar dynamo, coronal heating, and astrophysical turbulence. Prerequisite: SPA 522.

SPA 630 - WAVES IN FLUIDS

Semester Hours: 3

Comprehensive introduction to the science of wave motions in fluids. Waves and first-order (hyperbolic) equations, wave hierarchies; gas dynamics and fluid equations; acoustics, nonlinear plane waves, simple waves, shock waves and structure, shock reflection, similarity solutions, supersonic flows in gas dynamics; the wave equation, including plane, spherical and cylindrical waves, geometrical optics, including far-field approximation, caustics, nonhomogeneous media, anisotropy; water waves, including shallow water theory; group velocity, dispersion; nonlinear waves, including Korteweg-de Vries, sine-Gordon, and nonlinear Schrodinger equations, solitons. Prerequisite: SPA 610.

SPA 631 - WAVES AND FIELDS

Semester Hours: 3

This course will cover the following topics: 1) Review of static solutions of the Maxwell equations. Boundary-value applications. Green function solutions. 2) Covariant electrodynamics: Basic application of special relativity to charged particles and fields. Lienard-Wiechert potentials. Solutions to the wave equation. 3) Space Science applications: Thermal Spectra and Particle Distributions. Cyclotron and synchrotron radiation. Bremsstrahlung and collisions. Compton Scattering. Prerequisite: SPA 610.

SPA 632 - IONOSPHERIC AND MAGNETOSPHERIC

Semester Hours: 3

This course will give insights to the Earth's ionosphere and magnetosphere. Seminars cover basic concepts and fundamental plasma physics relevant to the ionosphere and magnetosphere, electrodynamics, electric circuit systems, geomagnetic storms, and substorms, auroras, etc. Training projects involve the use of satellite data and ground-based observations. Prerequisite: SPA 522.

SPA 636 - ADV SPACE WEATHER

Semester Hours: 3

Advanced topics in Space Weather with emphasis on practical effects and impacts on human technology and society: interaction of solar disturbances with Earth's magnetosphere, Solar Energetic Particles, and their effects; Forecasting and Nowcasting of Space Weather; Space Weather at Mars and other planets. Prerequisite: SPA 522.

SPA 662 - COMPUTATIONAL PHYSICS

Semester Hours: 3

Numerical methods to solve common physics problems using C or Fortran. Numerical integration and differentiation, root finding, data fitting, introductory stochastic methods, linear and non-linear differential equations. Fourier analysis. Elliptic parabolic hyperbolic partial differential equations via finite differences, integro-differential equations. Applications to classical dynamics, electromagnetism, statistical and quantum physics.

SPA 663 - COMPUTATIONAL FLUID DYNMC &MHD

Semester Hours: 3

Numerical simulations of various problems in space physics, astrophysics, engineering, and plasma dynamics. Finite- volume and finite-difference, shock-capturing and shock-fitting methods for hyperbolic equations, including gas dynamics, MHD, and shallow water equations. The hierarchy of numerical methods is introduced in a systematic way, starting from standard linear schemes and arriving at modern discontinuity-capturing non-linear methods. Exact and approximate Riemann solvers, characteristic analysis of underlying equations. Different implementations of boundary conditions are introduced in relation with the mathematical properties of quasilinear hyperbolic systems. Prerequisite: SPA 624, SPA 662.

SPA 689 - SELECTED TOPICS

Semester Hours: 3

Selected Topics in Space Science not covered in other courses.

SPA 699 - MASTER'S THESIS

Semester Hours: 1-6

SPA 741 - PHYSICS OF COSMIC RAYS

Semester Hours: 3

Covers two principal areas of cosmic ray physics: (i) cosmic ray origin and acceleration, and (ii) cosmic ray transport and detection. Includes galactic cosmic rays, anomalous cosmic rays, and solar energetic particles. Transport theory, acceleration mechanisms and observational signatures. Prerequisite: SPA 623.

SPA 742 - GAMMA-RAY BURSTS AND JETS

Semester Hours: 3

Astrophysical jet sources: kinetic and magnetically-dominated relativistic outflows. Blandford-McKee solution. Photospheres. Relativistic shock physics. Emission in relativistic plasmas. Gamma-ray bursts; observations, theory. Prerequisite: SPA 622, SPA 624.

SPA 771 - COMPETITIVE GRANT WRITING WKSP

Semester Hour: 1

This course is designed for senior level graduate students who are about to graduate and start their professional career. It will introduce students to the real and complete process of competing for grant support. It is comprised of a series of lectures (workshops), case studies, and ends with a formal proposal from each participant and a mock review process.

SPA 789 - SELECTED TOPICS

Semester Hours: 3

Selected Topics in Space Science not covered in other courses.

SPA 796 - JOURNAL CLUB

Semester Hour: 1

This course requires graduate students to read, interpret and present literature critically to fellow students, researchers, and faculty. Students stay abreast of current knowledge in the field, develop presentation skills and promote department unity. Faculty instructor will lead, assign, and provide students feedback on their presentations.

SPA 799 - DOCTORAL DISSERTATION

Semester Hours: 1-9

Students must have passed the Comprehensive Examination at PhD level and have PhD advisor's approval. No more than 9 hours may be taken prior to passing the Qualifying Examination.

Statistics (ST)

ST 687 - THEORY OF STATISTICS I

Semester Hours: 3

Distribution of statistics based on ordered samples, asymptotic sampling distributions, maximum likelihood, least squares, and other methods of point estimation, Rao-Blackwell theorem and Cramer-Rao inequality, confidence intervals, regions, and their optimal properties. Neyman-Pearson formulation and tests of simple hypothesis against simple alternatives.

ST 787 - THEORY OF STATISTICS II

Semester Hours: 3

Continuation of hypothesis testing, likelihood ratio and unbiased tests, uniformly most powerful tests, power function, nonparametric tests, statistical decision theory, distribution and linear models.

Faculty

A

Adams, Ellise, Professor, Nursing, 2006, PhD, Texas Women's University.

Adams, Marsha, Dean and Professor, Nursing, 2014, PhD, University of Alabama at Birmingham.

Adan, Drew, Librarian II, Library, 2017, MLIS, Simmons Graduate School of Library and Information Science.

Adcock, Lawana, Lecturer, Biological Sciences, 2016, PhD, Alabama AM University.

Ai, Shangbing, Professor, Math, 2002, PhD, University of Pittsburgh.

Al-Hamdan, Ashraf, Clinical Associate Professor, Civil and Environmental Engineering, 2007, PhD, University of Illinois at Chicago.

Alewine, Henry, Associate Professor, Accounting, 2010, PhD, University of Kentucky.

Alexander, Susan, Associate Professor, Nursing, 2009, DNP, University of Alabama in Huntsville.

Allen, David, Professor, Economics, 1994, PhD, University of Arkansas.

Allen, Mary Beth, Lecturer, Computer Science, 2017, M.S., Auburn University.

Allport, Christopher, Associate Professor, Accounting, 2005, PhD, Virginia Tech.

Amiri, Azita, Associate Professor, Nursing, 2012, PhD, University of Alabama at Birmingham.

Anderson, Michael, Professor, Civil and Environmental Engineering, 1998, PhD, Iowa State University.

Argentina, Vincent, Associate Professor, Art, Art History Design, 2014, MFA, University of Georgia.

Armentrout, Daniel, Clinical Associate Professor, Mechanical and Aerospace Engineering, 2012, PhD, University of Denver.

Aultman, Anna, Clinical Assistant Professor, Nursing, 2018, MSN, University of Alabama.

Avery, Atiya, Clinical Assistant Professor, Information Systems, 2019, PhD, University of Illinois at Chicago.

Aygun, Ramazan, Associate Professor, Computer Science, 2003, PhD, New York State University.

B

Baginski, Melissa, Clinical Assistant Professor, Nursing, 2009, MSN, University of Virginia.

Bail, Jennifer, Assistant Professor, Nursing, 2020, PhD, University of Alabama in Birmingham.

Baird, James, Professor, Chemistry, 1982, PhD, Harvard.

Baker, Karen, Lecturer, Theatre, 2018, MFA, University of Alabama.

Baldwin, Katie, Associate Professor, Art, Art History Design, 2013, MFA, University of the Arts, Pennsylvania.

Balla, Angela, Associate Professor, English, 2006, PhD, University of Michigan-Ann Arbor.

- Banish, R. Michael**, Associate Professor, Chemical and Materials Engineering, 1999, PhD, University of Utah.
- Bao, Yeqing**, Associate Graduate Dean, Professor, Marketing, 2001, PhD, Virginia Polytechnic Institute and State University.
- Bao, Yongchuan**, Associate Professor, Marketing, 2014, PhD, University of Southern California.
- Barnby, Elizabeth**, Clinical Associate Professor, Nursing, 2009, DNP, University of Alabama in Huntsville.
- Barnes, Dilcu**, Clinical Assistant Professor of Management Science, Management Science, 2017, PhD, Auburn University.
- Barnes, Dilcu**, Clinical Assistant Professor of Management Science, Management, 2017, PhD, Auburn University.
- Baudry, Jerome**, Chan Chair and Professor, Biological Sciences, 2017, PhD, University of Paris - Sorbonne.
- Baun, Dylan**, Assistant Professor, History, 2016, PhD, The University of Arizona.
- Beal, Aubrey**, Assistant Professor, Electrical and Computer Engineering, 2019, PhD, Auburn University.
- Beck, Monica**, Assistant Professor, Nursing, 2009, MSN, University of Alabama in Huntsville.
- Berbrier, Mitchell**, Professor, Sociology, 1996, PhD, Marquette University.
- Berkowitz, David**, Graduate Dean and Professor, Marketing, 1996, PhD, University of Alabama.
- Betancourt, José**, Associate Professor, Art, Art History Design, 2006, MFA, Hunter College.
- Bianchi, Ann**, Associate Professor, Nursing, 2007, PhD, Texas Women's University.
- Bitzer, Phillip**, Associate Professor, Atmospheric Science, 2011, PhD, University of Alabama in Huntsville.
- Blackmon, James**, Research Professor, Mechanical and Aerospace Engineering, 2001, PhD, University of California.
- Bolen, Ron**, Clinical Instructor, Nursing, 2017, MSN, University of Alabama.
- Bonamente, Massimiliano**, Professor, Physics, 2002, PhD, University of Alabama in Huntsville.
- Bowman, Elizabeth**, Senior Lecturer, Math, 2001, MA, University of Alabama in Huntsville.
- Bowman, Ronald**, Senior Lecturer, Electrical and Computer Engineering, 2005, MSEE, Clemson University.
- Boykin, Timothy**, Professor, Electrical and Computer Engineering, 1992, PhD, Stanford University.
- Brothers, Rebecca**, Librarian I, Library, 2017, MA, University of Washington.
- Bruzek, Jennifer**, Assistant Professor, Education, 2019, PhD, University of Kansas.
- Budisalih, Kimberley**, Clinical Assistant Professor, Nursing, 2017, MSN, Samford University.
- Buksa, Irena**, Associate Professor, World Languages and Cultures, 1990, DA, Syracuse.
- Burel, Joshua**, Assistant Professor, Music, 2017, DM, Florida State University.
- Burnett, John**, Associate Professor, Finance, 1992, PhD, University of Alabama.
- Burns, Laird**, Associate Professor, Management Science, 2009, PhD, Michigan State University.
- Burns, Laird**, Associate Professor, Management, 2009, PhD, Michigan State University.
- Burrows, Janice**, Lecturer, Math, 2018, MS, Texas AM University.
- Byrne, Heather-Lee**, Librarian I, Library, 2019, MLIS, Drexel University.

C

- Carey, Lawrence**, Professor, Atmospheric Science, 2012, PhD, Colorado State University.
- Carey, Matthew**, Assistant Professor, Music, 2016, DMA, Texas Tech University.
- Carmen, Christina**, Clinical Associate Professor, Mechanical and Aerospace Engineering, 2006, PhD, University of Alabama in Huntsville.

Cassibry, Jason, Associate Professor, Mechanical and Aerospace Engineering, 2004, PhD, University of Alabama in Huntsville.

Cate-Gibson, Stephanie Ryan, Senior Lecturer, Intensive Language Center, 2009, MA, North Carolina Central University.

Choup, Anne Marie, Associate Professor, Political Science, 2007, PhD, University of North Carolina at Chapel Hill.

Christopher, Sundar, Professor, Atmospheric Science, 1997, PhD, Colorado State.

Christy, John, Interim Dean and Distinguished Professor, Atmospheric Science, 1991, PhD, Illinois.

Chronis, Themistoklis, Clinical Assistant Professor, Physics, 2017, PhD, University of Connecticut.

Chung, Haeyong, Assistant Professor, Computer Science, 2015, PhD, Virginia Tech.

Clemmons, Tammy, Clinical Instructor, Nursing, 2006, MSN, University of Alabama in Huntsville.

Cling, Andrew, Associate Dean and Professor, Philosophy, 1988, PhD, Vanderbilt.

Coe, David, Associate Professor, Electrical and Computer Engineering, 2002, PhD, Georgia Institute of Technology.

Coffey, Sharon, Clinical Assistant Professor, Nursing, 2016, DNP, University of Alabama in Huntsville.

Coley, Lorenzo, Lecturer, Mechanical and Aerospace Engineering, 2018, MS, Mississippi State University.

Collopy, Paul, Professor, Industrial Systems Engineering, 2013, PhD, Stanford University.

Connors, Ryan T., Assistant Professor, Kinesiology, 2015, PhD, Middle Tennessee State University.

Conway, Joseph, Associate Professor, English, 2011, PhD, Washington University in St. Louis.

Cooper, Judy, Lecturer, Biological Sciences, 2015, M.S., University of Alabama in Huntsville.

Craw, Michael, Assistant Professor, Kinesiology, 2019, PhD, University of Tasmania.

Crook, Genevieve, Lecturer, Math, 1989, MA, University of Alabama in Huntsville.

Cross, Heather, Senior Lecturer, English, 2007, MA, University of Alabama in Huntsville.

Cruz-Vera, Luis, Associate Professor, Biological Sciences, 2007, PhD, CINVESTAV-IPN, Mexico.

Culumber, Zachary, Assistant Professor, Biological Sciences, 2018, PhD, Texas AM University.

Curtis, Christine, Provost, Professor, Chemical and Materials Engineering, 2014, PhD, Florida State University.

D

Darnell, Amy, Clinical Instructor, Nursing, 2020, MSN, Auburn University.

Davis, Rebecca, Clinical Assistant Professor, Nursing, 2009, MSN, University of Alabama in Huntsville.

Dawson, Darren, President and Professor, Electrical and Computer Engineering, 2019, PhD, Georgia Tech University.

D'Costa, Anthony, Eminent Scholar and Professor, Economics, 2018, PhD, University of Pittsburgh.

Delugach, Harry, Associate Professor, Computer Science, 1990, PhD, University of Virginia.

Deverapalli, Chakri, Director IT, Lecturer, Information Systems, 2008, MBA, University of Alabama in Huntsville.

Diagana, Toka, Professor, Math, 2018, PhD, University of Claude Bernard - Lyon 1, France.

Dillihunt, Monica, Associate Professor, Education, 2004, PhD, Howard University.

Doty, Johnna, Senior Lecturer, Music, 2012, MFA, Boston University.

Doty, Johnna, Senior Lecturer, Theatre, 2012, MFA, Boston University.

Duan, Lingze, Professor, Physics, 2007, PhD, University of Maryland.

E

Elliott, Jeremy M., Assistant Professor, Kinesiology, 2015, PhD, University of Georgia.

Elmore, Elizabeth, Clinical Assistant Professor, Nursing, 2019, DNP, The University of Alabama in Huntsville.

Emich, Cheryl, Clinical Assistant Professor, Nursing, 2013, MSN, University of Alabama.

English, Jennifer, Associate Dean and Associate Professor, Electrical and Computer Engineering, 2000, PhD, Georgia Institute of Technology.

Etzkorn, Letha, Professor, Computer Science, 1993, PhD, University of Alabama in Huntsville.

F

Fahimi, Farbod, Associate Professor, Mechanical and Aerospace Engineering, 2010, PhD, Sharif U Tech, Tehran.

Fikes, David, Lecturer, Mechanical and Aerospace Engineering, 2016, MS, University of Tennessee - Knoxville.

Fischer, Jeremy, Associate Professor, Philosophy, 2014, PhD, University of Washington.

Florinski, Vladimir, Associate Professor, Space Science, 2008, PhD, University of Arizona.

Fong, Eric, Professor, Management, 2004, PhD, University of Florida.

Foster, John, Department Chair, Chemistry, 2017, PhD, Aston University.

Foster, Melissa, Clinical Assistant Professor, Nursing, 2012, DNP, University of Alabama in Huntsville.

Frederick, Robert, Professor, Mechanical and Aerospace Engineering, 1991, PhD, Purdue.

Frendi, Kader, Professor, Mechanical and Aerospace Engineering, 1999, PhD, Brown University.

Friedman, Susan, Senior Lecturer, English, 2008, PhD, University of South Florida.

Frith, Karen, Associate Dean and Professor, Nursing, 2007, PhD, Georgia State University.

Frost, Alanna, Associate Professor, English, 2008, PhD, University of Louisville.

G

Gaede, Rhonda, Associate Professor, Electrical and Computer Engineering, 1992, PhD, University of Texas-Austin.

Gandila, Andrei, Associate Professor, History, 2013, PhD, University of Florida.

Gentry, Sheila, Clinical Instructor, Nursing, 2018, MSN, University of Alabama in Huntsville.

Gholston, Sampson, Professor, Industrial Systems Engineering, 1997, PhD, University of Alabama in Huntsville.

Gilchrist-Petty, Eletra, Professor, Communication Arts, 2008, PhD, University of Memphis.

Goebel, Rolf, Distinguished Professor, World Languages and Cultures, 1985, PhD, University of Maryland.

Gorur, Ravi, Professor, Electrical and Computer Engineering, 2015, PhD, University of Windsor.

Graves, Sara, University Professor, Computer Science, 1978, PhD, University of Alabama in Huntsville.

Greene, Jason, Dean and Professor, Finance, 2016, PhD, Indiana University.

Greer, Anthony, Lecturer, Communication Arts, 2019, MA, University of Alabama.

Gregory, Don, Distinguished Professor, Physics, 1992, PhD, University of Alabama in Huntsville.

Griffin, Robert, Associate Professor, Atmospheric Science, 2012, PhD, Penn State University.

Grimsley, Reagan, Librarian III, Library, 2017, MA, The University of Southern Mississippi.

Guerin, Amy, Assistant Professor, Theatre, 2016, MFA, University of Houston.

Guerra, Donna, Clinical Assistant Professor, Nursing, 2015, EdD, University of Alabama in Huntsville.

Gunn, Sinceree, Senior Lecturer, English, 2003, MA, University of Alabama in Huntsville.

Guo, Junpeng, Professor, Electrical and Computer Engineering, 2005, PhD, University of Illinois.

Gupta, Jatinder, Eminent Scholar and Professor, Information Systems, 2002, PhD, Texa Tech University.

Gyasi, Kwaku, Associate Professor, World Languages and Cultures, 1999, PhD, Ohio State University.

H

Hamilton, Frances, Assistant Professor, Education, 2014, PhD, Tennessee State University.

Han, Qingyuan, Associate Professor, Atmospheric Science, 1997, PhD, Columbia University.

Hannah, Linda, Lecturer, Psychology, 2019, MS, University of Central Texas, Killeen.

Harfouch, John, Assistant Professor, Philosophy, 2014, PhD, Penn State University.

Harwell, David, Professor, Theatre, 2005, MFA, University of Illinois.

Hazeli, Kavan, Assistant Professor, Mechanical and Aerospace Engineering, 2016, PhD, Drexel University.

Hazelwood, Rebecca, Lecturer, English, 2018, PhD, University of Louisiana at LaFayette.

Heikes, Deborah, Professor, Philosophy, 1998, PhD, University of Illinois.

Hile, Kimberly, Assistant Professor, Education, 2017, PhD, University of Illinois.

Hite, Dennis, Senior Lecturer, Electrical and Computer Engineering, 2005, MSE, University of Alabama in Huntsville.

Ho, Fat, Professor, Electrical and Computer Engineering, 1980, PhD, Southern Illinois University.

Hollingsworth, Angela, Clinical Assistant Professor, Nursing, 2016, DNP, University of South Alabama.

Hollingsworth, Donald (Keith), Professor, Mechanical and Aerospace Engineering, 2011, PhD, Stanford University.

Hoy, Haley, Professor, Nursing, 2006, PhD, Vanderbilt University.

Hsu, Liwu, Associate Professor, Marketing, 2012, PhD, Boston University.

Hu, Leiqliu, Assistant Professor, Atmospheric Science, 2017, PhD, University of Kansas, Lawrence.

Hu, Qiang, Associate Professor, Space Science, 2012, PhD, Dartmouth.

Huang, Wenzhang, Professor, Math, 1994, PhD, Claremont Graduate School.

Hubbell, Gaines, Assistant Professor, English, 2015, PhD, Rensselaer Polytechnic Institute.

Hunter, Amy, Clinical Assistant Professor, Nursing, 2014, DNP, University of Alabama in Huntsville.

Hunter, Noelle, Lecturer, Political Science, 2019, PhD, West Virginia University.

J

Jayawardena, Surangi, Assistant Professor, Chemistry, 2017, PhD, University of Massachusetts-Lowell.

Johnson, David, Associate Professor, History, 2005, PhD, Washington University in St. Louis.

Johnson, David, Associate Professor, World Languages and Cultures, 2005, PhD, Washington University in St. Louis.

Johnson, Kathryn, Professor, Art, Art History Design, 2003, MFA, University of Georgia.

Johnson, Molly, Associate Professor, History, 2003, PhD, University of Illinois.

Johnson, Terri, Senior Lecturer, Math, 2011, PhD, University of Alabama in Huntsville.

Joiner, Laurie, Associate Professor, Electrical and Computer Engineering, 1998, PhD, Clemson University.

Jones, Keith, Associate Professor, Art, Art History Design, 1996, MFA, Louisiana Tech University.

Jones, Nicholas, Professor, Philosophy, 2007, PhD, Ohio State University.

Jovanov, Emil, Associate Professor, Electrical and Computer Engineering, 1998, PhD, University of Belgrade.

Joyce, Lillian, Associate Professor, Art, Art History Design, 1997, PhD, University of California, Los Angeles.

K

Kaiura, Leslie, Associate Professor, World Languages and Cultures, 2007, PhD, University of Virginia.

Kang, Chang-kwon, Associate Professor, Mechanical and Aerospace Engineering, 2013, PhD, University of Michigan.

Kanistras, Konstantinos, Assistant Professor, Mechanical and Aerospace Engineering, 2017, PhD, University of Denver.

Kansakar, Siroj, Lecturer, Math, 2012, PhD, University of Alabama in Huntsville.

Keller, Karl, Senior Lecturer, World Languages and Cultures, 2007, MA, University of Alabama.

Knight, Kyle, Associate Professor, Sociology, 2012, PhD, Washington State University.

Knupp, Kevin, Professor, Atmospheric Science, 1991, PhD, Colorado State University.

Kulick, Jeffrey, Professor, Electrical and Computer Engineering, 1990, PhD, University of Pennsylvania.

Kyle, David, Lecturer, Education, 2004, M.A., University of North Alabama.

L

Lakin, Tracy, Clinical Assistant Professor, Nursing, 2019, DNP, The University of Alabama in Huntsville.

Lampley, Sandra, Assistant Professor, Education, 2016, PhD, Middle Tennessee State.

Landrum, David, Associate Professor, Mechanical and Aerospace Engineering, 1992, PhD, North Carolina State University.

Lane, Sean, Dean and Professor, Psychology, 2018, PhD, Kent State University.

Lanius, Candice, Assistant Professor, Communication Arts, 2016, PhD, Rensselaer Polytechnic Institute.

Lanz, Amelia, Associate Dean and Clinical Assistant Professor, Nursing, 2012, EdD, University of Alabama in Huntsville.

Le Roux, Jakobus, Associate Professor, Space Science, 2008, PhD, Potchefstroom.

Lee, Shanhu, Associate Professor, Atmospheric Science, 2015, PhD, University of Tokyo.

Lee, Yeolan, Associate Professor, Management, 2013, PhD, Ohio State University.

Lei, Yu, Associate Professor, Chemical and Materials Engineering, 2013, PhD, U of Ill, Chicago (UIC).

Lenahan, Shelley, Senior Lecturer, Math, 2004, MA, Texas AM.

Li, Gang, Professor, Space Science, 2008, PhD, Indiana University-Bloomington.

Li, Xiaotong, Professor, Information Systems, 2001, PhD, University of Mississippi.

Lieu, Richard, Distinguished Professor, Physics, 1995, PhD, Imperial College - London.

Ligrani, Phillip, Eminent Scholar and Professor, Mechanical and Aerospace Engineering, 2014, PhD, Stanford University.

Lin, Mark, Associate Professor, Mechanical and Aerospace Engineering, 2000, PhD, Virginia Polytechnic Institute.

Lindquist, Robert, Interim Vice President for Research and Economic Development and Professor, Electrical and Computer Engineering, 2003, PhD, Pennsylvania State University.

Lioce, Bonnie (Lori), Clinical Professor, Nursing, 2014, DNP, University of Alabama in Huntsville.

Liu, Jianqing, Assistant Professor, Electrical and Computer Engineering, 2018, PhD, University of Florida.

Liu, Junjun, Assistant Professor, Accounting, 2020, PhD, Arizona State University.

Love-Rutledge, Sharifa, Assistant Professor, Chemistry, 2017, PhD, The University of Alabama.

Lynch, Thuy, Assistant Professor, Nursing, 2017, PhD, University of Alabama.

M

Ma, Rui, Assistant Professor, Civil and Environmental Engineering, 2019, PhD, Rensselaer Polytechnic Institute.

MacKenzie, William (Ivey), Associate Professor, Management, 2010, PhD, University South Carolina.

Magnuson, Roy, Associate Professor, Biological Sciences, 1999, PhD, Massachusetts Institute of Technology.

Mahafza, Hamsa, Lecturer, Education, 2017, PhD, University of Texas at San Antonio.

Mahalingam, Brinda, Clinical Associate Professor, Economics, 2012, PhD, University of Colorado.

Mahalingam, Shankar, Dean and Distinguished Professor, Mechanical and Aerospace Engineering, 2010, PhD, Stanford University.

Maier, Linda, Professor, World Languages and Cultures, 1993, PhD, University of Virginia.

Malak, Natalie, Assistant Professor, Economics, 2018, PhD, McMaster University.

Manasco, Michael, Librarian II, Library, 2012, MLIS, University of Alabama.

Marinova, Sophia, Associate Professor, Management, 2014, PhD, University of Maryland.

Marschalk, Lacy, Lecturer, English, 2014, PhD, Auburn University.

Mathis, Shannon L., Assistant Professor, Kinesiology, 2011, PhD, Middle Tennessee State University.

Mayeur, Jason, Assistant Professor, Mechanical and Aerospace Engineering, 2018, PhD, Georgia Institute of Technology.

McDavid, Nicole, Lecturer, Communication Arts, 2015, MA, Auburn University.

McGinnis, Michael, Lecturer, English, 2015, PhD, Wayne State University.

Meade, Whitney, Clinical Assistant Professor, Education, 2011, PhD, Auburn University.

Mecikalski, John, Professor, Atmospheric Science, 2004, PhD, University of Wisconsin-Milwaukee.

Mendelson, Tobias, Clinical Assistant Professor, Accounting, 2017, JD, Samford University.

Mendenhall, Eric, Associate Professor, Biological Sciences, 2013, PhD, University of Minnesota.

Menon, Vineetha, Assistant Professor, Computer Science, 2017, PhD, Mississippi State University.

Mesmer, Bryan, Associate Professor, Industrial Systems Engineering, 2014, PhD, University of Buffalo.

Messimer, Sherri, Associate Professor, Industrial Systems Engineering, 1989, PhD, Texas AM.

Milenkovic, Aleksander, Professor, Electrical and Computer Engineering, 2001, PhD, University of Belgrade.

Miller, James, Professor, Physics, 1994, PhD, Maryland.

Mohr, John, Lecturer, History, 2018, PhD, Auburn University.

Mok, Wai Yin, Professor, Information Systems, 2001, PhD, Brigham Young University.

Moore, David, Director and Librarian III, Library, 2002, MLS, University of Alabama.

Morales, Claudio, Professor, Math, 1982, PhD, University of Iowa.

Morgan, Tracie, Clinical Assistant Professor, Nursing, 2016, MSN, University of Alabama in Huntsville.

Morphew, S. Melissa, Clinical Associate Professor, Professional and Continuing Studies, 2016, PhD, University of Georgia.

Morris, Tommy, Professor, Electrical and Computer Engineering, 2015, PhD, Southern Methodist.

Morrison, Katherine, Clinical Instructor, Nursing, 2017, MSN, Samford.

Mukherjee, Anusree, Assistant Professor, Chemistry, 2013, PhD, University of Minnesota.

Mukherjee, Tathagata, Assistant Professor, Computer Science, 2018, PhD, Florida State University.

Mullins, Frank, Associate Professor, Management, 2017, PhD, Syracuse University.

N

Nair, Udaysankar, Associate Professor, Atmospheric Science, 2011, PhD, Colorado State University.

Nelson, George, Associate Professor, Mechanical and Aerospace Engineering, 2012, PhD, Georgia Tech.

Neuschatz, Jeffrey, Distinguished Professor, Psychology, 2000, PhD, Binghamton University.

Newchurch, Michael, Professor, Atmospheric Science, 1994, PhD, Georgia Institute of Technology.

Newman, Timothy, Professor, Computer Science, 1994, PhD, Michigan State.

Ng, Joseph, Professor, Biological Sciences, 1998, PhD, University of California, Riverside.

Ng, Ka Man (Melody), Associate Professor, Music, 2013, DMA, University of Wisconsin.

Ng, Yeow Chye, Associate Professor, Nursing, 2013, PhD, University of Alabama at Birmingham.

Niemiller, Denise, Lecturer, Biological Sciences, 2017, PhD, University of Tennessee Knoxville.

Niemiller, Matthew, Assistant Professor, Biological Sciences, 2017, PhD, University of Tennessee.

Noletto, Colleen, Lecturer, English, 2016, PhD, Catholic University of America.

O

O'Brien, Jason, Associate Professor, Education, 2008, PhD, University of South Florida.

O'Keefe, Louise, Associate Professor, Nursing, 2006, PhD, University of Alabama at Birmingham.

Olson, Charlotte, Librarian III, Library, 2007, MFA, University of Florida.

O'Neal, Pamela, Professor, Nursing, 2005, PhD, Virginia Commonwealth University.

Ong, Belinda, Librarian III, Library, 2004, PhD, University of Kentucky.

Orman, Wafa, Associate Dean and Associate Professor, Economics, 2008, PhD, University of Arizona.

Osuga, Amalia, Assistant Professor, Music, 2018, DMA, University of Oregon.

P

Pacino, Nicole, Associate Professor, History, 2013, PhD, University of California, Santa Barbara.

Palmer, Jennifer, Clinical Instructor, Nursing, 2015, EdD, University of Alabama.

Pan, David, Associate Professor, Electrical and Computer Engineering, 2002, PhD, University of Southern California.

Park, Jae, Associate Professor, Information Systems, 2015, PhD, George Mason University.

Patnayakuni, Ravi, Associate Professor, Information Systems, 2004, DBA, Southern Illinois University.

Patterson, LaToya, Clinical Instructor, Nursing, 2014, MSN, University of Alabama in Huntsville.

Pekker, Mark, Professor, Math, 1987, PhD, Cornell.

Petnga, Leonard, Assistant Professor, Industrial Systems Engineering, 2017, PhD, University of Maryland.

Petty, Mikel, Associate Professor, Computer Science, 2005, PhD, University of Central Florida.

Pogorelov, Nickolai, Distinguished Professor, Space Science, 2008, PhD, Russian Academy of Sciences.

Poole, Jarmel, Clinical Instructor, Nursing, 2017, MSN, University of North Alabama.

Pottenger, John, Professor, Political Science, 1986, PhD, University of Maryland.

Pour, Maria, Assistant Professor, Electrical and Computer Engineering, 2015, PhD, University of Manitoba.

Preece, Robert, Associate Professor, Space Science, 2001, PhD, University of Maryland at College Park.

Preston, Kevin, Lecturer, Computer Science, 2018, MS, The University of Alabama in Huntsville.

Price, Jodi, Professor, Psychology, 2008, PhD, Georgia Institute of Technology.

Primeau, Marlana, Clinical Associate Professor, Nursing, 2004, DNP, University of Alabama in Huntsville.

Q

Que, Tingting, Assistant Professor, Finance, 2014, PhD, University of Iowa.

Quick, Beth, Dean and Professor, Education, 2013, Ed.D, Vanderbilt University.

R

Ragsdale, Christopher, Professor, Music, 2006, DMA, University of Miami, Florida.

Rahman, Tauhidur, Assistant Professor, Electrical and Computer Engineering, 2017, PhD, University of Florida.

Ramachandran, Kerrin, Lecturer, Intensive Language Center, 2011, MA, University of Alabama in Huntsville.

Ranganath, Heggere, Professor, Computer Science, 1982, PhD, Auburn University.

Rani, Sarma, Associate Professor, Mechanical and Aerospace Engineering, 2011, PhD, U of Illinois-Urbana-Champaign.

Ravindran, Sivaguru, Professor, Math, 1999, PhD, Simon Fraser University, British Columbia.

Ray, Biswajit, Assistant Professor, Electrical and Computer Engineering, 2016, PhD, Purdue University.

Reno, Alyssum, Clinical Instructor, Kinesiology, 2019, MS, The University of North Alabama.

Reynolds, Charles, Clinical Instructor, Nursing, 2020, MSN, University of Alabama in Birmingham.

Reynolds, Mark, Clinical Associate Professor, Nursing, 2009, DNP, University of Alabama in Huntsville.

Robertshaw, Joseph, Lecturer, English, 2018, PhD, Bowling Green State University.

Roh, Kyung-Ho, Assistant Professor, Chemical and Materials Engineering, 2016, PhD, University of Michigan.

Roller, Sarah, Assistant Professor, Education, 2016, PhD, Michigan State.

Rose-Green, Ena, Associate Professor, Accounting, 2008, PhD, Florida State University.

S

Sadeghi, Seyed, Associate Professor, Physics, 2007, PhD, University of British Columbia.

Salman, Abdullahi, Assistant Professor, Civil and Environmental Engineering, 2018, PhD, Michigan Technological University.

Sanders, Carolyn, Professor, Music, 1990, DM, Florida State University.

Saunders, John, Lecturer, Communication Arts, 2017, PhD, The Pennsylvania State University.

Schneider, Judith, Professor, Mechanical and Aerospace Engineering, 2015, PhD, University of California-Davis.

Scholz, Carmen, Professor, Chemistry, 1998, PhD, University of Technology, Dresden Germany.

Schwertfeger, Ron, Librarian II, Library, 2014, MA, University of Alabama.

Sears, Christine, Associate Professor, History, 2007, PhD, University of Delaware.

Seemann, Eric, Associate Professor, Psychology, 2003, PhD, Louisiana Tech University.

Sever, Thomas, Professor, Atmospheric Science, 2008, PhD, University of Colorado-Boulder.

Sheldon, Pavica, Professor, Communication Arts, 2011, PhD, Louisiana State University.

Shen, Milton, Associate Professor, Accounting, 2011, PhD, University of Kentucky.

Shotorban, Babak, Professor, Mechanical and Aerospace Engineering, 2008, PhD, University Illinois-Chicago.

Showalter, Darlene, Clinical Associate Professor, Nursing, 1998, DNP, University of Alabama in Huntsville.

Shrader, Amelia, Clinical Instructor, Nursing, 2020, MSN, University of Alabama in Huntsville.

Sims, Jennifer, Assistant Professor, Sociology, 2017, PhD, University of Wisconsin - Madison.

Sirbaugh, Megan, Lecturer, Atmospheric Science, 2019, MS, University of North Carolina - Charlotte.

Skelley, Dana, Assistant Professor, Education, 2017, EdD, The University of Memphis.

Slavin, Laura, Librarian III, Library, 2017, MA, Lincoln Memorial University School of Business.

Smeal, Mary Alice, Lecturer, Math, 2015, PhD, Auburn University.

Smith, Derrick, Associate Dean and Associate Professor, Education, 2008, EdD, Texas Tech University.

Smith, Eric, Professor, English, 2006, PhD, University of Florida.

Smith, Kelly, Lecturer, History, 2018, PhD, University of Cincinnati.

Smith, Laura, Assistant Professor, Art, Art History Design, 2019, PhD, University of Georgia.

Smith, Lenora, Clinical Assistant Professor, Nursing, 2013, PhD, Medical University of South Carolina.

Smith, Miranda, Clinical Instructor, Nursing, 2018, MNED, University of North Alabama.

Snow, Mary, Senior Lecturer, Chemistry, 2005, MS, University of Alabama in Huntsville.

Sommerkamp, Sandy, Clinical Assistant Professor, Nursing, 2011, MSN, Jacksonville State University.

Spencer, Sharon, Clinical Assistant Professor, Nursing, 2012, MSN, University of New Orleans.

Stallsmith, Bruce, Associate Professor, Biological Sciences, 1999, PhD, University of Massachusetts.

Steidl, Christina, Associate Professor, Sociology, 2012, PhD, Emory University.

Storer, Sallyann, Clinical Assistant Professor, Nursing, 2017, DNP, University of Alabama in Huntsville.

Strong, Carol, Lecturer, Physics, 1993, PhD, University of Alabama in Huntsville.

Subramanian, Anu, Professor, Chemical and Materials Engineering, 2018, PhD, Virginia Tech.

Sullivan, Veronica, Clinical Assistant Professor, Nursing, 2017, DNP, University of Alabama in Huntsville.

Sun, Ming, Associate Professor, Physics, 2014, PhD, Harvard.

Swain, James, Professor, Industrial Systems Engineering, 1992, PhD, Purdue.

Sysoeva, Tatyana, Assistant Professor, Biological Sciences, 2018, PhD, The Pennsylvania State University.

T

Tan, Yi, Assistant Professor of Management Science, Management Science, 2020, PhD, University of Kansas.

Tan, Yi, Assistant Professor of Management Science, Management, 2020, PhD, University of Kansas.

Tantaris, Richard, Lecturer, Mechanical and Aerospace Engineering, 2017, PhD, Vanderbilt University.

Taylor, Chris, Associate Professor, Art, Art History Design, 2014, MFA, Alfred University.

Taylor, W. Joseph, Associate Professor, English, 2010, PhD, University of Texas.

Tenhundfeld, Nathan, Assistant Professor, Psychology, 2019, PhD, Colorado State University.

Thomas, Chad, Associate Professor, English, 2011, PhD, University of Michigan.

Thomas, Chad, Associate Professor, Theatre, 2011, PhD, University of Michigan.

Thomas, Dale, Eminent Scholar and Professor, Industrial Systems Engineering, 2015, PhD, University of Alabama in Huntsville.

Thomson, Robert, Assistant Professor, Sociology, 2019, PhD, Baylor University.

Thornton, Tracy, Clinical Assistant Professor, Nursing, 2013, MSN, University of Alabama in Huntsville.

Torres, Aurora, Assistant Professor, Psychology, 1995, PhD, University of Oklahoma.

Torres-Diaz, Isaac, Assistant Professor, Chemical and Materials Engineering, 2019, PhD, University of Puerto Rico at Mayaguez.

Tseng, Fan, Department Chair and Professor of Management Science, Management Science, 1984, PhD, University of Texas.

Tseng, Fan, Department Chair and Professor of Management Science, Management, 1984, PhD, University of Texas.

Tsimika-Chronis, Evdoxia, Lecturer, Intensive Language Center, 2018, MA, Boston University.

Twigg, Pamela, Lecturer, Chemistry, 2014, PhD, Florida State University.

V

Vadrevu, Anuradha, MA, Math, 2017, MA, Mississippi State University.

Veasey, Roxie, Senior Lecturer, Art, Art History Design, 2005, MFA, University of Georgia.

Verlaan, Wolfram, Department Chair and Associate Professor, Education, 2012, PhD, Texas AM.

Vogler, Bernhard, Associate Professor, Chemistry, 2001, PhD, University of Tuebingen.

W

Waddell, Emanuel, Associate Professor, Chemistry, 2004, PhD, Louisiana State University.

Wade, Ryan, Senior Lecturer, Atmospheric Science, 2014, MS, University of Alabama in Huntsville.

Wang, Gang, Associate Professor, Mechanical and Aerospace Engineering, 2010, PhD, University of Maryland.

Waring, Stephen, Professor, History, 1988, PhD, University of Iowa.

Watson, Joseph, Assistant Professor, Theatre, 2018, PhD, Louisiana State University.

Weber, Anna, Senior Lecturer, English, 2012, MFA, Purdue.

Weber, Ryan, Associate Professor, English, 2011, PhD, Purdue.

Weger, Kristin, Assistant Professor, Psychology, 2017, PhD, Otto-Friedrich-University.

Weimer, Jeffrey, Associate Professor, Chemistry, 1990, PhD, Massachusetts Institute of Technology.

Weimer, Jeffrey, Associate Professor, Chemical and Materials Engineering, 1990, PhD, Massachusetts Institute of Technology.

Weisskopf, Mary Ellen, Assistant Professor, Computer Science, 1983, PhD, University of Alabama in Huntsville.

Wells, Earl, Professor, Electrical and Computer Engineering, 1992, PhD, University of Alabama.

Whitehead, Paul N., Assistant Professor, Kinesiology, 2017, PhD, University of Pittsburgh.

Wilkerson, William, Dean and Professor, Philosophy, 1997, PhD, Purdue.

Word-Allbritton, Andrea, Clinical Assistant Professor, Education, 2002, EdD, University of Alabama, Tuscaloosa.

Wren, Brent, Associate Provost and Professor, Marketing, 1994, PhD, University of Memphis.

Wu, Dongsheng, Professor, Math, 2006, PhD, Michigan State University.

Wu, Tingting, Associate Professor, Civil and Environmental Engineering, 2014, PhD, University of Florida.

X

Xing, Xuejing, Professor, Finance, 2007, PhD, University of Missouri-Columbia.

Xu, Gabe, Associate Professor, Mechanical and Aerospace Engineering, 2012, PhD, Georgia Tech.

Y

Yoo, Seong-Moo, Associate Professor, Electrical and Computer Engineering, 2001, PhD, Texas University.

Z

Zank, Gary, Trustee and Distinguished Professor, Space Science, 2008, PhD, University of Kwazulu Natal.

Zhang, Guangsheng, Assistant Professor, Mechanical and Aerospace Engineering, 2017, PhD, Xi'an Jiaotong University.

Zhang, Guo-Hui, Associate Professor, Math, 1993, PhD, Southern Illinois University.

Zhang, Huaming, Associate Professor, Computer Science, 2005, PhD, State University of New York at Buffalo.

Zhao, Shuang, Assistant Professor, Political Science, 2015, PhD, Indiana University, Bloomington.

Zhao, Shuang, Assistant Professor, Atmospheric Science, 2015, PhD, Indiana University, Bloomington.

Zhu, Feng, Associate Professor, Computer Science, 2005, PhD, Michigan State University.

Zhu, Qingyun, Assistant Professor, Management, 2019, PhD, Worcester Polytechnic Institute.

Financial Information

In the following section you will find information pertaining to financial aspects of attending The University of Alabama in Huntsville, including how you will be billed, how to pay your bill, the estimated cost of tuition and other fees, and information regarding financial aid options. The cost of attendance for students at The University of Alabama in Huntsville will vary by their course of study, personal needs, and place of residence. Please note that all fees, charges, and costs detailed in this catalog are subject to change without notice. Financial obligations must be satisfied by the established deadlines. For additional information or questions please contact the Bursar's Office (<https://www.uah.edu/bursar/>).

Billing and Payment Procedures

Tuition, fees and all associated charges are to be paid in full by the first official day of the semester (click here (p. 1160) to find first official day of semester). Acceptable forms of payment are:

- Cash
- Personal Checks
- Money Orders
- Cashier's Checks
- Traveler's Checks
- Electronic Checks
- Credit Cards/Debit Cards (VISA, MasterCard, American Express, or Discover - 2.75% service fee applies)

Payments may be made online through the student account, in person at the Bursar's Office (SSB 123), or by phone at 256.824.6226. Students who do not pay their bill in full by the first day of the semester are assessed a \$50.00 late fee. Students who do not pay their bill in full by the end of the second week of classes may be dropped from class rolls and their enrollment canceled. The University assumes no responsibility for students who attend classes without official enrollment. For summer sessions, please check dates in the Academic Calendar (p. 1160) and on the UAH website (<http://www.uah.edu/registrar/calendars/>).

Mail payments to:

The University of Alabama in Huntsville
Bursar's Office
Student Services Building, Room 123
Huntsville, AL 35899-5050

Installment Plan

Installment plans are available to students fall and spring semesters for the management of that semester's costs. UAH partners with Flywire Payment Solutions to offer student installment plan accounts. For more information, or to set up an installment plan, click here. (<https://www.uah.edu/bursar/installment-plans/>)

Balances

Past due balances are a debt owed the State of Alabama and appropriate action will be taken to collect all balances. Holds will be placed on all student accounts that have past due balances. This hold prevents students from receiving grades and transcripts and from registering for another semester at UAH. To the extent permitted by the laws of the State of Alabama, any costs to collect a past due account, to include collection agency charges and attorney fees, will be charged back to the student who shall be liable for payment of those charges.

Refunds

Students may drop a class through the sixth day of class (fall and spring) and receive a 100% tuition refund. Please check the UAH website (<http://www.uah.edu/registrar/calendars/>) for summer dates. A student desiring to drop one or more classes may do so on the UAH online registration site or by submitting a drop request form to the Records and Registration Office, SSB 120. The date of the drop request is the date the written request is received at the Records and Registration Office.

Financial Aid

Students who apply for financial aid are responsible for completing the necessary paperwork far enough in advance to assure aid is received in a timely manner. For further information, please check with the Office of Financial Aid, Student Services Building, Suite 124.

Graduate Student Aid

UAH has several programs to assist students in financing their college education. Comprehensive, updated information on all financial aid offered through the Office of Financial Aid is available here (<https://www.uah.edu/admissions/graduate/financial-aid/>). It includes detailed information about types of aid, eligibility guidelines, application procedures, criteria for awards, disbursement methods and regulations, and institutional policy followed in the administration of aid. Additional information and necessary forms are available online and in the Office of Financial Aid.

Students of academic promise who can demonstrate financial need are encouraged to apply for assistance. Realistic financial planning is an essential part of college preparation. UAH helps qualified students find employment, scholarships, and loans as resources permit.

Students should make financial plans well in advance of entering the University. There are two important priority dates for student aid: December 15 for scholarships and April 1 for federal aid (apply online at <https://fafsa.ed.gov/>). The priority dates are the dates by which completed scholarship applications are certain to be included in the first round of review and by which the Free Application for Federal Student Aid (FAFSA) can be processed in a timely manner. A new FAFSA application must be submitted each year aid is requested.

Types of Financial Aid

Scholarships

UAH graduate students interested in receiving scholarships should submit a scholarship application (<https://apps.uah.edu/Scholarship/>) by December 15th of each year for priority consideration. If you currently have a scholarship, check your scholarship description to determine if submitting a scholarship application each year is required.

In addition to traditional scholarships, graduate students may also be eligible to receive the Graduate Student Fellowship Scholarship. Eligible students will automatically receive a discount on their tuition. No scholarship application is required.

Please visit the Graduate Financial Aid website (<http://www.uah.edu/admissions/undergraduate/financial-aid/scholarships/>) for complete information and eligibility rules.

Loans

UAH participates in the William D. Ford Federal Direct Stafford Loan program. Student loan funds are made available directly from the U.S. Department of Education. Although it is sometimes necessary to borrow money to finance an education, caution is advised. Generally, a student should not rely primarily on loans and is advised not to borrow more than what is needed to meet expenses. Additional information regarding eligibility amounts, loan limits, application procedures, and suggested application timelines may be found online on the Financial Aid website (<https://www.uah.edu/admissions/undergraduate/financial-aid/>). This and other valuable information regarding the financial aid process are available in the Office of Financial Aid.

Federal Work-Study Program

The Federal Work-Study Program provides employment for students who need financial assistance. A participating student works part-time on campus or in a non-profit agency while attending the University. In determining eligibility, preference will be given to students with the greatest financial need.

Return of Federal Financial Aid

Federally funded financial aid awarded to a student who withdraws from all classes after registration but before the end of the refund period, or who earns no passing grades for a specific term, must be repaid to the respective program source. When withdrawal or reduction of class load occurs after the end of the refund period, all tuition charges will be paid from the awarded aid and any remaining aid must be repaid to the respective aid source. Specific regulations governing this policy may be found on the *undergraduate* financial aid website at <https://www.uah.edu/admissions/undergraduate/financial-aid> (<https://www.uah.edu/admissions/undergraduate/financial-aid/>).

For more information regarding Federal Financial Aid programs, please review the Department of Education's Federal Student Aid website regarding graduate or professional program funding: <https://studentaid.ed.gov/sa/>

Housing Semester Rates

Central Campus Residence Hall (CCH)

Available for 1st Year Students

Private Bedroom in 4-person suite	\$3,260
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Frank Franz Hall (FFH)

Honors First Year Student Housing

Private bedroom in 4-person suite	\$3,350
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North Campus Residence Hall (NCH)

1st Year Student Overflow, Early Fall Sports Athletes, and Upperclassmen with Charger Excellence Scholarships

Private bedroom in 4-person suite	\$3,475
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Studio Suite (one-bedroom suite)	\$3,715
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Charger Village (CGV)

Available for 2nd Year Students

Private Bedroom in 4-person suite	\$3,515
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Private Bedroom in 2-person suite	\$3,625
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Studio Suite (one-bedroom suite)	\$3,790
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Fraternity and Sorority Housing (FSH)

Available for 2nd Year and Upperclassmen

Private Bedroom in 10-bedroom house	\$3,280
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Southeast Campus Housing (SCH)

Available for Sophomores, non 1st Year Charger Excellence Scholarships, Upperclassmen, and Graduate Students

Private Bedroom in 3-bedroom suite (Graduate Students and Student Families - 12 month contract)	\$2,810
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One Bedroom Unfurnished	\$8,280*
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One Bedroom Furnished	\$8,900**
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Off-Campus Apartments

Available for 2nd Year (non-scholarship) and Upperclassmen (non-scholarship)

Private Bedroom in an Apartment*	\$3,625
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*Ashford Terrace, Emerald Ridge, Highland Point, or Waterford Square

¹ Payable \$2,760 Fall semester, \$2,760 Spring semester, \$2,760 Summer semester.

² Payable \$2,967 Fall semester, \$2,967 Spring semester, \$2,967 Summer semester.

Note: All Housing rates include basic utilities, Internet access, and basic cable television for each suite and bedroom.

Meal Plan Rates

Graduate students are not required to purchase meal plans, but options are available if you would like to purchase a package. Please contact the charger card office for a list of meal plans. <https://www.uah.edu/chargercard/meal-plans> (<https://www.uah.edu/chargercard/meal-plans/>)

Tuition and Fees

The University reserves the right to change its tuition, fees, charges, rules and regulations at the beginning of any semester and without prior notice. Generally, the Board of Trustees of the University of Alabama System considers proposals for changes in fees at the June meeting. The most current tuition and fees rates can be found on the Bursar's website under tuition rates (<https://www.uah.edu/bursar/tuition/>).

Graduate Hours	Resident	Non-Resident
1	759.00	1713.00
2	1381.00	3139.00
3	2003.00	4565.00
4	2625.00	5992.00
5	3247.00	7418.00
6	3869.00	8844.00
7	4351.00	9967.00
8	4834.00	11091.00
9 to 15	5316.00	12215.00
16	5799.00	13339.00
17	6282.00	14463.00
18	6765.00	15587.00

Each additional semester hour is \$483.00 for in-state students and \$1124.00 for out-of-state students.

The University reserves the right to change its fees, charges, rules and regulations at the beginning of any semester and without prior notice.

Facilities Fee

\$12 per hour

Campus Course and Other Instructional Fees

College of Arts, Humanities, and Social Sciences - \$23 per hour

AMS, ARH, ARS, CL, CM, EH, EHL, GS, GY, HY, MU, MUA, MUE, MUJ, MUX, PHL, PSC, PY, SOC, TH, WLC, WGS

ARS - additional \$25 fee per hour

TH - additional \$15 fee per hour

MU - Studio Fee of \$125 per hour

MU 100 - additional \$10 fee per hour

College of Business - \$23 per hour

ACC, BLS, ECN, FIN, IS, MGT, MKT, MSC

College of Education - \$23 per hour

ECH, ED, EDC, HPE, KIN

HPE courses have additional fees per course as follows:

1 credit hour course - \$150

2 credit hour course - \$175

3 credit hour course - \$200

College of Education Additional Fees per Course

ED 501	\$100.00
ED 698	\$400.00
ED 699	\$400.00

College of Engineering - \$45 per hour

CBS, CE, CHE, CPE, EE, EM, ISE, MAE, MTS, OPE, OSE

Office of International Services

International Fee (Fall and Spring Semesters) - \$150 per semester

International Fee (Summer Semester) - \$25 each 5-week term

International Fee (Summer Semester) - \$50 each 10-week term

J Visa Processing Fee - \$100 per request

College of Nursing - \$45 per hour

NUR

HESI Exam Fee for 408-20 - \$153

HESI Exam Fee for 408-2 - \$153

HESI Exam Fee for 408-3 - \$153

College of Professional and Continuing Studies - \$23 per hour

PRO

College of Science - \$36 per hour

AST, ATS, BSE, BYS, CH, CS, ESS, MA, MS (*Summer only*), MOD, MTS, OPT, PH, SPA, ST

Credit by Departmental Exam

\$10 per hour

Intensive Language and Culture Program Rate Tuition

ILC - \$250 per hour

College fee of \$21 per hour

The above tuition and fees are related to graduate program offerings. Additional fees may apply such as a parking permit or a Charger ID card. Please visit the Bursar's website for a complete listing (<https://www.uah.edu/bursar/tuition/>).

Policies and Procedures

The University of Alabama in Huntsville has various policies and procedures that guide our faculty, staff, and students. This section of the catalog provides detailed information on these policies, with which you should be familiar. Failure to read and comply with the policies listed here will not exempt a student from being held accountable to them. Additional policies are listed in the UAH Graduate Handbook (<https://www.uah.edu/graduate/resources/graduate-handbook/>).

Please note that the policies identified in this catalog do not represent an entire repository of university policies, as colleges and departments may implement policies that are not listed here. International graduate students are also encouraged to review the Office of International Services' (<https://www.uah.edu/ois/>) policies in order to maintain their immigration status. In addition, all policies may be amended throughout the year.

Academic Probationary Status

Any time a student's overall grade point average on graduate courses drops below a 3.0, the student will be placed on academic probation. A student on academic probation is not a candidate for a degree and may not register for classes without approval from the graduate dean, nor may they schedule a masters or doctoral defense.

For unconditionally admitted students, probationary status is removed by raising the overall grade point average to 3.0 or better on all graduate work attempted in all terms up to and including the semester in which 12 semester hours of graduate work are completed following the semester the student is placed on probation.

Conditionally admitted students must maintain a B (3.0) average through the semester in which the first 12 semester hours is completed, or they are subject to dismissal from the Graduate School. Conditionally admitted students whose GPA falls below a 3.0 may petition to be allowed to continue in the graduate program if their advisor and department chair are in support of this. Such students must submit a written, signed petition indicating the reason for the poor academic performance, and a plan for raising the GPA to at least a 3.0. Such a plan must give specific details of courses to be taken, course repeats to be used, etc. and must be signed by the advisor and the department chair before being submitted to the graduate dean. If approved, the graduate dean may stipulate other conditions to the plan in order to allow the student to remain in the graduate program.

Failure to remove probation in the manners described may result in dismissal from the Graduate School. In exceptional cases students may petition for readmission to their graduate program upon recommendation of the faculty in the major department and approval by the graduate dean.

Academic Responsibility

Students at The University of Alabama in Huntsville have the following academic responsibilities:

1. To enroll in only those courses for which the stated prerequisite(s) (if any) have been satisfactorily completed. Failure to comply with this procedure may result in administrative withdrawal;
2. To attend all meetings of each class in which they are enrolled. Instructors will announce at the beginning of the semester if they consider attendance in computing final grades;
3. To observe all regulations of their college and select courses according to the requirements of that college;
4. To consult their advisors on all matters pertaining to their academic careers, including changes in their programs;

5. To answer promptly all written notices from advisors, faculty, deans, and other university officers;
6. To maintain the integrity of the classroom by practicing academic honesty. Students should refer to the Graduate Student Handbook for details regarding academic misconduct;
7. To file an 'Application for Advanced Degree' or 'Application for Graduate Certificate,' as appropriate, through the Office of the Registrar to the Graduate School at least 3 months before the expected date of completion of requirements;
8. To be personally responsible for fulfilling all requirements for graduation and observing all regulations at UAH.

Academic Honesty

Plagiarism and other forms of cheating are subject to penalties as outlined in the Graduate Student Handbook. A graduate student found guilty of plagiarism or falsification of research data/results is subject to dismissal from the University.

Academic Appeals Process

Academic appeals will originate in written form by the student and will be processed through the chair of the student's major department, the College Dean, and the Office of the Provost, in that order. The decision of the Provost is final.

Class Attendance

Education at UAH depends upon the cooperation of students and faculty. Students are held responsible for the full work of the course in which they are registered, including participation in the discussion and work of the class at each class meeting.

A student's final grade in each course is determined on the basis of identified course requirements; therefore, regular class attendance is important.

Confidentiality of Student Records

The Family Educational Rights and Privacy Act of 1974 (FERPA) is a federal law that protects the confidentiality of student education records. To implement FERPA, the University has formulated and adopted a written institutional policy governing the handling of these records.

The term 'education records (http://www.uah.edu/registrar/ferpa/#educational_record)' under FERPA includes generally any record, whether in a printed, handwritten, audio, video, or computer media format, maintained by the University and containing information related to a student in his/her role as a student (<http://www.uah.edu/registrar/ferpa/#student>). Certain records are, however, excluded by FERPA from this broad definition, such as those made by instructional, supervisory, and administrative personnel and kept in their sole possession, those made by campus police, and those made by a physician or other professional medical personnel in connection with treatment of the student.

Under FERPA and University policy, a student has a right of access to his/her education records and may inspect and review the information contained in them. To exercise this right, the student should present a request to the University office where the record is located, and a response will be made no later than 45 days later. In certain cases, a copy of the record may be provided, with a copying fee, as an alternative to actual inspection. Some records are not within this right of review, such as financial information from the student's parents and confidential letters or statements of recommendation where the student has waived the right of access.

A student who believes his/her education records contain information that is inaccurate, misleading, or in violation of his/her privacy rights may bring the matter to the attention of the appropriate records official. If by informal discussion with this official the student does not obtain the corrective action desired, the student will then be entitled to a hearing at which he/she may challenge the objectionable item. Additional information about hearing procedures will be given to the student at that time. The decision of the hearing official or panel shall be final. If the decision is adverse to the student, he/she may insert in the education record an explanatory statement about the disputed item.

A student's privacy interest in the education record is further protected by the rule against unauthorized disclosure. Generally, the University may not, without the student's consent, release the education record or personally identifiable information (http://www.uah.edu/registrar/ferpa/#personally_identifiable_information) in it to other individuals or entities.

Disclosure in certain circumstances, however, is specifically excepted by FERPA from the foregoing rule. These circumstances include disclosure to certain parties—University personnel who have a legitimate educational interest in the information, officials of institutions where the student is seeking to enroll, parties to which the student is applying for financial aid, the parent of a dependent student, etc.; disclosure to comply with a judicial order or lawfully issued subpoena; or disclosure in connection with a health or safety emergency. Under the first exception, 'University personnel (http://www.uah.edu/registrar/ferpa/#university_official)' includes any UAH employee, and a 'legitimate educational interest (http://www.uah.edu/registrar/ferpa/#legitimate_educational_interest)' means that the employee has a need for access to the record to perform appropriate tasks clearly within the area of responsibility of the employee, to perform a task related to the education or discipline of the student, or to provide a benefit or service relating to the student. Personally identifiable information will be transmitted by the University under these exceptions only upon the condition that the recipient not permit any other party to have access to it without the student's consent.

The University may also release what is called 'directory information (http://www.uah.edu/registrar/ferpa/#directory_information)' without obtaining the student's consent. Directory information is limited to the following: the student's name, address (local and permanent), telephone number, e-mail address, date and place of birth, enrollment status (full-time or part time), major field of study, participation in officially recognized activities and sports,

dates of attendance, degrees and awards received, the previous educational institution most recently attended, and a photograph of the student. However, a student may prevent the release of even this information, if he/she wishes, by completing a form provided for this purpose in the Office of Student Records.

Any student who believes that his/her rights under FERPA have been violated by the University may notify and request assistance from the Provost and Executive Vice President for Academic Affairs. The student may also file a complaint with the Family Policy Compliance Office, U.S. Department of Education, 400 Maryland Avenue, SW, Washington, DC 20202-5920.

Course Repeat Policy

Students should be aware that course repeats, for any reason, may not be looked upon favorably by some employers and by professional schools; hence, they should avoid the need for repeats.

Students may repeat any course an unlimited number of times in order to achieve a passing grade or an improved understanding of the course material.

One course may be repeated with the previous grade excluded from the calculation of the student's grade-point average. The student must declare such a course repeat before the end of the regular registration period for the semester in which the course will be repeated. Only a course for which the student has received a grade of C, D, or F may be repeated under this option. When withdrawing from a course that has been declared as a course repeat, the previous grade will still be used in the computation of the GPA, and the course will not count toward the maximum of one repeat. Until a grade other than W is reported, the previous grade will be used for the GPA. The transcript will show both the original grades and the course repeat grades, but only the grade points and credit hours earned in the repeated course will count toward graduation and will be averaged into the student's GPA. Concurrent registration for multiple sections of a course is not allowed.

For all other courses repeated at UAH, both the original grade and the course repeat grade will show on the transcript and will be calculated in the student's GPA.

A student wishing to exercise the option of repeating a course with grade replacement must file the intent to do so in the Office of Student Records before the end of regular registration using a Graduate Course Repeat form.

Enrollment Status

Seniors Taking Graduate Courses

A student (other than a senior taking graduate courses with appropriate authorization; see 'Seniors Taking Graduate Courses', or a student in a combined undergraduate/graduate program) must be admitted to the Graduate School to receive graduate credit for courses taken or to take courses at the 500 level or above.

Course Load

A full-time graduate student is one enrolled in courses totaling 9 (GTA or GRA) to 12 semester hours for fall and spring semesters and 6 semester hours for summer. The maximum course load for a graduate student is 13 semester hours. A student employed full-time (40 or more clock hours a week) may schedule no more than 6 hours of graduate work a semester without permission of the faculty advisor or the department chair if the student does not have an advisor. A full-time teacher working toward certification is limited to two courses a semester and a maximum of four three-semester-hour courses an academic year (nine months).

Thesis/Dissertation Requirements

Students working on a thesis or dissertation must register for thesis or dissertation credit each term in which they receive supervision or during which they are engaged in the formal preparation of the thesis/dissertation. **Students must register for 3 credit hours of either 699 or 799 in the semester that they defend.** Thesis and dissertation supervision courses are graded on satisfactory/unsatisfactory basis.

Continuous Registration Requirement

Students pursuing a doctoral degree must register for a minimum of 3 semester hours of graduate credit (to include dissertation credit) each fall and spring semester until all degree requirements are complete and the dissertation is complete and defended.

Credit to Audit

A student is permitted to change a course from credit to audit only during the first four weeks of classes. For students whose tuition is paid by the University through graduate assistantships or tuition scholarships, changing a course from credit to audit will require the student to reimburse the University for that course's tuition.

Graduate Non-Standard Terms for Federal VA Certification Purposes

The VA instructs institutions to enter the training time (full, $\frac{3}{4}$, etc.) in the TT/FT box for the enrollment period based on the school's academic policy when submitting the federal VA certification for graduate level terms. The VA also depends on the institutional determination of what is considered full time in these cases. The VA has an undergraduate matrix for students that is used for non-standard terms. However, this matrix does not adequately

apply to graduate students in a fair and equitable manner when graduate students take courses in non-standard terms due to the weight of semester hours being affected by the number of hours the institution considers full time for graduate level coursework as compared to the undergraduate equivalent (12 hrs for UG = FT vs. 9 hrs Fall and Spring; 6 hrs Summer for GR = FT). Furthermore, the academic policy does not dive deeper into the individual parts of term in order to apply the academic policy appropriately and in an equitable manner as compared to the undergraduate counterpart and due to the way the federal VA requires institutions to certify benefits to the VA.

To bring clarity and equity to this situation, the following policy has been established and will be applied when certifying graduate students in non-standard terms that takes the academic policy of what the institution considers full time and allocates the policy's equivalent to the individual parts of the term when certifying benefits to the VA and is publishing this certification policy guidance to bring the institution into federal compliance by having this information published in the University's catalog. Otherwise, graduate students using benefits would be unfairly subjected to the lesser-weighted undergraduate hours.

Below is the University's determination for VA purposes of how the academic policy for full-time status would apply to VA students for determining rate of pursuit for VA purposes:

GRADUATE POLICY FOR FULL-TIME STATUS WITHIN A SEMESTER:

9 HRS Fall & Spring and 6 HRS Summer

VA NON-STANDARD SUMMER SCHEDULE EXAMPLE:

MAYMESTER: 3 HRS

SUM 1st 5 weeks: 3 HRS

SUM 2nd 5 weeks: 3 HRS

TOTAL HOURS: 9 HRS

(This student would be full-time for the semester, and each part of term would be full-time for that individual part of term. As a result, when submitting graduate hours to the VA, the institution will use the equivalent of how the academic policy would apply to the individual parts of term if a student was full-time for the entire term being certified in other similar cases).

Examinations

During each semester, one or more announced examinations of class period length may be held. At the end of each semester, a final examination period is scheduled for each course. Absences from a scheduled final examination without previous arrangement with the course instructor (except in extenuating circumstances) will be classified unexcused and a failing grade in the course will be assigned.

Any student whose final examination schedule is such that he or she is scheduled to take three or more examinations during a single day shall have the right to have the middle examination rescheduled. The date and time of the rescheduled examination shall be by mutual agreement between the student and the affected faculty member and must be agreed upon prior to the final week of the semester. It is the student's responsibility to notify the instructor of this type of conflict, and it is the instructor's responsibility to verify that the conflict actually exists. If a student is scheduled to take four examinations during a single day, then the same procedure applies except that the student shall now have the right to have both the second and fourth examinations rescheduled.

Graduate Dean's List

The requirements for inclusion on the Graduate Dean's List are quite rigorous; hence a student who achieves this award shows evidence of exceptional achievement.

For inclusion, an individual must:

- have completed at least 12 hours of graduate coursework at UAH during the last 12 months¹; *and*
- have maintained a GPA on graduate-level coursework at UAH of 3.85 overall; *and*
- have maintained 4.0 for the past 12 hours.

Courses that provide a satisfactory or 'S' grade are noncredit courses and are not eligible for inclusion when calculating the student's GPA or credit hour requirements. The Graduate Dean's List is compiled by the Graduate School each spring prior to Honor's Day. Qualifying students who do not have a confidentiality request will be recognized on the Graduate School's website.

¹

Spring to fall semester of the previous year

Graduate Degree Requirements

The following scholastic requirements are those of the Graduate School. Individual colleges and/or departments may list additional requirements.

1. Overall grade point average must be B (3.0) or better on all graduate credit hours at UAH. In addition, the grade point average must be B (3.0) or better on courses taken in the current graduate degree program;
2. No grade lower than a C may be counted toward a graduate degree;
3. At least 30 percent of the hours required for a graduate degree must be completed in courses numbered 600 or above;
4. A majority of the credit hours (including dissertation credits) toward a doctoral degree must have been earned at UAH (or, in the case of joint/shared programs, at the participating institutions).
5. In the case of joint/shared programs, at least 33% of all hours earned for a degree must be earned at UAH.

The Master's Degree as First Graduate Degree

Students may follow one of two plans for the master's degree, except where modified by individual departments. To avoid delay, students are encouraged to submit a Program of Study with the help of a faculty advisor before the completion of 12 semester hours of graduate coursework, in order to assure that courses taken will apply to the degree.

Thesis Plan

Degree requirements under this plan include completion of at least 24 semester hours of graduate course work and at least 6 credit hours of coursework (699) toward the writing of an acceptable thesis. Students working on a thesis must register for thesis credit each term in which they receive supervision or during which they are engaged in the formal preparation and/or defense of the thesis. The thesis should show evidence of the student's capability for research, independent thought, and analysis. Furthermore, the thesis should be written in fluent, acceptable English. The subject must be in the major field. All theses must be accessible to the general public. The thesis is supervised and approved by a faculty committee composed of at least three members of the graduate faculty and appointed by the chair of the department, with approval of the graduate dean. A majority of the committee must be from the major department/program. The chair and at least half of the committee must 1) be full-time UAH faculty members and 2) have full membership in the graduate faculty. If the committee chair is different from the advisor, the advisor must also be a full member of the graduate faculty.

A completed copy of the thesis must be submitted to the major department and the thesis defended according to the dates set by the Graduate School, typically at least eight weeks before the end of the semester in which degree requirements are expected to be completed. The specific dates and detailed procedures for submission of theses can be found at <http://uah.edu/graduate/>. After the student has passed his/her thesis defense a copy of the thesis signed by the committee, department chair and college dean must be submitted to the Graduate School for final proofreading and approval by the graduate dean. Theses must comply with the regulations set forth in the Graduate School's Thesis and Dissertation Manual, available online at uah.edu/graduate/resources/thesis-manual/ or in paper copy from the Graduate School. Students must be in good academic standing (3.0 or better) to schedule a thesis defense.

In exceptional cases, theses may be written in absentia. Before leaving the University, students must 1) select a thesis subject, 2) submit to the chair of the major department a satisfactory outline of the thesis, and 3) submit satisfactory evidence that adequate facilities are available where research is to be done. The student's advisor, the department chair, and the graduate dean must then approve such a plan.

Non-Thesis Plan

Degree requirements for the master's degree under this plan include the completion of a minimum of 30 semester hours of graduate coursework. Individual colleges and/or departments may have specific or additional requirements. A thesis is not required; however, a candidate working under this option may be required to participate successfully in a seminar or other courses for acquaintance with research methods and appreciation of the place and function of original investigation in the field.

Transfer Credit

With permission from the major department, students may transfer up to twelve (12) semester hours of acceptable graduate credit earned in an approved institution and may count it toward a master's degree. No transferred credit may be more than ten years old at the time of a student's graduation from UAH. Such credit may be transferred with the approval of the major department if completed with a grade of B or better.

In some circumstances, a student may need to take a graduate course at another institution while enrolled in a UAH degree program. The transfer of such credit back to UAH must be approved by the department and by the graduate dean prior to the student enrolling at the other institution. (This does not apply to joint or shared programs with other schools).

Time Limit

The degree must be earned within 10 years or by the end of the 30th semester. There are three semesters a year; fall, spring, and summer. The time clock starts when the first course is taken (including transfer credit).

Application for Degree

All candidates for a master's degree must apply for the degree by submitting the Application for Advanced Degree and fee to the Registrar's Office at least three months before the degree is to be conferred. Consult the graduate school website for specific deadline dates.

Final Examination

A final comprehensive examination, or satisfactory performance (B or better) in a capstone course, is required of all candidates for a master's degree. Capstone courses must be designated as such by the department/program during the course approval process and be approved by the College Dean, the Graduate Council Curriculum Committee, the Graduate Dean, and the Provost.

Final examinations for non-thesis candidates may be written, oral, or both. Thesis option candidates must pass a final examination that includes an oral presentation of the thesis in the form of a seminar before the student's supervisory committee; the oral presentation is open to the members of the University community. The examination must be given according to the dates set by the School of Graduate Studies, usually at least six weeks before the end of the semester in which degree requirements are expected to be completed, and the results reported within two working days to the graduate dean. A written notice of the time and place of examination is sent to the graduate dean at least two weeks before the examination date. The graduate dean appoints an additional member of the graduate faculty to act as observer for all thesis defenses. Once set the examination becomes an official Graduate School matter; the date cannot be changed without prior arrangement amongst the supervisory committee members and the student and without approval of the graduate dean. For more details, consult the Graduate School Handbook.

After approval by the graduate dean, the department sends a copy of the written notice to the candidate and each member of the committee. A student may take the final examination no more than twice.

Thesis Submission

After the student has passed their thesis defense and at least six weeks before the end of the semester in which degree requirements are expected to be completed, a final draft of the thesis with supervisory committee, department/program chair, and college dean signatures must be submitted to the Graduate School, with personal contact information. Theses must comply with the regulations set forth in the Graduate School's Thesis and Dissertation Manual, available online at [uah.edu/graduate/resources/thesis-manual](http://www.uah.edu/graduate/resources/thesis-manual) (<http://www.uah.edu/graduate/resources/thesis-manual/>). Student not in compliance will be notified. Upon acceptance by the Graduate School of a student's thesis, the Graduate Dean will forward a signed copy to the student who will then upload it to Proquest. All theses must be accessible to the general public. Detailed procedures for submission can be obtained by calling (256)824-6002.

Second Master's Degree

A student is permitted to apply no more than six semester hours of credit earned for one graduate degree toward an additional master's degree. Such permission is granted at the discretion of the major department and approved by the graduate dean.

Summary of Checkpoints toward Completion of all Master's Degree Requirements

The following checkpoints have been established to assist a student in proceeding from admission to graduation. Timely completion of these forms, in sequence, will help to insure that a student's degree program is in order.

Program of Study: This form must be filed as early as possible and definitely before the completion of 18 semester hours. If a supervisory committee develops the program, the student should be invited to the committee meeting. Once approved, changes in the Program of Study must be submitted on a Change of Program form and approved by the committee chair, department chair and graduate dean. A valid reason must be given for the change.

Application for Advanced Degree: This is to be filed at least three months before the end of the semester in which degree requirements are expected to be completed. It is available in the Registrar's Office.

Notification of Thesis Defense/Final Examination: Notification of the examination date must be turned in to the Graduate School at least two weeks in advance of the examination. The final examination must be taken at least six weeks before the end of the semester in which degree requirements are expected to be completed, and according to the dates set by the Graduate School and not earlier than the semester in which the student will complete all required coursework. A member of the committee will be appointed to be the graduate observer.

Report of Thesis Defense/Final Exam: Following the thesis defense/final exam the committee shall submit a signed report to the Graduate School.

Doctoral Degrees

UAH offers doctoral level programs in the Colleges of Engineering, Science, and Nursing. For specific information regarding Nursing's Doctor of Philosophy (Ph.D.) or Doctor of Nursing Practice (DNP) degrees, please visit the College of Nursing website. *This information will be available in next year's catalog cycle.*

The Doctor of Philosophy Degree

The doctor of philosophy degree is a research oriented degree awarded upon the demonstration of scholarly competence. The degree program at UAH is based on the successful completion of a program of study designed by the student and a faculty committee. The program may include mastery

of certain research skills (e.g., languages, computer programming, statistics, and others approved by the Graduate Council), and must include an independent research project, the results of which are presented in the form of a dissertation.

Degree Requirements

The following specific degree requirements are applicable to all Ph.D. degree programs within the University. Additional requirements may be specified by individual colleges and/or departments as shown in this catalog under the appropriate section.

Course Requirements

Course requirements, including at least 48 hours of graduate coursework (excluding dissertation research), are defined in the Program of Study and are determined by the appropriate department. Usually the student will take a majority of the courses in a given field with the remainder in a cognate field. This, however, is not a requirement. A maximum of nine semester hours credit in thesis/research work from the master's degree may be allowed to count toward the 48 hour requirement. Students must also satisfactorily complete a minimum of 18 semester hours of dissertation research (799). Students must register for dissertation research each semester in which they receive faculty supervision. The approval of the Program of Study should be accomplished as early as possible, but no later than one year after admission to the Ph.D. program. Once approved, the program may be amended only with the approval of the supervisory committee upon submission of the Change of Program form and approval of the graduate dean.

Continuous Registration Requirement

All students who have completed the minimum coursework requirements for the doctoral degree they are pursuing (excluding dissertation hours) must register for a minimum of 3 semester hours of graduate credit (to include dissertation credit) each fall and spring semester until all degree requirements are complete.

Transfer Credit

All credit toward the Ph.D. which has not been earned at UAH must be acceptable graduate credit from an approved institution. Such credit may be transferred with the approval of the major department if completed with a grade of B or better. A majority of the credit hours (including dissertation credits) toward a doctoral degree must have been earned at UAH (or, in the case of joint/shared programs, at the participating institutions).

Academic Residence Requirement

Residence at UAH as a doctoral student is required for evaluation of the student's investigative abilities, independent thought, and scholastic progress by faculty members other than the major advisor. Residence may be established through either (1) being enrolled as a full-time student (at least 9 graduate semester hours) either for one continuous academic year, or for Spring and Fall semesters in the same calendar year, or (2) being enrolled in at least 6 hours of graduate course work in at least three of four consecutive semesters. Colleges and/or departments may have more stringent requirements and students should refer to the appropriate section of the catalog for details. All research effort presented for residence credit toward the Ph.D. degree must be performed under the direction of a full member of the graduate faculty.

Supervisory Committee

A supervisory committee is appointed for each student working toward the Ph.D., usually after satisfactory completion of a preliminary examination administered by the major department. The supervisory committee is appointed by the department chair with approval of the graduate dean as part of the Program of Study approval. The supervisory committee is composed of at least five members of the graduate faculty, with at least half being from the major department/program. The chair and at least half of the committee must 1) be full-time UAH faculty members and 2) have full membership in the graduate faculty. If the committee chair is different from the advisor, the advisor must also be a full member of the graduate faculty.

Qualifying Examination

The Qualifying Examination is given under the auspices of the Graduate School and must be administered by the Supervisory Committee within one year of the date the student completes the formal coursework on the Program of Study. It is conducted in two distinct stages which may be separated by a length of time deemed appropriate by the supervisory committee. The first stage is a demonstration through written and oral examination that the student is proficient in the subject matter in the Program of Study. The final stage is the dissertation proposal review in which the student prepares a written report and makes a subsequent oral presentation describing the proposed dissertation research. Both the dissertation topic and expected approach(es) must be clearly delineated to the committee's satisfaction in order for a pass to be granted. The presentation of the oral dissertation research proposal must be scheduled through the Graduate School at least two weeks in advance. Once this review is complete, the results of the Qualifying Examination are reported to the Graduate School within two working days on the prescribed form. The presentation of the oral dissertation proposal may be given no more than twice.

Time Limit

The degree must be earned within 10 years or by the end of the 30th semester. There are three semesters a year; fall, spring, and summer. The time clock starts when the first course is taken (including transfer credit).

Application for Degree

All candidates for a Ph.D. degree must apply for the degree by submitting the Application for Advanced Degree and fee to the Registrar's Office at least three months before the end of the semester in which degree requirements are expected to be completed.

Dissertation

The dissertation is evidence that the student can independently identify a problem of contemporary significance through familiarity with the current literature in the major field, organize and execute a program of research, recognize and analyze the results, and present them in cogent, well-written exposition. Furthermore, the dissertation should be written in fluent, acceptable English. Dissertation results are expected to be submitted for refereed scholarly publication. All dissertations must be accessible to the general public. A completed copy of the dissertation must be submitted to the major department at least eight weeks before the end of the semester in which degree requirements are expected to be completed. See the Graduate School website for specific deadlines. Dissertations must comply with the regulations set forth in the Graduate School's Thesis and Dissertation Manual, which is available online at [uah.edu/graduate/resources/thesis-manual](http://www.uah.edu/graduate/resources/thesis-manual) (<http://www.uah.edu/graduate/resources/thesis-manual/>).

Final Examination

The final examination must include an oral presentation of the dissertation in the form of a seminar before the student's committee; this presentation is open to the members of the University community. The examination must be given at least six weeks before the end of the semester in which degree requirements are expected to be completed, and the results reported within two working days to the graduate dean. The committee appoints a member of the graduate faculty to act as an observer for all dissertation defenses. Once set, the examination becomes an official Graduate School matter; the date cannot be changed without prior arrangement amongst the supervisory committee members and the student and without the approval of the graduate dean. A student may take the final examination no more than twice. Students must be in good academic standing to schedule a dissertation defense.

Summary of Checkpoints toward Completion of Degree Requirements

The following checkpoints have been established to assist a student in proceeding from admission to graduation. Timely completion of the forms, in sequence, will help to ensure that a student's degree program is in order.

Program of Study: The supervisory committee and the student should meet to develop a complete program for the student. Once approved, changes in the Program of Study must be submitted on a Change of Program form and approved by the committee chair, department chair and graduate dean. A valid reason must be given for the change.

Notification of Qualifying Examination: Notification of the qualifying examination must be turned in to the Graduate School at least two weeks before the examination date.

Report of Qualifying Examination: Following the examination the committee shall submit a signed report to the Graduate School.

Application for Advanced Degree: This should be filed three months before the end of the semester in which degree requirements are expected to be completed. (Available from the Registrar's Office, SSB 120.)

Notification of Dissertation Defense: Notification of the defense must be turned in to the Graduate School at least two weeks before the examination date. This examination must be taken at least six weeks before the end of the semester in which degree requirements are expected to be completed. A member of the committee will be appointed to be the graduate observer.

Report of Dissertation Defense: Following the defense the committee shall submit a signed report to the Graduate School.

Dissertation Submission

After the student has passed his/her dissertation defense and at least six weeks before the end of the semester in which degree requirements are expected to be completed, a final draft of the dissertation with supervisory committee, department/program chair, and college dean signatures must be submitted to the Graduate School, with personal contact information. Dissertations must comply with the regulations set forth in the Graduate School's Thesis and Dissertation Manual, available online at [uah.edu/graduate/resources/thesis-manual](http://www.uah.edu/graduate/resources/thesis-manual) (<http://www.uah.edu/graduate/resources/thesis-manual/>). A student not in compliance will be notified. Upon acceptance by the Graduate School of a student's dissertation, the Graduate Dean will forward a signed copy to the student who will then upload it to Proquest. All dissertations must be accessible to the general public. Detailed procedures for submission can be obtained by calling (256)824-6002.

Registration

Dates, times, procedures, and eligibility conditions for registration are published in the Schedule of Classes on the UAH website (<https://www.uah.edu/cgi-bin/schedule.pl>). After the published deadline, registration requires approval from the Dean of the Graduate School. A student must submit a written petition with appropriate documentation to substantiate extenuating circumstances to the Graduate School. The petition must include signatures from the instructor and the chair of the department that offers the course. All financial obligations to the University must be cleared before a student may register for courses. Students should consult with their academic advisor prior to registration. Non-degree students have a lower registration priority for full classes.

Concurrent registration for multiple sections of a course is not allowed. A student who schedules courses during registration makes a financial commitment to the University. Schedule adjustments, drops, and withdrawals must be officially transacted either via UAH web registration or in writing on a Registration/Schedule Adjustment form and recorded by the Office of the Registrar by the published deadlines. Adjustments in fees, if any, will be made by the Office of the Bursar. The University assumes no responsibility for students who attend classes without proper registration.

A semester hour is an academic unit of credit awarded for the completion of educational activities. The amount of credit awarded depends on the expected amount of time required to complete in-class and out-of-class work during a semester for a course that is passed. For example, each semester hour awarded for a lecture course at UAH requires at least one hour of classroom or direct faculty instruction and a minimum of two hours out of class student work each week for approximately fifteen weeks for one semester. At least three hours of work per week is required for each semester hour awarded for practica, internships, activity courses, laboratory experiences, and distance learning courses, although there will be variations in the amount and type of instruction and the minimum amounts of outside student work to accommodate differences among academic disciplines and the natures of particular subject matters and courses. The institution reserves the right to make semester hour assignments that exceed the minimum time requirements stated. Time expectations for work outside of class are minimums and may be higher depending on the nature and level of the course as well as the ability, commitment, and learning style of the student.

Schedule Adjustments

After the beginning of an academic term, students seeking to change their course schedules must follow the Schedule Adjustment Process. Schedule adjustments fall into seven categories: Drop/Add, Late Addition, Credit/Audit, Withdrawal, Late Withdrawal, Retroactive Withdrawal, and Medical Withdrawal. The following definitions and procedures will govern the Schedule Adjustment Process.

Drop/Add

After classes have begun, students should consult with their academic advisor and other university officials for advice and approval before making any schedule changes. Students are advised to check the impact of dropping courses on things like financial aid, athletics eligibility, visa status, etc.

Through the sixth day of classes for a ten-week or fifteen-week semester, fourth day of a seven-week semester, or third day of a six-week or shorter semester, students may Add a course through the web-registration process, by meeting with their advisor, or by submitting a Registration/Schedule Adjustment form to the Office of the Registrar.

Through the sixth day of classes for a ten- or fifteen-week semester, fourth day of a seven-week semester, third day of a six week or shorter semester, students may Drop any or all courses from their schedule and receive a refund of tuition and fees associated with the dropped courses.

Late Addition

In rare circumstances a student may have a legitimate and substantial need to register, add a class or change a class section after the deadline (i.e., Last Day to Add a Class). In these instances the student must complete the Registration/Schedule Adjustment form, with recommendations (approval/non-approval) from the instructor and the chair of the department that offers the course. The Office of the Registrar will process the request once approvals are obtained.

New international students who want to register after the deadline must obtain approval from the International Student Advisor, and in the case of graduate students, the Graduate Dean. Approvals for late registration for new international students will include the respective academic units.

Credit to Audit

A student is permitted to change a course from credit to audit through the fourth week of a fifteen-week semester, the third week of a seven- or ten-week semester, and the second week of a five-week or shorter semester. The instructor is not required to grade any written assignments that may be submitted by an auditing student. A student who elects to audit a course may not at any point after electing to audit, change to "for-credit", i.e., graded status. Any student failing to follow established procedure for change to audit will continue to be enrolled in the class for credit and may receive a failing grade in that course.

Withdrawal

After the Drop/Add period a student may Withdraw from any course and receive a grade of W. The deadline for Withdrawal is the end of the tenth week of a fifteen-semester, end of the seventh-week of a ten-week session, the end of the fifth week of a seven-week session, the end of the third week of a five-week semester, or the end of the second week of a semester shorter than five weeks.

Withdrawal is accomplished by either 1) executing a withdrawal on the registration website or 2) by submitting a Registration/Schedule Adjustment form to the Office of the Registrar. No signatures or approvals are required for a Withdrawal, but students should consult with appropriate officials to determine the impact that withdrawing from a course may have on financial aid, athletics eligibility, visa status, etc.

Class non-attendance does not constitute withdrawal nor does notification to the instructor. Any student failing to follow the established procedure for withdrawal will continue to be enrolled in the class and may receive a failing grade in that course.

Late Withdrawal

After the Withdrawal period, a student may request a Late Withdrawal from a course under the most extenuating circumstances. Avoidance of an undesirable grade does not justify withdrawal.

Students requesting a Late Withdrawal must submit the Late Withdrawal Form, along a written explanation of the extenuating circumstances and any appropriate documentation, to the Office of the Provost. Students may mail their request and supporting documentation to Provost@UAH.edu or deliver it to SSB 303. If the Office of the Provost believes sufficient evidence exists to warrant a Late Withdrawal, the withdrawal request is forwarded to the

Dean of the college in which the student is enrolled (minus personal documentation) for consideration. If approved, the Office of the Registrar will process the request when approvals are obtained and received by the Registrar.

Class non-attendance does not constitute withdrawal nor does notification to the instructor. Any student failing to follow the established procedure for withdrawal will continue to be enrolled in the class and may receive a failing grade in that course.

Retroactive Withdrawal

Undergraduate students may at times experience extraordinary problems during an academic semester. Within two years of having completed such a semester, a student may petition the Office of the Provost to withdraw retroactively from ALL classes taken during that semester. A retroactive withdrawal is granted only under exceptional circumstances, such as extraordinary medical or personal problems and is only granted prior to graduation. The petition must use the Retroactive Withdrawal form and include clear and documented evidence whenever possible. The Office of the Provost verifies the documentation and considers the petition. If the request is granted, the grades for ALL courses taken during the semester in question will be changed to W's. Petitions for Retroactive Withdrawals are considered after final grades are posted. Students should be aware that retroactive withdrawals may have an impact on their ability to receive or retain financial aid and timely completion of their degree.

Medical Withdrawal

Students may at times experience medical hardships that prevent them from attending class and necessitate a withdrawal. Decisions on whether to award a Drop, Withdrawal, Refund, etc. must include sufficient documentation to justify the request. In such cases the student should contact the Dean of Students office for assistance.

Recording of Withdrawals

If the withdrawal process is completed during the first two weeks of the semester, the withdrawing student's name does not appear on the final rolls of the class from which the student withdrew, and that course does not appear on the student's permanent record. If the withdrawal process is completed after the first two weeks, then the withdrawing student's name will be on the final roll of the class from which the student withdrew, and that course will be recorded on the student's permanent record with a final grade of W.

Counseling

Students need to be aware that many potential employers, as well as graduate and professional schools, view an excessive number of W's on a transcript as a flag that the student cannot be counted on to complete demanding projects. Advisors should be informed of this fact and students should be encouraged to discuss with their advisors any plans to withdraw from a course, especially after the first two weeks of the semester.

Grading System

The University of Alabama in Huntsville's grading system includes grades of A, B, C, D, F, I, X, W, S, U, P, AU, and N. Instructors have the option of augmenting the course grades of A, B, C, and D with symbols '+' and '-' signifying, respectively, high and low achievement within the assigned grade. These augmented letter grades become part of the student's permanent record and appear on transcripts, but augmentation of a letter grade does not affect its value for the purposes of the GPA computation.

A	Superior achievement. Four quality points given per semester hour.
AU	Audit. Course attendance as a listener. No credit given, no quality points assigned, no attendance requirement.
B	Above average achievement. Three quality points given per semester hour.
C	Average Achievement. Two quality points given per semester hour.
D	Passing work. One quality point given per semester hour.
F	Failing work. No credit given; no quality points assigned.
I	Incomplete. Assigned by the instructor when a student, due to circumstances beyond his or her control, has not satisfied some requirement of the course. The deadline for a student to remedy a grade of I is the last day of class of the next semester enrolled or one calendar year from the date of the grade whichever occurs first. If the grade of I is on a student's record at the time of graduation, it is treated as an F.
N	No grade. Assigned by the Office of the Registrar when the instructor does not report a grade.
P	Passing work. Assigned in some courses. See Pass-Fail Option.
S	Satisfactory work. Applicable to noncredit courses and to some specified credit courses, and will not be counted in the GPA.
U	Unsatisfactory work. Applicable to noncredit courses and to some specified credit courses.
W	Withdrawal. (See Withdrawal Policy.)

X

Excused absence from examination. Assigned by the instructor when a student completes all course requirements except the final examination. The final grade becomes an F unless the examination is completed by the time of the announced deferred examination date at the beginning of the semester of next regular enrollment of the student. (See Examinations and UAH calendar). Time schedule permits a student to take only one examination on this date. If a student receives more than one grade of X, he or she should make arrangements directly with other instructors for additional make-up examinations.

Course Numbering System

Range Year	Student Normally Takes Courses
001-099	Refresher (noncredit)
100-199	Freshman
200-299	Sophomore
300-399	Junior (upper-level)
400-499	Senior (upper-level)
500-599	Graduate
600-699	Graduate
700-799	Graduate, Ph.D. level

Change of Grade

When it is believed that a grading error may have occurred, a student is permitted a maximum of one semester from the date a grade is assigned to request a change of course grade. Grades submitted to the Office of the Registrar can normally be changed only by submission by the instructor on a Change of Grade form containing a written explanation of the error. The Change of Grade form must be approved by the department chair and received in the Office of the Registrar no later than two semesters from the date the original grade was assigned.

Academic Appeals

An academic appeal may be filed by a student regarding an action taken by University personnel, including instructional personnel, administrators, or staff members at the University, that affects the student's academic standing. Examples of academic appeals include, but are not limited to, allegations of unfairness in grading, alleged violation of a written or oral agreement with a student (e.g., course requirements for graduation), and alleged inconsistent applications of existing policies. Appeals related to course grades must be filed within 30 days of the end of the semester/term in which the grade was earned. Students wishing to file an appeal must follow the Academic Appeals policy, found at https://www.uah.edu/images/administrative/policies/02.01.12-AA_Academic_Appeals_Policy.pdf

Transcripts

There are two ways to request an official UAH transcript:

1. Complete a transcript request form (<https://www.uah.edu/registrar/forms/transcript-request/>) available on the registrar's website.
2. You can also request electronic or paper official transcripts through the National Student Clearinghouse (https://www.studentclearinghouse.org/secure_area/Transcript/login.asp?FICEcode=00105500/).
 - o In order to send PDF transcripts, you must request them through the link above.

Please note: A 3% convenience fee will be added to all credit/debit card payments. However, if you use the National Student Clearinghouse (https://www.studentclearinghouse.org/secure_area/Transcript/login.asp?FICEcode=00105500/) to request transcripts, you will **not** be charged the convenience fee.

General Information

Mission of The University of Alabama in Huntsville

The University of Alabama in Huntsville is a research-intensive, internationally recognized technological university serving Alabama and beyond. Our mission is to explore, discover, create, and communicate knowledge, while educating individuals in leadership, innovation, critical thinking, and civic responsibility and inspiring a passion for learning.

History

The University of Alabama in Huntsville (UAH) is a part of the University of Alabama System. In June 1969, the University of Alabama Board of Trustees established the University of Alabama System with three independent, autonomous campuses at Huntsville, Birmingham, and Tuscaloosa. Each campus has a separate president who reports to the Board of Trustees through the chancellor of the system.

Academic programs were initiated in Huntsville in 1950; in 1963 degree opportunities at the master's level were provided and in 1964, at the baccalaureate level. The first master's degree based on work begun and completed in Huntsville was awarded in 1964 and the first undergraduate degrees in 1968. Doctoral programs were initiated in physics and engineering in 1971, and the School of Nursing was established the same year. In 1974, in a component of the Alabama School of Medicine, the first full-time medical students began their core clinical experience in Huntsville. (These programs were transferred to direct UAH management in 1995). In the two decades of the 1970s and 1980s, UAH implemented a broad range of undergraduate degree programs; established master's programs in the liberal arts, nursing, and business administration; initiated professional degree programs at both the graduate and undergraduate levels; and inaugurated selected Ph.D. programs in high-technology fields in the sciences and engineering.

UAH is focused to meet the specific needs of scientific and technological enterprises and the cultural and intellectual needs of a rapidly expanding region. It is UAH's intention to be innovative, even experimental, to explore what is new, to evaluate existing programs continually, to develop and establish curricula and pedagogical techniques calculated to help students live and perform well in a complicated environment.

Accreditation

UAH is accredited by the Southern Association of Colleges and Schools Commission on Colleges (SACSCOC) to award bachelor's, master's, specialist, and doctoral degrees. Contact the Commission on Colleges at 1866 Southern Lane, Decatur, Georgia 30033-4097 or call 404-679-4500 for questions about the accreditation of UAH.

Several UAH programs are accredited by their respective accrediting agencies. Academic programs in chemistry are accredited by the American Chemical Society. Eight undergraduate engineering programs (aerospace engineering, chemical, civil, computer, electrical, industrial and systems, optical, and mechanical) are accredited by the ABET, Inc. Both undergraduate and graduate programs in nursing are accredited by the Commission on Collegiate Nursing Education. Computer science holds accreditation from the Computing Accreditation Commission of ABET, Inc. All programs, both undergraduate and graduate, in the College of Business are accredited by the American Assembly of Collegiate Schools of Business (AACSB). In addition, the University of Alabama in Huntsville is an accredited institutional member of the National Association of Schools of Art and Design (NASAD) and the National Association of Schools of Music (NASM). Teacher education programs are approved by the Alabama State Board of Education, according to standards of the National Association of the State Directors of Teacher Education and Certification (NASDTEC), for the issuance of appropriate professional certificates for service in public schools, and the College of Education at The University of Alabama in Huntsville is accredited by the National Council for Accreditation of Teacher Education (NCATE).

Academic Calendars

Academic calendars are available on the registrar's website and can be found at the following webpage:

<http://www.uah.edu/registrar/calendars> (<http://www.uah.edu/registrar/calendars/>)

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Class Schedule

The following link will take you to the current class schedule:

<http://www.uah.edu/cgi-bin/schedule.pl>

Additional student information can be found at <https://www.uah.edu/students> (<https://www.uah.edu/students/>).

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