1972

1972-1973 Catalog, vol. 6, no. 1

University of Alabama in Huntsville

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Catalog 1972-73
Volume 6, No. 1
Statement of Purpose

The University of Alabama in Huntsville is dedicated to the intellectual, aesthetic, social, and economic advancement of the state and region it serves, and to the proposition that it can best aid in this advancement by being a competent member of the national and international academic communities.

Such membership requires constant attention to teaching, research, and interaction with the local, state, and regional communities. It demands a steady allegiance to the academic values: an atmosphere conducive to the unhindered pursuit of knowledge and the education of students primarily as thinking individuals. Basic to the establishment and maintenance of its identity as a true university is a strong program in the liberal arts and sciences, which continue to form the core of education. Progressively, this institution intends to expand its programs by pursuing the special advantages of its environment.

Its location in the midst of important government and industrial research centers gives it highly unusual opportunities for new and creative programs in engineering and the natural sciences. Huntsville, as a city which has peacefully managed drastic social and economic change, offers a rich field of discovery in the social sciences. Because many citizens in this area have well-developed cultural interests and talents, the University is encouraged to provide exceptional programs in the humanities.

In the development of its programs, the University intends to seize all of these advantages by incorporating new academic disciplines, enriching traditional studies, and creating fresh academic approaches as the faculty and students concentrate on the vastly complex problems of contemporary life.
The UAH Term System

UAH operates on a system in which four identical terms, each spanning 12 weeks, constitute a calendar year.

Credit for course work is granted in standard semester hour units.
Academic Calendar

Fall Term, 1972

- Early Registration: July 20 - August 2
- Freshman Orientation: August 8-9
- Fall Placement Tests: August 11
- Application Deadline: August 17
- Registration: August 31, September 1
- Classes Begin 8:00 a.m.: September 5
- Late Registration: September 5-6
- Deferred Examinations: September 9
- Mid-Term: October 9
- Study Day: November 14
- Examinations: November 15-18

Winter Term, 1972-73

- Early Registration: October 26 - November 8
- Winter Placement Tests: November 10
- Application Deadline: November 22
- Student Thanksgiving Holidays: November 20-29
- Registration: November 30
- Classes Begin 8:00 a.m.: December 4
- Late Registration: December 4-5
- Deferred Examinations: December 9
- Student Christmas Holidays: December 21 - January 1
- Classes Resume 8:00 a.m.: January 2
- Mid-Term: January 17
- Study Day: February 22
- Examinations: February 23-24, 26-27

Spring Term, 1973

- Early Registration: February 1-14
- Spring Placement Tests: February 16
- Application Deadline: February 26
- Registration: March 5
- Classes Begin 8:00 a.m.: March 7
- Late Registration: March 7-8
- Deferred Examinations: March 10
- Student Spring Holidays: April 20-23
- Classes Resume 8:00 a.m.: April 24
- Mid-Term: April 10
- Examinations: May 21-24
- Commencement: May 27
Summer Term, 1973

Early Registration .......................... April 26 - May 9
Summer Placement Tests .................. May 11
Application Deadline .................. May 29
Registration .................................. June 4
Deferred Examinations ................. June 9
Classes Begin 8:00 a.m. ............. June 6
Late Registration ......................... June 6-7
Student Holiday ............................. July 4
Mid-Term ..................................... July 11
Study Day ..................................... August 16
Examinations ................................... August 17-18, 20-21

Class Periods

Monday, Wednesday, Friday

<table>
<thead>
<tr>
<th>Period</th>
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<tr>
<td>A</td>
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<td>B</td>
<td>9:25 a.m.-10:40 a.m.</td>
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<tr>
<td>C</td>
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<tr>
<td>D</td>
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<td>G</td>
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<td>3:50 p.m.- 5:50 p.m. (MW only)</td>
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<tr>
<td>S</td>
<td>6:00 p.m.- 8:00 p.m. (MW only)</td>
</tr>
<tr>
<td>T</td>
<td>8:10 p.m.-10:10 p.m. (MW only)</td>
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Tuesday, Thursday

<table>
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<tr>
<td>P</td>
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</tr>
<tr>
<td>Q</td>
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<tr>
<td>R</td>
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<tr>
<td>S</td>
<td>6:00 p.m.- 8:00 p.m.</td>
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<tr>
<td>T</td>
<td>8:10 p.m.-10:10 p.m.</td>
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The University of Alabama in Huntsville is an Equal Opportunity Institution and welcomes applications for employment and educational programs from all individuals regardless of race, color, religion, sex, or national origin.
General Information

The University of Alabama in Huntsville (UAH) is a part of the University of Alabama system. In June of 1969, the Board of Trustees established the University of Alabama system with three independent, autonomous campuses—Tuscaloosa, Birmingham, and Huntsville. Each campus has a separate president, reporting directly to the Board of Trustees. Academic programs were initiated in Huntsville in 1950; in 1963 degree opportunities at the master's level were provided; in 1964 degree programs at the baccalaureate level were initiated. The first master's degree based on work begun and completed in Huntsville was awarded in 1964; the first undergraduate degrees were awarded in 1968. Doctoral programs in physics and engineering were initiated in 1971. UAH is accredited by the Southern Association of Colleges and Schools.

This brief chronology indicates that the programs of UAH are still in the developing stages, a characteristic of viable programs in any university. UAH was brought into being and is growing to meet the specific needs of scientific and technological enterprises and the cultural and intellectual needs of a rapidly expanding region.

Since the UAH program is new, it is relatively unfettered by tradition and patterns of established practice. It is our 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 better in a complicated environment.

UAH is supported by the state, federal, and local governments, and by generous individuals and industries. The existing programs strive for superiority within limited areas and though expansion is anticipated, a wide variety of specialties is not planned for the foreseeable future.

The degree programs at UAH are administered by: the Division of the Humanities; the Division of Social and Behavioral Sciences; the Division of Natural Sciences and Mathematics; the Division of Engineering; and the Division of Nursing.

The Division of the Humanities offers the Bachelor of Arts degree with majors in art, English, French, German, and history. Courses are also offered in education, Russian, Spanish, music, philosophy, and speech. Graduate courses are offered in education. Programs for both elementary and secondary teaching certification are available. The Division of Humanities and the Division of Social and Behavioral Sciences cooperate in offering a program in Slavic Studies.

The Division of Social and Behavioral Sciences offers the Bachelor of Arts
degree with majors in economics, psychology, political science and sociology. A Master of Science degree is offered in administrative science.

The Division of Natural Sciences and Mathematics offers the Bachelor of Arts degree with majors in biology, mathematics and mathematics education, and the Bachelor of Science degree with majors in biology, chemistry, mathematics, mathematics education and physics. Courses are also offered in statistics, computer science and natural science. Graduate programs are offered that lead to the Master of Arts degree with a major in mathematics and the Master of Science degree with majors in chemistry and physics. The Doctor of Philosophy degree is offered in physics. The Ph.D. can be obtained in chemistry through a cooperative plan with the University of Alabama, Tuscaloosa, in which a student spends one academic year at the Tuscaloosa campus.

The Division of Engineering offers the Bachelor of Science in Engineering, Master of Science in Engineering, Master of Science in Operations Research and Doctor of Philosophy degrees. The undergraduate program is founded on a unified engineering curriculum with options of specialization in electrical engineering, engineering mechanics, fluid and thermal engineering, industrial and systems engineering, and computer science. This curriculum requires a number of liberal education courses and emphasizes a strong grounding in mathematics, physics, and chemistry. The M.S. program in engineering provides for specialization in four areas of study at the master's level.

The Division of Nursing offers the Bachelor of Science in Nursing degree. The program is a flexible one aiming toward the development of persons who can assume responsible citizenship while practicing nursing or a functional nursing specialty.

Programs which cut across divisional lines are also offered at UAH. A Master of Arts degree program in developmental learning is expected to be fully implemented during the 1972-73 school year. Specializations in computer science and criminal justice are also offered under Interdivisional Programs.

A program is now under development which will lead to the Doctor of Medicine degree.

The Division of Continuous Education offers credit and non-credit courses, conferences, seminars, and institutes in a variety of subjects to provide for individual enrichment and professional advancement. In activities primarily for adults, the division cooperates with appropriate departments to offer programs leading to the Two-Year Certificate in child development and law enforcement and the Post-Graduate Certificate in modern technology and program management.

The UAH Library is being developed to give maximum support to the
academic and research programs. Its more than 80,000 volumes of monographs and journals reflect great care in selection; its more than 150,000 items in such forms as microfiche, federal documents, maps, technical reports, and sound recordings provide supplementary sources for special purposes. Acquisition of library resources is given high priority in the development at UAH.

The availability of the Redstone Scientific Information Center, with holdings in science and technology that make it possibly the finest technical library in the Southeast, adds substantial strength to UAH programs, particularly at the graduate level.

Students admitted to UAH have achieved academic records that compare favorably with those in larger and older educational institutions. Through evaluations of previous academic records and entrance examinations, UAH attempts to insure admission to those who are well qualified for collegiate education. Students are assured that faculty members are present to help but not "oversee" them; and because of assumed maturity, students are expected to seek counseling and special assistance as needed.

The faculty at UAH has been assembled from leading universities throughout the United States and abroad. The quality of this faculty is evident when measured by its writings, its research, and its reputation in the academic world.

The University of Alabama in Huntsville is an institution which has some distinctive features and unusual strengths. The information contained in this publication is designed to outline in more detail the policies, purposes, and programs of The University of Alabama in Huntsville.
Facilities

The 332 acre campus of The University of Alabama in Huntsville is located in Northwest Huntsville adjacent to Research Park. The seven University buildings, all of which have been constructed since 1960, contain modern equipment and exemplify modern functional design.

Morton Hall houses most of the classes and offices for the Division of Social and Behavioral Sciences and the Division of Nursing.

The Science-Engineering Building contains classrooms and laboratories for the undergraduate physical and biological sciences, chemistry, and engineering programs and most of the faculty offices for the Division of Natural Sciences and Mathematics and the Division of Engineering. The building is equipped with modern laboratory equipment including a penthouse containing a live animal room and greenhouse.

The three-story Library building is the first phase of a library complex that will form the center of a cluster of academic buildings projected for the campus. Capacity of the library is approximately 125,000 volumes. The library has open-access stacks and student typing equipment. Services of subject specialists are available for the students.

The Graduate Studies Building contains executive administrative offices, admissions and student affairs offices, graduate classrooms, faculty offices, and the administrative offices and classrooms of the Division of Continuous Education.

The Research Institute is an integral division of The University of Alabama in Huntsville. It provides research leadership, management services, facilities, and equipment for faculty, research staff, and graduate students to expand the frontiers of knowledge. With few exceptions, the faculty performing research in the Institute are actively engaged in the undergraduate and graduate study programs in the academic divisions of UAH.

The Research Institute houses offices and laboratory space and equipment to support research in the aerospace and missile related sciences and engineering, science and technology surveys and applications, management, social sciences, and life sciences.

A key feature of the Research Institute is the contiguity of the disciplines, which fosters communication and encourages an interdisciplinary approach to research. Other important benefits derive from this particular and rather unique organization. It is a point for exposure of graduate students to a research environment, a place for recognition and dissemination of current research of the faculty to the scientific and
technological community, and a place for pooling research instrumentation to make it optimally accessible to University personnel.

The two-story University Union has facilities for dining, sports, assemblies, dramatic presentations, and other recreational activities. It also contains meeting rooms, offices for the Student Government Association and student newspaper, and a bookstore.

A two-building complex, temporarily called the Humanities Building, houses programs in the humanities, principally in music, art, English and history. In addition to serving the instructional programs in the humanities, the facility contains large lecture rooms for varied University programs.

Housing

The University of Alabama in Huntsville has available 88 two-and three-bedroom apartment units for rental to single students, married students, faculty, and staff. The apartments are located across University Drive within walking distance of the campus. All apartments are carpeted and air-conditioned; each apartment has one bath as well as a living room, dining area, and kitchen equipped with gas range and electric refrigerator. A limited number of three-bedroom duplexes are available to married students and faculty with children; three-bedroom townhouses are available to single persons as well as married students and faculty. For application and additional information, get in touch with the Office of Student Affairs, University Housing, P.O. Box 1247, The University of Alabama in Huntsville, Huntsville, Alabama 35807.
Information on Admissions

The faculty and staff of The University of Alabama in Huntsville welcomes inquiries and applications from interested persons who wish to further their learning experiences with a program of higher education. The UAH student body is composed of individuals of all ages—traditional full-time college students and other adults who are combining their educational pursuits with work, family, and other activities. Application for admission should be made well in advance of the date of proposed entrance but not more than one calendar year. See UAH calendar for application deadline dates for specific terms.

Prospective freshmen are encouraged to apply during their senior year in high school. Tentative admission will be granted on the basis of ACT scores and high school records through the junior year. Work completed in the senior year and confirmation of graduation will be reviewed before a student’s admission is final.

Application forms, detailed instruction on how to apply, and information brochures are available at the Information Desk located in Morton Hall.

Admission to the Freshman Class

Plan A

High school graduates may be admitted as freshmen to The University of Alabama in Huntsville on the basis of acceptable high school records and scores achieved on the American College Testing (ACT) Program examinations. (ACT scores are not required for applicants who were graduated prior to 1961.)

All applicants should present a minimum of 16 high school units in the following categories:
   - 4 Units English
   - 1 Unit History or Social Studies
   - 1 Unit Algebra
   - 1 Unit Geometry
   - 9 Units of Electives (at least 5 electives should be academic in nature.)

UAH urges high school students to include in their elective courses additional units in mathematics, foreign languages, natural sciences, and social studies. The Division of Engineering and the Division of Natural Sciences and Mathematics strongly recommend that the additional elective units include two units of college preparatory mathematics. Applicants who plan to enter the Division of Engineering or major in a
natural science should also include 1 unit of physics and 1 unit of chemistry. Students will find it to their advantage to follow these recommendations in their choice of high school electives so that they may be able to begin their college program at the appropriate level.

Applicants having deficiencies in the required high school courses may be admitted in good standing; however, the deficiencies must be removed during the first year of enrollment in a manner approved by the appropriate division director. Courses taken to remedy entrance deficiencies cannot be used to satisfy degree requirements.

Plan B

Persons who have not been graduated from high school may be admitted on the basis of satisfactory scores achieved on the General Educational Development Entrance Test (GED). The University of Alabama in Huntsville serves as a testing center for the GED program. Anyone seeking additional information or wishing to take the GED examination should get in touch with the Office of Student Records.

Application Procedure

Applicant must submit:
1. Completed application forms in duplicate.
2. Non-refundable application fee of $10.00.
3. A Student Medical Form.

In addition, he must request that:
1. Two copies of his high school transcript be sent from the high school to the Office of Student Records and
2. (Plan A) ACT test scores be sent from ACT to the Office of Student Records.
   (Plan B) Official score reports of GED examinations be sent from agency administering tests to the Office of Student Records (if the applicant does not have a high school diploma.)

The application for admission must be in the Office of Student Records by the specified dates in the UAH calendar.

Admission of Special Students

An individual who has applied and who does not qualify as a regular beginning freshman may be admitted to UAH as a special student. The special student will be limited to an accumulated maximum of 15 semester hours. (It is recommended that he schedule 6 semester hours in the first term and no more than 9 semester hours in his second term.) At
the conclusion of 15 semester hours, the special student may be admitted as a regular degree-seeking student if his overall record reflects a C average. It is the student’s responsibility to petition to become a regular student by filing the appropriate application.

An individual who has applied and who does not qualify as a regular transfer student may be admitted on probation as a special student. As such, he will be limited to an accumulated maximum of 15 semester hours. At the conclusion of 15 semester hours, the special student may be admitted as a regular student if he has attained a cumulative C average. If, at the end of 15 semester hours, he has made substantial progress toward an overall C average, he may petition for renewal of the special student status for an additional 15 semester hours.

A foreign student may also be admitted as a special student if his Test of English as Foreign Language score prohibits regular admission. Subsequent admission as a regular student is subject to the same conditions as the new student and the transfer student.

An individual holding a bachelor’s degree, or higher, may apply to attend the UAH as a special student. He, also, will be limited to an accumulated total of 15 semester hours and will be expected to qualify for admission as an irregular post graduate student or as a graduate student if he plans to continue his studies at UAH.

Admission of Academically Talented High School Students

UAH welcomes inquiries from academically talented high school students who may wish to enroll in courses for college credit during the summer term between their junior and senior year of high school or concurrent with their senior year in high school. For detailed information, such students should contact their high school counselors or the Office of Student Affairs at UAH.

Admission of Transfer Students

Students who have previous academic records at a college or university level may be admitted to UAH as transfer students. For all students who intend to graduate from UAH, transfer credits are evaluated in the Office of Student Records during the first term of enrollment. The application of such accepted credits to a particular program of study will be made and approved at the time of official determination of the individual’s program of study. It must be understood that acceptance and application of credits are two separate and distinct processes.

Credits earned in terms of quarter hours will be converted to semester hours on the basis of 2/3 of one semester hour for each quarter hour.
The University of Alabama is composed of three campuses—Tuscaloosa, Huntsville, and Birmingham. A student enrolled in an undergraduate division at any U. of A. campus may transfer to an undergraduate division at another U. of A. campus so long as he is eligible to continue enrollment in the University. He will receive credit for courses in which a passing grade has been made.

Applicants with previous records showing 18 semester hours or more of work attempted at accredited colleges or universities must have a minimum overall C average on all work attempted and be eligible to return to the last institution attended in order to qualify for unconditional admission. An applicant with less than an overall C average may be admitted on probation upon recommendation of the director of the division in which he plans to major provided:

1. The quality point average is at least 0.75 (1.00=C); and
2. The quality point deficiency is less than 8.

A prospective transfer student who has attempted fewer than 18 semester hours of work at an accredited college or university and who has at least a 0.5 average (on a 3.0 system), or who has passed at least half of the work attempted may be considered for admission on the basis of high school grades and ACT scores.

In the case of students admitted under these conditions, transferred courses with grades of D are not accepted.

If the previous record was earned at an institution not holding regional accreditation, the applicant may be admitted as outlined; but accepted credits will be classified as provisional and his evaluation will bear the notation "provisional credit." Full credit for the provisional credit will be based upon performance during the first 30 semester hours attempted at UAH. Each student in this category should see the Registrar concerning his status at the end of the term in which he has completed his first 30 semester hours at UAH.

If a student is transferring from a junior college and has previous credits from a senior college, his credits for transfer will be evaluated on an individual basis and may be limited to 64 hours.

Application Procedure

Applicant must submit:
1. Completed application forms in duplicate.
2. Non-refundable application fee of $10.00.
3. A Student Medical Form.

In addition he must request that:
1. Two copies of his high school transcript be sent from the high school to the Office of Student Records.
2. Official transcripts from each collegiate institution attended be sent directly from the previous institutions to the Office of Student Records.

The application for admission must be in the Office of Student Records no later than specified dates on the UAH calendar.

If an applicant is entering as a special student, refer to page 18.

Admission of Irregular Post Graduate (IPG) Students

Applicants already holding a bachelor's or other higher degree will be considered for admission in the status of irregular post graduates.

A student admitted in this category may take any course at the 500 level or below if he has met the prerequisites. In some instances, a student may, with the approval of the division director, take courses numbered 600 or above; however, credits earned in these courses while a student is classified as an IPG will not carry graduate credit.

Application procedure is the same as that for Admission of Transfer Students. (High school transcripts are not required.)

Admission of Transient Students

To qualify as a transient student a person must be currently enrolled in good standing at another institution (including either of the University of Alabama's other two campuses) and interested in attending UAH for one term only.

Completed Transient Application Forms (in duplicate) and a Letter of Good Standing Form must be submitted for approval to the Office of Student Records prior to the registration period of the term the student wishes to attend.

Admission of Audit Students

A person desiring to attend courses or lectures without examination or credit may be admitted on the basis of information required on the Audit Application Form. (Regularly admitted students may register to audit
credit courses without separate application.) An auditor may not obtain credit in a course by retroactive action after announced deadlines for changes. (See section on Course Changes.)

Admission of Foreign Students

In addition to fulfilling the specified entrance requirements or their equivalents, a foreign student (this applies to any person whose official residence is other than the United States) must submit a satisfactory score on the Test of English as Foreign Language unless his native language is English. Each foreign applicant must also give evidence of financial ability to meet the expenses of his intended stay at UAH.

Foreign students are advised to submit applications earlier (preferably 3 months) than announced deadlines for other students. All inquiries should be directed to the Office of Student Records.

If an applicant is entering as a special student, see page 18.

Readmission

A student who has not attended UAH for one or more terms and who wishes to return should consult with the Office of Student Records in order to determine his status and the conditions under which he may resume his studies.

Admission to the Graduate School

Detailed information concerning admission to the Graduate School will be found in the Division of Graduate Programs section.

Non-Matriculated Students

Persons registering for courses offered through the Division of Continuous Education may enroll as non-matriculated students. Credit earned while in this category remains on file with the Continuous Education Division. If the student is later admitted to UAH, the credit may be requested to be accepted into the regular records, subject to the standard regulations governing transfer credit.

A non-matriculated student may complete application procedures at the time of registration. No transcripts or other credentials are required. A non-matriculated student must certify that he or she is:

1. a high school graduate or has a satisfactory score (50 or higher) on the GED,
2. has the stated prerequisites for the course desired, and
3. is not under current suspension from another collegiate institution.
Financial Information

Expenses per Term

Full-Time and Part-Time Students Taking 8 or More Semester Hours (Undergraduate)
Alabama Resident .......................................................... $175.00
Non-Resident .............................................................. $350.00

Full-Time and Part-Time Students Taking 5 or More Semester Hours (Graduate)
Alabama Resident .......................................................... $228.00
Non-Resident .............................................................. $456.00

The above identified costs include course fees, building fees, student union fees, and a student activity fee. An out-of-state fee is included for all non-resident students.

Part-Time Students Taking 7 or Less Semester Hours (Undergraduate)
Registration Fee .............................................................. $ 3.00
Course, Buildings, and Student Union Fees per Semester Hour ............................................. $ 22.00*
For Non-Residents, an Additional Charge per Semester Hour ............................................. $ 22.00
Student Activity Fee .......................................................... $ 4.00

Part-Time Students Taking Graduate Education Courses**
Registration Fee .............................................................. $ 3.00
Registration Fee for Courses on Semester Basis .......................................................... $ 4.50
Course, Buildings, and Student Union Fees per Semester Hour ............................................. $ 25.00*
Student Activity Fee .......................................................... $ 4.00

Part-Time Students Taking 4 or Less Semester Hours (Graduate)
Registration Fee .............................................................. $ 3.00
Course, Buildings, and Student Union Fees per Semester Hour ............................................. $ 50.00*
Student Activity Fee .......................................................... $ 4.00
For Non-Residents, an Additional Charge per Semester Hour ............................................. $ 50.00

*A Student Union Fee of $1.75 is included in the cost of the first hour only for each person enrolled each term.
**Effective the 1972 Winter Term, persons taking graduate education courses will pay standard graduate fees.
An estimated average cost of books per term for full-time students is $50.00.

Regulations concerning traffic and parking will be distributed at the time of registration.

The University reserves the right to change its fees, charges, rules, and regulations at the beginning of any term and without previous notice.

Payment of Fees

A Fee Statement showing total amount due will be mailed to each student each term. Payment should be made by check if possible and mailed to the Office of Financial and Internal Affairs along with the Fee Statement. If a student does not receive a Fee Statement within several days after registration, he should contact the Office of Financial and Internal Affairs. It is the student's responsibility to see that his account is paid by the final day for payment indicated on the statement.

Audit Fee—Same as for Credit.

Fees for non-credit courses vary and are announced in individual brochures.

Other Charges

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<tr>
<td>Addition of Course Fee</td>
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<tr>
<td>Change of Course Fee</td>
<td>5.00</td>
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<tr>
<td>Examination Fee (Deferred or Special)</td>
<td>2.00</td>
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<td>(A Student missing more than two examinations in one term is charged a maximum fee of $5.00)</td>
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<tr>
<td>Installment or Deferred Payment Fee</td>
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<tr>
<td>Laboratory Fee (Biology, Chemistry, Physics, Psychology)</td>
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<tr>
<td>Applied Music</td>
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</tr>
<tr>
<td>2/3 Hour Private Instruction</td>
<td>20.00</td>
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<td>1 1/3 Hours Private Instruction</td>
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<td>Late Deferred Penalty</td>
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<td>Late Registration Fee (In addition to regular registration fee)</td>
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<td>Returned Check Handling Fee</td>
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<td>1st Check</td>
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<tr>
<td>3rd Check</td>
<td>5.00</td>
</tr>
<tr>
<td>Late or Replacement of I.D. Card</td>
<td>2.00</td>
</tr>
<tr>
<td>Transcript Fee--First transcript free--</td>
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</tbody>
</table>
Each additional copy ........................................ 1.00
No transcript will be issued for a person who has a financial obligation to the University.

Cap and Gown Rental—Handled through the Book Nook

Diploma Fees
- Bachelor’s and Master’s Degrees ................................ 15.00
- Diploma Fee (If qualifications for graduation are not met and if diploma has been ordered) .......... 5.00
- Duplicate Diploma ............................................ 7.50
- Thesis Binding Fee (3 copies) .................................. 13.00
- Each Additional Copy ..................................... 4.25

Fees may be paid in three installments. An additional charge of $2.00 is made for this option. A statement will be mailed to the student for each installment due. Payment must be made by a deadline date designated on the statement; otherwise, a late penalty will be charged.

Withdrawals and Refunds

After a student has enrolled, he will be carried on the class rolls until such time as written notification is received that he has withdrawn. It is the student’s responsibility to withdraw officially in accordance with University regulations. See Student Academic Information Section on “How to Withdraw”. Basic fees (course, buildings fund, and lab fee) will be pro-rated according to the withdrawal schedule below. All other applicable fees must be paid in full.

Withdrawal after registration is completed but before first class meeting of the course
- Charges—Registration fee

Withdrawal during first week of classes
- Charges—25% of basic fees

Withdrawal during second week of classes
- Charges—50% of basic fees

Withdrawal during third week of classes
- 75% of basic fees

Withdrawal after third week of classes
- Charges—100% of basic fees

Students suspended for disciplinary reasons shall have no right to a refund of any portion of any fees paid or due to be paid.
Out-Of-State Student

A student (under 21 years of age) shall be classified as an out-of-state student unless one of his or her parents or legal guardians

1. is a registered voter of the State of Alabama, or
2. has been a legal resident of the State of Alabama for at least one year immediately preceding any registration by the student at The University of Alabama in Huntsville, or
3. is a member of the armed forces of the United States or employee of other governmental agency and officially stationed in Alabama, or
4. is permanently employed in a full time job in the state of Alabama.

If a student is over 21 years of age, or married, and falls into one of the above categories, or is a female student whose husband falls into one of the above categories, he or she shall be classified as an "in-state" student.

Once a student has registered at The University of Alabama in Huntsville, his classification for tuition purposes shall remain unchanged in the absence of satisfactory evidence to the contrary. Such evidence must be reduced to writing and filed with the registrar who shall determine whether, according to the above standards, a change in classification shall become effective at the time of the student's next registration.

Student Aid

The University of Alabama in Huntsville has several programs to assist capable students in financing their college education.

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 students find employment and awards scholarships and loans to qualified students as its resources permit. In planning a program of financial assistance, consideration should be given to the advisability of combining scholarships, loans, and part-time employment since none of these alone is adequate in extreme cases.

The Financial Aids and Placement Office has prepared a booklet, Financial Aids to Students, which lists scholarships, grants, loans, and types of employment available to students.

A student should make his financial plans well in advance of entering the University. He is advised to write to the Financial Aids and Placement Office requesting the booklet mentioned above at the same time that he makes application to the University. Applications for student aid must be filed at the Financial Aids and Placement Office prior to March 1 for the following school year. No award implies automatic renewal; a new application must be submitted by the above deadline each year.
College Scholarship Service

The University of Alabama in Huntsville participates in the College Scholarship Service of the College Entrance Examination Board. The amount of financial aid granted a student is based upon financial need. To help the University judge student needs and award aid fairly, UAH asks parents to fill out a Parent's Confidential Statement of their income, assets, and liabilities. On the basis of this financial statement, the University can determine the amount of money the student will need.

Some points to be considered in determining a reasonable parental contribution are salaries of both parents, additional income, net worth of business or farm, real estate holdings, savings, investments, special family circumstances (such as additional costs of two working parents), number of dependents, student's earnings and assets, extraordinary expenses (such as business or medical), and debts for certain purposes. Special circumstances such as job expense, debts, support of elderly relatives, or other children in college also are taken into account.

Types of Financial Aids

Scholarships
All scholarships at UAH are awarded for the academic year (nine months) and are not available for the summer term. Nearly all of these scholarships are awarded on a merit-need basis. Most available scholarships vary from $100.00 to $600.00.

It is not necessary, and often not advantageous, to apply for a particular scholarship. The student's need and scholastic ability will be the factors considered in determining the value of the scholarship offered him. When a student completes the regular scholarship application form, he will be considered for all undergraduate scholarships awarded by The University of Alabama in Huntsville.

The following scholarships are awarded annually:

Samuel Palmer Memorial Scholarships
The Board of Trustees of the University of Alabama established in 1967 a scholarship trust fund of $17,217.19 to be known as the Samuel Palmer Memorial Scholarship. The interest from this fund shall be used for two scholarships to be awarded annually to UAH students. The recipients shall be selected on the basis of scholastic standing and leadership and must be full-time undergraduate students.

Carl T. Jones Engineering Scholarships
This scholarship was established from donations to UAH and the University of Alabama Huntsville Foundation in the memory of the late Carl T. Jones, prominent Huntsville businessman and civic leader. It is
awarded annually to two full-time freshman students majoring in engineering and indicating a desire to practice this profession in Alabama.

American Institute of Industrial Engineers, Inc., Scholarship
A scholarship award in the amount of $300 is made each year by the North Alabama Chapter of the American Institute of Industrial Engineers to a full-time undergraduate student at UAH with a good general academic performance. While it is desired that the student be enrolled in Industrial Engineering, it is not a mandatory factor.

Presidential Scholarship
A scholarship award in the amount of $600 will be made each year to a rising senior who in the judgment of the President has made the most significant contribution to The University of Alabama in Huntsville and one who shows unusual potential for future leadership. A quality point average of 2.5 or better is required.

Wernher Von Braun Scholarship
This scholarship, created in honor of Dr. Braun by his numerous friends, will be awarded annually to a full-time junior or senior student. The recipient will be selected on the basis of his quality point average, which must be 2.5 or better, his contribution to UAH and the community, and his potential for future leadership.

University of Alabama Huntsville Foundation Scholarships
These scholarships are awarded annually to high school seniors from Madison County who plan to attend UAH. Criteria for eligibility consists of scholastic ability, leadership, and financial need. Selection of winners is made by the high schools. The Huntsville Foundation also awards several scholarships to junior and senior level students throughout the year.

UAH is a corporate institute for Gorgas Scholarship Award winners.

Loans
In some cases it is advisable to borrow to finance an education; however, caution is advised in borrowing. Generally, a student should not rely primarily on loans to finance his education. A student is usually advised not to borrow more than half of what he needs to meet his expenses.

National Defense Student Loan Program: Under Title II of the National Defense Act of 1958, students in good standing and with financial need may apply for National Defense Student Loan funds. The act directs that need be the primary consideration for granting such a loan. Terms of this loan apply to both undergraduate and graduate students.

Subject to the availability of funds, an undergraduate student may borrow for college expenses in one year a sum not exceeding $1,000, and during his entire course in higher education, a sum not exceeding $5,000.
Graduate or professional students may borrow as much as $2,500 a year, up to a maximum sum of $10,000. The borrower must sign a note for his loan. The repayment period and interest do not begin until nine months after the student ends his studies. The loans bear interest at the rate of 3% a year on the unpaid balance, and repayment of principal may be extended over a ten-year period.

Guaranteed Student Loan Program: To help students from middle or upper-income families, a Guaranteed Student Loan Program is now authorized. Under this program, a student may borrow from a bank or other financial institutions. Both graduate and undergraduate students may borrow as much as $1,500 a year. Students who have pursued full-time courses of study during an academic year or its equivalent may qualify for up to an additional $500 during periods of accelerated study, not to exceed $2,000 in a 21 month period.

Grants
Educational Opportunity Grants: Grants ranging from $200 to $1,000 a year will be awarded to students of exceptional financial need who would not, except for the Grant, be financially able to attend college.

Grants are restricted to undergraduate students and may be renewed for the four years of undergraduate work.

Work-Study Program
The College Work-Study Program provides part-time employment for full-time students who need financial aid to attend college.

In determining eligibility, preference will be given to students from low-income families. The needs of other students then may be met to the extent that funds are available.

A student may begin participation in this program after he has been accepted for admission by UAH. He may work 40 hours a week at this time until he is actually enrolled. While enrolled for classes he may work an average of 15 hours per week. Most undergraduate students employed will earn between $1.60 and $1.75 per hour. Skilled graduate students will earn about $2.00 per hour.

Graduate Fellowships and Assistantships
Persons interested in graduate fellowships and/or assistantships should direct their inquiries to the academic departments concerned.

Federal Nursing Student Loan and Scholarship Programs
This program was established by Congress as part of the Public Health
Continuous Education for additional information.

Law Enforcement Education Program

As authorized by the Omnibus Crime Control and Safe Streets Act of 1968 (PL 90-351), a Law Enforcement Student Grant and Loan Program has been established by the Law Enforcement Assistance Administration to encourage and help to assist financially, persons pursuing or interested in pursuing law enforcement careers.

The grant program provides payments for tuition, fees, and books, not to exceed $200 per term. Those students awarded grants must agree to remain in the service of their employing agencies for a period of two years following completion of any course of study funded by the grant.

The grant is restricted to in-service law enforcement officers of local, state, and federal units of government. Eligible students may enroll for part-time or full-time studies in any course acceptable toward satisfying the requirements for a Bachelor's Degree.

Loans up to a maximum of $1,800 per academic year are made available to full-time students preparing to enter the field of law enforcement and to full-time students either on academic leave from their law enforcement agency or currently employed by a law enforcement agency.
To be eligible for a loan, an applicant must be a full-time student currently enrolled or accepted for admission to The University of Alabama in Huntsville. The program of study undertaken may be at the undergraduate or graduate level, but the credits at the undergraduate level must lead to a degree in an area directly related to law enforcement.

The applicant must indicate an intention to pursue, resume, or continue full-time employment in a publicly funded local, state, or federal law enforcement agency upon completion of his studies. Otherwise, repayment of the loan will begin nine months following the termination of full-time student enrollment. Minimum repayments of $50 per month are due quarterly on the loan which bears 7 percent simple interest.

Cancellation of up to 100% of the loan is available to persons who enter the criminal justice field upon graduation.

Applications are available in the UAH Financial Aids and Placement Office. It is advised that these forms be obtained, completed and returned well in advance of the period of study for which they apply.

**Veterans**

Under the Veterans' Readjustment Act of 1966 (PL 89-358), which affects most veterans, the veteran receives his allowance directly from the government. He is responsible for paying his fees directly to the University and meeting payment deadlines applicable to all students.

The Veterans Administration will make full payment only when the student's schedule includes at least 8 semester hours each term. In order to facilitate the prompt and accurate reporting of the student's status and course load, it is necessary that the student complete a brief form at the Office of Student Records every term he is enrolled.

It is the student's responsibility to keep himself in good standing with the Veterans Administration and to respond to notification of changes in regulations.

For additional information, write to Veterans' Administration Regional Office, 477 South Court Street, Montgomery, Alabama 36104.

Many students who are children of veterans of World War I, World War II, or the Korean Conflict may be eligible for benefits under the War Orphans Educational Assistance Act (PL 634). Contact the nearest Veterans Administration regional office for additional information.

The Alabama G.I. and Dependents Education Benefit Act provides for eligible veterans, their children, widows and/or wives. No monetary benefits are involved, as tuition is paid directly to the school. For
additional information, write to Assistant to the Director, Department of Veterans' Affairs, P.O. Box 1509, Montgomery, Alabama 36102.

Vocational Rehabilitation

Students with physical disability may obtain grants-in-aid covering fees, books, and supplies through the Vocational Rehabilitation Service which is supported by federal and state appropriations. For further information, write to Alabama Vocational Rehabilitation Service, 407 Governors Drive, S.W., Huntsville, Alabama, or to the Director of Vocational Rehabilitation, Room 416, State Office Building, Montgomery, Alabama, 36104.

Miscellaneous

Many businesses and industries provide tuition assistance to employees attending UAH. An employed student may wish to consult the personnel office of his place of employment to determine its policy regarding tuition assistance.
Student Life

Student Government Association

The Student Government Association promotes the welfare of students in all areas of University life. Its primary purpose is to help improve the educational environment. This includes promoting academic innovation and working closely with faculty and administration toward making desirable changes in institutional policies.

Through a substantial budget, the SGA develops and sponsors programs to enrich the student's cultural, intellectual, and social life; to make the University community as complete as possible; and to broaden the student's interests and knowledge.

Each student enrolled at UAH is automatically a member of the Student Government Association. To carry out the official business of the organization there exists an SGA executive branch and a sixteen member legislature.

The SGA sponsors many student services such as life and health insurance, a store discount plan, a student charge card, special rates for community cultural events and a package of banking services from a local bank. As well as administering the Symposium and Lecture Series, the Entertainment Series, the Film Series and the University Playhouse, the SGA provides students with an Ombudsman, legal counsel, a used textbook exchange, and a book club.

University Union

All Union facilities are open to the University community-students, faculty, and staff. Regular hours are: 8:00 a.m. - 10:30 p.m., Monday - Friday; 10:00 a.m. - 1:00 p.m., Saturday; and 11:00 a.m. - 10:30 p.m., Sunday.

Athletics--The Union coordinates all intramural and intercollegiate athletics and has facilities for team and individual sports such as basketball and table tennis. Equipment includes weights, exer-gyms, trim-wheels, peg-board climb, chinning bar, volleyballs, and basketballs.

Dances, Plays, Film and Lecture Series--SGA sponsors dances, usually held once a month, and films, lectures and dramatic productions throughout the year, all of which are held in the Union.

Book Nook--The University's paperback bookstore has popular and supplemental paperbacks, records, UAH stationery, jackets, and art and
classroom supplies. The Book Nook will also place individual orders for any book in print.

The textbook store is located in Morton Hall. All assigned text are available from this store, which also stocks a large line of office and classroom supplies.

Lounges--A color TV lounge, a study lounge, and a card and game room are located on the second floor.

Meeting Rooms--The large Multipurpose Room on the first floor can accommodate up to 1,000 people, or can be divided into three smaller rooms. Two conference rooms upstairs can accommodate 20 people each.

Offices--All student offices (Student Government Association, Film Series, "exponent", Crew and Athletics) and the office of the Union Manager are on the second floor.

Union Snack Bar--The University food service, located in the Union, provides convenient eating facilities and economical prices. It is open from 8:00 a.m. through 7:00 p.m., Monday - Thursday, and Friday from 8:00 a.m. to 5:00 p.m. A vending machine area is open during regular Union hours.

Shower Facilities--Men's and women's shower facilities are located on the first floor next to the Multipurpose Room. Lockers are also available.

Student Publications

"exponent," the official student newspaper, is published biweekly. This campus publication is edited and managed by UAH students with the advice and general direction of the joint student-faculty Publications Board. All UAH students are eligible for staff membership. The editors are elected by the student body. The Student Government Association occasionally publishes a pamphlet concerning new programs and services provided for the student body. Also, a student directory is published annually by the SGA.

Intercollegiate Competition - Crew, Soccer, Basketball

The UAH Rowing Club, a charter member of the Southern Intercollegiate Rowing Association, competes against all Southern Conference crews, which include Rollins College, Jacksonville University, Tampa University, Florida Southern College, University of East Carolina, and the Citadel in both individual races and championship regattas.

The UAH Crew also participates in the following major regattas: Miami,
Cypress Gardens, Mid-American, President’s Cup, and the Dad Vail. The 1971-72 varsity crew placed 5th national in small college rankings after a good showing at the Dad Vail.

The UAH soccer team began its first intercollegiate schedule in 1971, facing opponents such as Vanderbilt University, German Air Force team, Italian Air Force team and Oakwood College. The team posted a 15-1-1 record and won the 1971 Rocket City Soccer Classic.

The UAH basketball team, in its fourth year, plays varsity teams from throughout the Southeast. The UAH team won the 1971 Selma Invitational.

Membership is open to any male student.

**UAH Intramural Organization**

The aim of the Intramural Organization is to provide an opportunity for all students to enjoy satisfying physical and competitive activities. The philosophy of the organization is based upon the concept that students should have freedom of choice, equality of opportunity, and responsibility for sharing in planning, supervising, and administering the program.

All regularly enrolled students and members of the faculty and staff are eligible to take part in intramural activities. These include: basketball, flag football, golf, soccer, softball, table tennis, tennis, track, and volleyball.

In addition the Organization participates in the following sports on an intercollegiate basis: basketball, soccer, and crew. Golf will be added to intercollegiate competition during the spring of 1973.

**Choral Organizations**

UAH has four choral groups: The UAH Choir, The Premier Singers, The Village Singers, and The Summer Chorus. Membership is open to all students; course credit is offered. Participation in any of the four groups may be repeated. (See course listings in the Division of the Humanities section for details.)

**The UAH Choir**

The UAH Choir, the first choral ensemble to be organized at UAH, is composed of from thirty to forty students. These students perform the choral literature of the great masters of music history. Their repertoire always includes a large choral work and outstanding arrangements of folk
music from several countries.

**The Premier Singers**
The Premier Singers are spirited men and women students who perform popular music. The group provides light-hearted entertainment for campus and community organizations and serves as an outlet for UAH students who enjoy singing together.

**The Huntsville Village Singers**
The Huntsville Village Singers is a small, elite group of mixed voices performing a broad range of madrigal and choral chamber music as well as presenting choreographed medleys and tunes from Broadway and Hollywood. The Village Singers were one of 10 college musical groups selected for a 1972 USO tour.

**Summer Chorus**
Summer Chorus is a group of mixed voices singing a wide variety of popular and serious choral music to satisfy the tastes of all students.

**Student Organizations**
Additional information about student organizations and a current list of club officers may be obtained from the Office of Student Affairs.

**Alpha Omega Fraternity**
Alpha Omega Fraternity, founded during the spring of 1971, is affiliated with the national Alpha Tau Omega Fraternity. Through brotherhood, the fraternity enriches the lives and educational experiences of its members and performs many services for the University community.

**Biology Club**
The object of the UAH Biology Club is to promote interest and research in the biological sciences. Any person enrolled as a full or part-time student at UAH and interested in biology is eligible for membership. The meetings are called at random by the president. Activities are aimed at giving the members a first-hand look at science in its natural environment, and include many and varied field trips, lectures, films, and an annual collecting trip to Florida. The club also offers aid on research projects.

**Christian Fellowship Group**
The Christian Fellowship Group provides University students with additional opportunities for Christian worship, through Bible study, prayer, and Christian fellowship.

**Circle K**
Circle K, a service organization for men and women students, is sponsored by the Metropolitan Kiwanis Club. It is open to all students interested in
service to the community. Past interests of the club have included disadvantaged youth, ecology, minority concerns, and drug education. Circle K holds weekly meetings and occasional social events.

Economics and Business Club
The purpose of the Economics and Business Club is to promote interest in these fields and to inform the community about economic issues. In addition to club officers, the organization elects a representative to the Economics and Business faculty committee. Dues are $3.00 per school year.

Engineering Society
The Engineering Society is a service organization composed of students and faculty in engineering, allied sciences, and mathematics. Regular membership is open to engineering faculty and students, and associate membership is open to the faculty and students of the sciences and mathematics.

The Society meets twice a month to discuss current engineering developments and to participate in special programs of science and engineering enrichment. The meetings provide a common ground for communication between faculty and students leading to a more complete understanding of engineering practice. The Engineering Society also works with the Division of Engineering in solving problems related to curriculum, class scheduling, professional licensing, and the like.

Gamma Xi
Gamma Xi is a service organization open to all women students and is affiliated with the national Gamma Sigma Sigma service organization. Gamma Xi functions at the university, community, and national levels and members also work at various service and fund-raising projects. Initiates must undergo a ten-week pledge period during which time they will work on special projects and attend the regular meetings which are held twice a month.

Medical Careers Association
The Medical Careers Association is for students who intend pursuing a career in the health field, which includes pre-medical and pre-dental students as well as those in nursing, medical technology, and allied fields. The purpose of the Association is to help its members fulfill the entrance requirements of the various professional schools across the nation and to acquaint them with opportunities in the health fields. Interviews with and lectures by admissions officers of professional schools, programs about the latest advances and opportunities in the health fields, and guidance in the selection of courses of study are some of the services provided by the association.
Pep Club
The purpose of the UAH Pep Club is to promote school spirit and University support for all athletic functions.
Membership is open to any interested University student.

Slavic Club
The Slavic Club is for students who wish to further their understanding of Slavic cultures. While the emphasis is on Russia, the whole spectrum of Slavic nations is studied. At Club gatherings, the members use various media to investigate different facets of their interests.

Social Science Honor Society
This society is affiliated with Delta Tau Kappa, international behavioral science organization. Its purpose is to honor students who have good academic records and a potential for future service in this field. Each year the Society selects an outstanding professor and student from the social sciences (defined as history, political science, psychology, sociology, foreign languages, and economics). The society also performs services for the campus. Meetings are held every two months.

The Society of Physics Students
The Society of Physics Students, designed solely for students, enables its members to participate in the physics community on a professional basis. Students in SPS pay small national dues and receive Physics Today. Any interested student may join. Within SPS is the Sigma Pi Sigma honorary society. Membership in this fraternity is based on general scholarship. An overall QPA of 2.0 and a QPA of 2.2 in at least 15 hours in physics is required for Sigma Pi Sigma.

Student National Education Association
The UAH chapter of the Student NEA is for students who plan to be educators. One of the organization’s purposes is to involve students in the issues and processes of education before they begin their careers. All undergraduate education students may join.

Cultural and Entertainment Series

The University Cultural Series
The University Cultural Series, jointly sponsored by the SGA and the UAH faculty and administration, presents performances to stimulate the cultural interests of the students. In advance of each event, full-time students may draw one free ticket and one half-priced “date” ticket for each event; part-time students may purchase one ticket at half price. Tickets are available in advance at the Information Desk in Morton Hall and at the Book Nook in the University Union.
UAH Film Series
The UAH Film Series, free to UAH students, shows art, foreign, contemporary and classic movies monthly. The intent behind the Series is to entertain as well as provide the student with a wide cultural background in film and give him an opportunity to investigate the social and economic importance of film as an art form.

The UAH Symposium and Lecture Series
The Symposium and Lecture Series brings a variety of speakers to the campus. Two sub-committees exist within the symposium: the Free University and the Role of one University which provides forums in which students, faculty, and staff discuss issues directly related to the University. A test file is also maintained to aid students in their studies. Students are invited to attend all meetings and take an active part in the Symposium and Lecture Series.

The UAH Entertainment Series
The Entertainment Series sponsors dances, concerts and other social activities. All students are invited to participate in all of the scheduled functions. All meetings of the Entertainment Series are open to students.

The UAH University Playhouse
The University Playhouse, a student-operated group, presents theatrical productions and is open to any member of the University community with an interest in the theatre.
Student Academic Information

Placement Tests

All students who are beginning college level course work in English, mathematics, chemistry, or a foreign language (if taken in high school) are placed at the level best suited to their academic preparation and background.

A student's ACT scores and high school grades determine his placement in English, mathematics and history. A student wishing to take German, French or Spanish must take an advanced language examination provided he has had two or more years of the language in question in high school. If a student has had two or more years of Russian in high school and plans to continue studying the same language at UAH, he must consult with and be placed by the Chairman, Department of Modern Foreign Languages. Students who have had less than two years of a language in high school or are taking a language for the first time do not take language placement tests. A student who has taken no previous college chemistry courses must take the chemistry placement examination before enrolling in chemistry classes at UAH.

A student is required to pursue placement procedures only with regard to the aforementioned academic areas and conditions. He may, of course, enroll in courses which do not require placement.

Placement tests are scheduled once each term (see the UAH calendar). Students wishing to take these tests should register in the Counseling Office at least three days before the tests are to be given. They will be notified at the time of the exams when to expect to receive the results of the tests and course assignments.

Students who have already taken the ACT exam and who have not been assigned to English and mathematics sections must request placement through the Counseling Office. A student should submit his request at least three days before the placement tests are scheduled even though he does not have to take an exam. All course assignments resulting from placement requests must be completed before regular registration occurs for the term in which the student wishes to take said course(s).

Charges for examinations are: ACT--$8.00; Chemistry, Spanish, German, and French--$3.00 each. Students are charged only for the tests they take.

Credit by Examination

Students may attempt to earn degree credit in certain general courses by
satisfactory performance on specific tests covering the subject matter of the courses. In no case may it be earned by a student who has enrolled in a comparable or higher level course in college in the same discipline. Details of examinations available may be obtained from the Office of Student Affairs in Morton Hall.

Student Counseling

Both personal and vocational counseling are offered through the Counseling Office of the Office of Student Affairs.

Students undecided as to their major area of study are invited to seek assistance in the Counseling Office. Detailed academic advising is provided by the faculty. As soon as a student has decided on an area of concentration, he should get in touch with the appropriate department chairman or division director and request a faculty advisor.

The Counseling Office administers and interprets personal and vocational interest measures when appropriate.

Courses of Instruction

Courses are described under the sections of the various divisions.

All courses listed will be offered at times which will be announced in printed schedules each term. There is no assurance that a particular course will be scheduled in any given term or year.

Registration

Dates of registration, of late registration, and tentative dates of early registration are listed in the UAH calendar. Any student eligible to register may take part in early registration.

A student who schedules courses during any registration period (early, regular, or late) will have made a financial commitment to the University. If courses are dropped or changed, he must submit these changes in writing to the Office of Student Records. Adjustments in fees, if any, will be made by the Office of Finance.

How to Change a Course

Once a student has completed registration, all changes in his schedule must be made on a Change of Course Form and recorded in the Office of Student Records.
Credit to Audit

A student is permitted to change a course from credit to audit only during the first three weeks of classes.

Removal of Course From Schedule

1. In the case of a cancelled class, submission of a Change of Course Form by the student facilitates correcting his record.
2. In the case of a "drop before class," a Change of Course Form must be submitted prior to the first scheduled meeting of the class.
3. Except in the case of (1) or (2), removal of a course after the first scheduled meeting of a class is considered a withdrawal. (See section on Withdrawal.)

Other Kinds of Changes

The following kinds of changes may be accomplished only during the designated hours of regular and late registration. (See UAH calendar.)

1. Change from one course to another.
2. Change from one section to another section of the same course.
3. Addition of course to schedule.
4. Change from audit to credit. Only students who are otherwise eligible to take the work for credit will be permitted to make this kind of change.

How to Withdraw

A student may withdraw from one or more courses or from UAH by completing the Request for Withdrawal Form secured from the Office of Student Records. Regardless of the circumstances under which withdrawal becomes necessary, a student must carry out withdrawal procedures.

The official date of withdrawal is the date on which the withdrawal form is received in the Office of Student Records. Action will be taken on courses involving withdrawals based on the following conditions:

1. A grade of W will be assigned if the withdrawal occurs during the first three weeks of class.
2. A grade of W or WF will be assigned if the withdrawal occurs between the end of the third week and the beginning of the sixth week of classes.
3. A grade of F will be assigned if the withdrawal occurs after the beginning of the sixth week except in cases of extenuating circumstances. If the student so desires, he may submit the
circumstances in writing on a Request for Withdrawal Form and ask for a review by his division director.

Conduct

A student enrolling in the University assumes an obligation to conduct himself in a manner compatible with the University's function as an educational institution. The administration reserves the right to establish rules for expulsion and penalties for failure to meet standards of scholarship, character, and health.

All members of the UAH Community are subject to federal, state, and local laws. Laws having to do with alcoholic beverages, drugs, narcotics, gambling, fireworks, and the use of state property are particularly applicable to a university.

Alabama laws are explicit with regard to alcoholic beverages. It is unlawful for any person to exhibit or display an alcoholic beverage (including beer and wine) or to consume an alcoholic beverage in any public place except in a duly-licensed restaurant, hotel, or private club. It is unlawful for a person under the age of 21 to consume alcoholic beverages.

The possession and/or sale of drugs and narcotics is closely regulated by both federal and state laws. Gambling is not legally permissible under the existing state laws. The Huntsville City Code specifically prohibits the use of fireworks (excluding "dipsticks" and sparklers) within the city limits of Huntsville. State law also prohibits the misuse and/or abuse of state property.

All members of the University community are urged to report infractions of these laws to the campus security office. After consultation with administrative officials, appropriate action will be taken through disciplinary action by the University and/or local law enforcement agencies.

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 by all students is important.
Examinations

During each term, one or more announced examinations of class period length may be held.

At the end of each term, a two and one-half hour examination period is scheduled for each course. Absences from a scheduled final examination without prior arrangement with the course instructor (except in extenuating circumstances) will be classified unexcused, and a failing grade in the course will be assigned.

(Refer to X under Grades and Quality Points for regulations concerning deferred examinations. Students taking deferred examinations must pay a fee of $2.00.)

Course Numbering System

<table>
<thead>
<tr>
<th>Range of Numbers</th>
<th>Year Student Normally Takes Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>001-099</td>
<td>Refresher (non-credit)</td>
</tr>
<tr>
<td>100-199</td>
<td>Freshman</td>
</tr>
<tr>
<td>200-299</td>
<td>Sophomore</td>
</tr>
<tr>
<td>300-399</td>
<td>Junior (upper level)</td>
</tr>
<tr>
<td>400-499</td>
<td>Senior (upper level)</td>
</tr>
<tr>
<td>500-599</td>
<td>Advanced undergraduate credit but graduate credit awarded by permission</td>
</tr>
<tr>
<td>600-799</td>
<td>Graduate</td>
</tr>
</tbody>
</table>

Student Classification

A regular student is classified as indicated in the following table when he has completed the number of semester hours shown.

<table>
<thead>
<tr>
<th>Semester Hrs. Earned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshman 0-29</td>
</tr>
<tr>
<td>Sophomore 30-59</td>
</tr>
<tr>
<td>Junior 60-91</td>
</tr>
<tr>
<td>Senior 92 up</td>
</tr>
</tbody>
</table>

Academic Workloads

A full-time undergraduate student is one who is enrolled in courses totaling at least 8 semester hours. The maximum number of semester hours in which a student will be permitted to enroll in one term is 13, including simultaneous correspondence courses. Under exceptional circumstances, permission may be granted by division directors to take
additional hours. (Equivalents will be used for non-credit and audit courses.) A part-time undergraduate student is one who is enrolled in courses totaling 1-7 semester hours. A student enrolling for a minimum load each term should not expect to graduate in four years unless he enrolls four terms each year.

Students will be given much responsibility for independent study. Careful budgeting of time will be necessary if the desired academic goals are to be reached. Accordingly, full-time students are advised to limit their employment. Experience has shown that approximately 20 hours per week constitutes an average work load that will allow needed time for adequate study.

For students who, for financial reasons, need to be employed to a greater extent, a reduction in course load is suggested. From the standpoint of allowing sufficient time for the amount and quality of work necessary to meet a student's academic goals, fully employed undergraduate students normally will find that they should take no more than two courses.

### Grades and Quality Points

<table>
<thead>
<tr>
<th>Grades</th>
<th>Quality Pts./Sem. Hr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Superior</td>
</tr>
<tr>
<td>B</td>
<td>Above Average</td>
</tr>
<tr>
<td>C</td>
<td>Average</td>
</tr>
<tr>
<td>D</td>
<td>Passing</td>
</tr>
<tr>
<td>F</td>
<td>Failure</td>
</tr>
</tbody>
</table>

I  **Incomplete.**

Assigned by the instructor when a student has failed to satisfy some minor requirements of the course. This grade becomes an F unless the course requirements are completed during the first four weeks of the next term of enrollment. If the grade of I is on a student's record at the time of graduation, it is treated as an F.

X  **Absent from examination.**

Assigned by the instructor when a student completes all course requirements except the final examination. This grade becomes an F unless the examination is completed by the time of the announced deferred examination date of the term of next regular enrollment of the student. (See section on Examinations and UAH calendar.)

W  **Withdrawal.**

Assigned by the Office of Student Records when a student withdraws from a course with passing work. (See section on
Withdrawal.

**WF Withdrawal Failing.** Assigned by the Office of Student Records when a student withdraws from a course with failing work. (See section on Withdrawal.)

A grade of S (Satisfactory) or U (Unsatisfactory) is assigned in some courses.

A grade of P (Passing) or F (Failing) is assigned in some courses. (See following section on Pass-Fail System.)

**Repeating a Course**

The last grade received in a course taken more than once will be the official and only grade of the course for purposes of evaluation of quality points; but a student is charged with hours attempted each time he registers for a credit course and receives a grade other than W, S, or U.

Grades submitted to the Office of Student Records can be changed only by submission by the instructor of a corrected grade sheet containing a written explanation of the error. The corrected grade sheet must be approved by the director of the academic division concerned.

**Pass-Fail System**

To be eligible to take courses on a P-F basis, a student must:
1. Have junior or senior standing;
2. Not be on probation;
3. Have an approved AOC appropriately filed.

A student is limited to 12 semester hours of credit on a P-F basis. P-F system applies only to courses chosen as electives.

A grade of P may be changed to a regular grade only if the student changes his AOC to an area in which a regular grade is required. The change must be initiated at the division level and must go through the normal grade change procedures. Once a P grade has been changed to a regular grade, it must remain.

Under the P-F system, a grade of P will not be counted in a student’s quality point average; a grade of F will be counted in a student’s quality point average.

A student may initiate the P-F option by making application at the Office of Student Records before the end of the late registration period.
Even though a student chooses to take elective courses on the P-F basis, instructors' grade sheets will reflect the actual grade and the student may obtain the regular grade upon request.

**Quality Point Average**

The quality point average is computed by dividing the total number of quality points earned by the total number of semester hours attempted. Courses in which a grade of W, P, S, or U is assigned are not included.

**Student Grade Report**

At the completion of each term, a report of final grades is mailed to the address furnished by the student.

A statement of a student's satisfactory or unsatisfactory academic performance will be provided, upon request, to the individual or agency sponsoring the student's tuition, if the individual or agency submits a statement certifying grade release and unless written notification to the contrary is submitted by the student to the Office of Student Records prior to the final examination period.
Visiting Student Program

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

1. The student must be a full-time student.
2. The student must have an overall C average.
3. The course desired must be unavailable at the student’s home institution.
4. The student’s request must be approved by his advisor and other appropriate personnel.
5. Permission of the institution teaching the course is dependent upon availability of space for the visitor after its own students are accommodated.

Any student interested in participating in the Visiting Student Program should contact the Office of Student Records for information and procedures to be followed.

Honors

Honor Scholar

A student earning 8 or more semester hours in a term with a quality point average of 2.50-3.00 is distinguished by being identified as an Honor Scholar. A student who takes less than 8 semester hours per term and establishes a quality point average of 2.50-3.00 will, at the end of the term in which at least 8 semester hours are completed, be designated as an Honor Scholar.

Scholar

A student earning 8 or more semester hours in a term with a quality point average of 2.00-2.49 is recognized by having his name placed on the list of Scholars. A student who takes less than 8 semester hours per term and establishes a quality point average of 2.00-2.49 will, at the end of the term in which at least 8 semester hours are completed, have his name placed on the list of Scholars.

For these purposes, a part-time student’s work will be considered in blocks that do not overlap.
Honors at Graduation

A student graduating at the bachelor’s level with a quality point average of 2.20-2.49 will be graduated With Honor; a student with a quality point average of 2.50-2.79 will be graduated With High Honor; a student with a quality point average of 2.80-3.00 will be graduated With Highest Honor.

To be eligible for consideration for honors, a student must complete at least 50% of his total degree requirements at UAH. A student’s overall point average as well as his quality point average on work taken at UAH will be computed, and both computations must fall within the specified range.

Honors designations will appear on transcripts, commencement programs and diplomas.
Academic Probation and Suspension

A beginning student is subject to scholastic review at the end of the term in which he has attempted a total of at least 8 semester hours of work. At the time of review, if he has not passed one-half of work attempted or attained a quality point average of 0.5, he is placed on scholastic probation.

A transfer student is subject to scholastic review at the end of the term in which he has attempted at least 8 semester hours. At the time of review, if his quality point average is less than 1.0, he is placed on scholastic probation.

After the first evaluation, a student's record is examined at the end of any term in which at least 8 semester hours have been attempted from the time of previous review.

At the specified times of review, a student will be placed on scholastic probation if his overall quality point average for work attempted at all institutions is less than 1.0 (C). He also will be placed on probation if his average for work attempted at UAH only is less than 1.0 (C).

<table>
<thead>
<tr>
<th>If Overall Quality Point Average Is</th>
<th>Quality Point Average*</th>
<th>Quality Point Deficiency**</th>
<th>Action Indicated</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0 or higher</td>
<td>0</td>
<td></td>
<td>Probation Removed</td>
</tr>
<tr>
<td>Less than 1.0 and 1.0 or higher or 7 or less</td>
<td>7 or less</td>
<td></td>
<td>Probation Continued</td>
</tr>
<tr>
<td>Less than 1.0 and Less than 1.0 and More than 7</td>
<td></td>
<td></td>
<td>Suspension</td>
</tr>
</tbody>
</table>

*On last block of work prior to review
**Including transferred deficiencies

A student suspended for scholastic reasons is eligible to return on scholastic probation at the beginning of the second term following suspension.

When a student within the University of Alabama system, is suspended the second time for scholastic reasons he is permanently disqualified for readmission.

A student whose academic status is indeterminate due to grades of I or X may be permitted to register conditionally. A student with either of these grades should take the necessary steps to remove the incomplete grades within the specified time limits. (See section on Grades and Quality Points.) At the time such grades are changed to regular letter grades, the appropriate scholastic review will be made and necessary action taken.
Change of Program

Students who are pursuing one program of study at UAH and desire to change to a program in another division may petition to do so by making application at the Office of Student Records. Counseling 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.

Application for Graduation

Candidates for graduation should file their applications before the end of the fall term preceding the date of anticipated May graduation. Application forms may be obtained at the Office of Student Records.

Students completing degree requirements at other times of the year will be given certified letters of completion and may attend the next graduation ceremony.

Second Bachelor's Degree

After a student has earned one bachelor's degree at UAH, he may qualify for a second bachelor's degree by completing (in addition to credits applied to the first degree) in residence a minimum of 25% of the total degree requirements for the second degree. The second degree must include a new major. The student must meet all other applicable requirements for a degree.

Lengthy Matriculation

A student may complete requirements for graduation as specified in the UAH catalog for the year he enters UAH, provided he does so within a period of seven years from his original date of entry. If a student does not complete requirements for graduation within the prescribed time, he must change to the current catalog and meet the requirements as specified. At any time within the seven years that requirements for graduation are changed, a student may elect to be graduated under the new requirements.

Transcripts

Official transcripts are issued and sent by the Office of Student Records to recognized institutions and agencies which require such documents. Transcripts are issued only upon the request of the student involved.
Official transcripts are not issued to the individual student; however, he may request an unofficial transcript which does not bear the University seal.

The first copy of a transcript is free; a charge of $1.00 is made for each additional transcript issued. No charge is made for transcripts issued to other units of the University of Alabama system.

No transcript will be issued for a person who has a financial obligation to the University.

**Correspondence Study and Other Non-Resident Credit**

Persons interested in taking correspondence study courses through The University of Alabama in Tuscaloosa may write the Extension Division, University of Alabama, P.O. Box 2987, University, Alabama 35486.

Up to 25% of the credit applied toward a baccalaureate degree may be earned by means other than residence credit at an approved institution. Examples of “other means” are: credit by examination, correspondence study, educational experiences in the armed forces, professional certificate programs, and extension credit.
Undergraduate Academic Programs and Requirements

The undergraduate academic programs of The University of Alabama in Huntsville are administered by five divisions with the following approved major programs:

Division of the Humanities

Areas of study in which majors are currently offered are:
- Art
- English
- History
- French
- German

Other areas with course offerings are: Education, Russian, Spanish, Music, Philosophy, and Speech.

Division of Social and Behavioral Sciences

Areas of study in which majors are currently offered are:
- Economics
- Psychology
- Business Administration
- Political Science
- Sociology

Division of Natural Sciences and Mathematics

Areas of study in which majors are currently offered are:
- Biology
- Chemistry
- Mathematics
- Mathematics Education
- Physics

Courses also are offered in Natural Sciences, Computer Science, and Statistics.

Division of Engineering

Major areas in the programs of studies leading to the degree in engineering are:
- Electrical Engineering
- Industrial & Systems Engineering
- Environmental Engineering
- Computer Science
Fluid & Thermal Engineering  
Engineering Mechanics

Division of Nursing

All majors receive instruction in general nursing practice in a clinical setting; and, through a secondary area of concentration, may pursue study that will enable them to begin practice in one of the following functional areas:  
Teaching Technical Nursing  
Supervising Nursing Practice  
Administering Delivery of Nursing Care  
Practicing as Clinical Specialists

Detailed information concerning the various degree programs, including courses descriptions, is organized according to divisions. See the Table of Contents for the listing of divisions.

Undergraduate Degree Requirements

Degrees Offered

Programs for the undergraduate degrees of Bachelor of Arts, Bachelor of Science, Bachelor of Science in Engineering, and Bachelor of Science in Nursing are provided with major AOC's in the indicated areas of specialization:

Bachelor of Arts:  
Art, Biology, Economics, English, French, German, History, Mathematics, Political Science, Psychology

Bachelor of Science:  
Biology, Chemistry, Mathematics, Mathematics Education, Physics

Bachelor of Science in Engineering:  
Unified Programs with Professional Specializations

Bachelor of Science in Nursing:  
Unified Programs with Professional Specializations  
Unified Professional Program with Selected Secondary Area of Concentration.

Total Degree Requirements

1. Minimum requirements for the Bachelor of Arts and Bachelor of Science degrees are 128 semester hours; for the Bachelor of Science in Engineering degree, 136 semester hours. A minimum of 25% of the total
requirements and 12 of the last 18 hours must be completed at UAH after September 1, 1964. Also, 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 AOC (6 hours in his major and 6 hours in his cluster) after September 1, 1964. (AOC is defined on page 65.) A minimum of 30% of the total degree requirements must be taken in courses numbered 300 or above.

2. The maximum amount of correspondence or extension credit allowed towards a bachelor's degree is 25% of the degree requirements.

3. An overall average of C is required for all courses taken at: (a) all institutions; (b) UAH; (c) UAH and overall in the major; and (d) UAH and overall in all other courses in the AOC.

Requirements for Programs Including an Area of Concentration (AOC) (B.A. and B.S. Degrees)

Humanities, Natural Sciences and Mathematics and Social and Behavioral Sciences

1. General Education Phase

The general education phase provides the foundation for liberal learning and includes writing, literature, history, social sciences, natural sciences, mathematics, and foreign languages. Specific requirements for general education have been identified for each degree. Courses which are included both in general education requirements and also in either the major or cluster may be omitted in calculating the maximum of 64 hours which may be required in the AOC.
2. A major is an accumulation of courses designed to give the student depth of competence and understanding of a subject. Its development may be visualized as vertical. A suggested minimum number of hours to constitute a major is 36. Fifteen hours must be taken in upper level courses in the major. A composite major may be developed from courses in more than one discipline. Guidelines for such majors must be identified by the departments involved and approved by the Dean of Faculty; explicit course programs are subject to approval by all disciplines concerned and must meet standards as set forth above.

3. A cluster may be defined in two ways:
   a. A group of courses in one or more disciplines designed to give the student breadth, relating his major subject to other fields of knowledge. Its development may be visualized as horizontal. Ideally, such a cluster is an interdisciplinary development of one aspect of the major, or
   b. A group of courses from one or more disciplines which bear a logically defensible relationship to one another, separate from the thrust of the major, designed to give the student breadth and some depth in a secondary area.
   c. In either case, the minimum number of hours in the cluster is 21 (9 upper level if the cluster is composite; 6 upper level if the cluster is a single discipline.)

4. The AOC Form is a document prepared cooperatively by a student and a responsible faculty advisor. Academic departments and/or divisions must assume responsibility for insuring that each of their students has an opportunity to develop an AOC Form before the end of the student’s sophomore year.
Ill. Elective Courses

Electives are courses taken by the student beyond the requirements identified in I and II above. A minimum of 12 hours of electives must be chosen from disciplines not included in the AOC.

IV. Requirements for Teacher Certification

1. Secondary Education
   These courses are specified electives which a student may choose in order to qualify for secondary certification along with his bachelor’s degree.

2. Elementary Education
   A student seeking elementary certification chooses the prescribed courses as a supporting cluster; this group of courses then becomes an integral part of the AOC and subject to the prescriptions thereof.

Professional and Pre-Professional Opportunities

Medical and Dental Programs

Most students entering medical or dental schools do so after earning an undergraduate degree. After consulting the specific requirements of the desired medical or dental school, applicants interested in careers in medicine or dentistry will find that UAH offers programs that will prepare them for admission to the professional school.

Competition for admission to medical and dental schools is great, and students should realize that completion of the admission requirements does not insure acceptance. Since admission to the schools is not assured, students are advised to complete undergraduate degree requirements.

Typical of the requirements for admission to medical colleges are those which follow for the Medical College of Alabama at The University of Alabama in Birmingham:

1. Two academic years of English
2. One academic year of general biology or zoology
3. One academic year of general inorganic chemistry (including qualitative analysis and laboratory work)
4. One academic year of organic chemistry with laboratory work
5. One academic year of physics with laboratory
6. College algebra and trigonometry

In addition many medical schools require that students take one year of physical chemistry and mathematics through calculus. Students are encouraged to take as much chemistry and mathematics as possible. To reduce duplication in later work, electives taken in biology should be
genetics and embryology. A student is advised to choose his program according to his individual interest and ability so that he may fulfill his maximum academic potential.

Typical of the requirements for admission to dental schools are these which follow for the School of Dentistry at The University of Alabama in Birmingham:

<table>
<thead>
<tr>
<th>Semester</th>
<th>Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Biology</td>
<td>8</td>
</tr>
<tr>
<td>2. Inorganic chemistry (including qualitative analysis)</td>
<td>8</td>
</tr>
<tr>
<td>3. Organic chemistry</td>
<td>8</td>
</tr>
<tr>
<td>4. Quantitative analysis</td>
<td>4</td>
</tr>
<tr>
<td>5. Physics (including laboratory)</td>
<td>8</td>
</tr>
<tr>
<td>6. College algebra and trigonometry</td>
<td>6</td>
</tr>
<tr>
<td>7. Thirty semester hours of non-science courses to include 6 (preferably 12) semester hours in English. It is recommended that students complete 12 semester hours in a foreign language and include as many courses in history, political science, economics, philosophy, psychology, and sociology as possible.</td>
<td></td>
</tr>
<tr>
<td>8. The completion of a minimum of 90 semester hours of collegiate work.</td>
<td></td>
</tr>
</tbody>
</table>

Students should elect courses in mathematics through calculus and should not elect biology courses that constitute a part of the dental school curriculum.

Medical Technology

A program in Medical Technology is available through the unified effort of UAH and the Huntsville Cooperative School of Medical Technology.

A student interested in Medical Technology may elect one of the suggested curricula leading to the B.S. degree. (See Biology Curriculum VII or Chemistry Curriculum VI.) Upon the completion of all other University requirements, a maximum of 29 semester hours of elective credit, earned through the Medical Technology internship, may be applied toward the B.S. degree at UAH.

This program is designed to meet the requirements for certification by the Registry for Medical Technologists of the American Association of Clinical Pathologists.

Law

Many schools of law require applicants to obtain a bachelor's degree as a prerequisite for admission. Interested students should examine the requirements of the specific law school which they wish to attend for
identification of the needed curriculum.

The University of Alabama School of Law does not prescribe any particular curriculum of pre-law study, but normally requires as a condition for admission that the applicant has successfully completed the following undergraduate work or its equivalent:

<table>
<thead>
<tr>
<th>Course</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>English Composition</td>
<td>6</td>
</tr>
<tr>
<td>English or American Literature</td>
<td>6</td>
</tr>
<tr>
<td>American History</td>
<td>6</td>
</tr>
<tr>
<td>Political Science (including U.S. Government)</td>
<td>6</td>
</tr>
<tr>
<td>Principles of Economics</td>
<td>6</td>
</tr>
</tbody>
</table>

Additional recommended courses are philosophy, psychology, sociology, foreign languages, and accounting. Since other requirements must be met, completion of these courses does not insure admission.

Education--Teaching Certificates

A student may complete professional requirements for a Class B Elementary or Secondary Professional Teaching Certificate in any of the approved major areas of concentration. Students interested in a degree in education involving programs in other major areas may complete much of the course work at UAH. When preparing such programs, a student should consult the requirements of the particular school to which he may transfer.
**Division of the Humanities**

The graduate of The University of Alabama in Huntsville should take his place as a responsible citizen through having attained an understanding of man's relation to himself, his fellow man, and the physical and biological world in which he lives. He should be trained in the skills of criticism so that he will be able to gather, organize, and evaluate data. He should be able to communicate his thoughts in correct and effective language. He should enter his adult life with those appreciations and tastes which will prove enriching to him and his community.

The Division of the Humanities embraces disciplines and academic programs essential to those objectives that fall in the areas of the humanities and education.

**Undergraduate Degrees and Study**

Within the Division a student seeking a Bachelor of Arts degree must, no later than the close of his sophomore year, declare an area of concentration (AOC). This AOC must include a major chosen from one of the following disciplines: art, English, French, German, or history; and must include one of the following variations:

1. An established cluster drawn from one department currently offering a major at The University of Alabama in Huntsville. The cluster must include a minimum of 21 semester hours as prescribed by the department, 6 of which must be numbered 300 or above;

2. A cluster drawn from one discipline without an established major which includes 21 semester hours of courses of which at least 6 hours are numbered 300 or above; or

3. A cluster supporting the major drawn from two or more disciplines which must include a minimum of 21 semester hours, 9 of which must be taken in courses numbered 300 or above.

Any cluster chosen by a student is subject to the approval of (1) the student's major department; (2) the other department or departments from which courses in the cluster are drawn; and, (3) the Division Director. Each major department has developed appropriate areas of concentration designed to provide a sound curriculum in various areas of interest; however, a student who wishes to deviate from any of the standard AOC's may work out an individual program with the advice of his major department subject to the above regulations concerning approval. In addition to the areas where majors and supportive clusters are authorized, courses are offered in education, Russian, Spanish, music,
philosophy, and speech.

Visual Art (ART)

Area of Concentration (AOC) with Visual Art Major

The art program is planned to provide the necessary background for graduate work in art, a career in art, and for cultural enrichment.

Two basic patterns have been established for the degree candidate in art: Plan 1 is designed to be most helpful to the greatest number of students; Plan 2 is designed for students of exceptional ability.

The basic degree requirements include 6 semester hours of history of art (Art 100 and 101) in a foundation program of 18 to 22 semester hours of courses in the 100 series; and upper division work of 22 semester hours as detailed below.

Opportunities for upper division specialization within the visual art degree program are offered in: art history, painting, communication graphics, sculpture, and art teacher training.

To enable UAH visual art graduates to compete with graduates from institutions offering the Bachelor of Fine Arts degree, the UAH visual art program provides both depth and breadth in studio course offerings.

Requirements for a major: Art 100 and 101 are required of all art majors.

All of the studio courses require supplies to be secured by the student. The amount required varies with the nature and level of the course.

Plan I. Visual Art Program

1. Major in Studio Specialties (painting, communication graphics, and sculpture):

   Lower Division Foundation Program (22 semester hours) drawing, 6 hours (3 courses); design, 4 hours (2 courses); sculpture, 4 hours (2 courses); photography, 2 hours; and art history, 6 hours (100, 101).

   Upper Division (22 semester hours)
   Junior Year: 6 hours (3 courses) in the major studio area (painting, communication graphics, or sculpture) at the 300 level; 7 hours consisting of 4 hours (2 courses of 2 hours each at the 300 level, in studio areas outside the major studio specialty each in a different area or both in the same area), and 3 hours in art history at the 300
level.

Senior Year: 6 hours (3 courses) in the major studio area at the 400 level and 3 hours of art history at the 300 level or above.

II. Major in Art History Specialty:

The art history major includes introductory experiences in studio areas to provide insight into artistic experience for those whose function it is to discuss and relate and evaluate the work of artists of the past and present.

Lower Division Program (18 semester hours):

a. 12 hours of art history (Art 100, 101, 109 and 3 additional hours above the 100 level).

b. 6 hours of studio (three courses, all at the 100 level) which include two of the four lower division studio areas (design, drawing, sculpture, and photography).

Upper Division (22 or 23 semester hours):

a. Junior Year: 9 hours in art history (3 courses at 300 level).

b. Senior Year: 9 hours in art history (3 courses, at least two of which are at the 400 level).

c. 4 hours in studio (2 courses) one of which will be at the 300 level, or 2 hours (one course) in studio and 3 hours in an approved culturally oriented course in the Humanities.

III. Major in Art with Certification:

a. For Class B Secondary Art Professional Teaching Certificate, Grades 7-12. The cluster of 21 hours would include 18 hours in a cognate subject approved as a teaching minor by the State Department of Education. A list of these is available in the Art Office.

Lower Division (18 semester hours): 6 hours of art history (from Art 100, 101, 109); 12 hours in studio (6 courses) with at least one course at the 100 level in each of three areas; Design, Drawing, Sculpture. Photography (165) is recommended (not counted as Drawing or Design). Prerequisites for upper division courses should be kept in mind in selecting courses.

Upper Division (22 or 23 semester hours): 6 hours of art history at 300 level; 2 hours of painting (Art 370 or 371 or 373); 12 hours (6 courses) in studio, including at least two areas in addition to painting, at least 4 hours of which will be at the 300 level, and art elective, 2 to 3 hours. Graphics (382) is recommended.
b. For Class B Elementary-Secondary Art Teaching Certificate, Grades 1-12. The State Department of Education, recognizing the greater breadth of preparation required for art teaching at both secondary and elementary levels along with preparation for art supervision accepts a major in studio and applied art areas and a minor grouping emphasizing historical aspects of art. The studio major should include a minimum sequence of studio courses as listed above in a studio art program of at least 38 hours. At least 15 hours of the supportive cluster should be in art history with the balance in arts related courses. Both Elementary Art (ARS 215) and Secondary (ED 388-Art) Art Methods should be scheduled. The student teaching should include both elementary and secondary experience, arranged through the Department of Education.

c. For a B.A. degree with a Class B Elementary Professional Teacher's Certificate. Art courses for an art major as listed above. The Cluster is made up of required courses in education.

Basic requirements for teacher certification (secondary and elementary) are identified in the Education section of the catalog. Teacher education courses relating to art teaching certification include: Secondary Art Methods (ED 388-Art); ARS 215, Art for Elementary Teachers; and ED 497, Secondary (or Elementary) Student Teaching in Art.

NOTE:
The minimum art course content required for a secondary certificate in art is not adequate as an undergraduate background for graduate work in art or as a basis for an art career. It is also minimal as a basis for teaching in a developed secondary art program. For these reasons, the student should schedule additional art courses where possible relating to his goals (career, graduate work, a more adequate preparation for art teaching).

Plan II. Visual Art Program for the Exceptional Student

Plan II involves a supplement to the major requirements stated under Plan I.

This program is designed for individuals who wish to meet the exacting demands of graduate study and for students of exceptional ability and commitment. Students who wish to enter this program must receive the consent of the Department Chairman not later than the third term prior to graduation.

Plan II may be followed in two ways in a 134-hour degree program:
A. Independent study (6 hours: Art 490, 491) in the candidate's specialty, leading to a one-man exhibition or the presentation of a research paper at a seminar meeting in the last term of the senior year; or
B. 6 additional semester hours of work in art history may be scheduled by the studio major, or 6 additional semester hours work in studio may be scheduled by the art history major.

Selected examples of a student's art work may be retained at the discretion of the art faculty to add to a permanent collection.

An art student transferring to UAH from another institution must submit information on previous training and representative samples of his art work to the art faculty for evaluation. This should be done in advance of initial registration. Advanced placement in regard to UAH art courses will be determined by the art faculty on the basis of the examples of art work and supporting data and, at the discretion of the art faculty, achievement on a special performance project or projects. Transfer students who receive a degree with a specialty in visual art from UAH must take at least 12 semester hours of visual art courses numbered 300 or above at UAH. A student having a cluster in visual art must take at least 8 semester hours of this work at UAH.

Supportive Art Clusters

A student primarily interested in another discipline who wishes to include courses in art history and/or in studio areas of art may select a program in either art history or in studio courses or in a combination totaling 21 semester hours. Art courses may be combined with pertinent courses in related disciplines to form a supportive cluster with the advice and consent of the Department Chairman.

Visual Art (ARH, Art History; ARS, Art Studio)

100 Art History Survey I: Ancient and Medieval Art. 3 hrs.
A survey of the architecture, sculpture, painting, and decorative arts of the ancient and medieval worlds, considered in relation to the conditions under which they were produced.

101 Art History Survey II: Renaissance and Modern. 3 hrs.
A survey of the architecture, sculpture, painting, and other art manifestations of the Western World from 1400 to the present. The cultural setting, the determining influences, and the creative projections of the individual artists in each period are considered.

109 Introduction to Criticism and Appreciation of Art; Aesthetics in the Visual Arts. 3 hrs.
Introduction to basic aspects of and factors in criticism and appreciation of art, including an introduction to phenomenological aesthetics. Exploration of avenues of appreciation open to and used by individuals of varying backgrounds. A brief review of art movements of the 19th and 20th centuries.
in relation to pertinent influences in the environment as modified or structured by individual creativity. Not applicable to art history requirements for studio specialties. (Same as PHL 109)

120 Two-Dimensional Form in Design. 2 hrs.
An introduction to the primary fundamentals of two-dimensional design, encompassing analytical and intuitive work in dot, line, and plane on the pictorial surface.

121 Color in Design. 2 hrs.
An investigation into the physiological, psychological, and physical properties of color, with experimental studio work in both the subjective and objective evaluation of color usage.

140 Sculptural Use of Organic Material. 2 hrs.
Introduction in clay to three-dimensional sculptural space and practice in mold-making and casting techniques.

141 Sculpture: Metal Assemblage. 2 hrs.
Welded metal as sculpture—oxyacetylene and arc welding.

160 Drawing with Dark-On-Light Media. 2 hrs.
Introduction to two-dimensional form and expression through the use of the traditional means of line, value, texture, etc.

161 Drawing with Fluid Media. 2 hrs.
Introduction to the use of inks, washes, oils, gouache, airbrush, and related media.

162 Drawing Light-On-Dark Media. 2 hrs.
Introduction to the use of light in drawing, especially useful in preparation for oil paintings.

163 Drawing with Collage. 2 hrs.
Introduction to drawing systems that involve assembling performed visual references.

165 Photography for Drawing and Design. 2 hrs.
The understanding and practice of photography through its use as a drawing and design medium. Students are not required to own photographic equipment. Required for all studio art majors.

197 Industrial Illustration. 2 hrs.
See EG 197, Industrial Illustration. Suggested for communication graphics specialists.

215 Art for Elementary Teachers. 3 hrs.
Introduction to art structure and art appreciation and to potential uses of art media for elementary school teachers. Through a combination of illustrated lectures, demonstrations, guided discussions, reference reading, and studio experience those areas of art most significant for the elementary teacher are explored. Consideration is given to some of the ways in which creative use can be made of contemporary art and audio-visual media that provide enrichment opportunities for elementary school children.

Upper Division

300 Historical Survey of American Art. 3 hrs.
A survey of the visual arts in America from the Colonial Period to the present,
with consideration of the changes in the status of the visual arts in American culture in successive periods. In connection with architecture, prototypes that have influenced American building forms and furnishings are reviewed. Prerequisite: Art 100 or 101 or approval of instructor.

301 Historical Survey of Classical Art. 3 hrs.
A survey of the developmental changes in the visual arts in Greece and the Roman Empire and the cultural interrelationship involved. Examples are presented of the influence of classical art on later art forms in Europe and America. Prerequisite: Art 100 or 101 or approval of instructor.

302 Historical Survey of Medieval Art. 3 hrs.
A survey of the architecture, sculpture, and decorative arts, including manuscript illumination of the Middle Ages in relation to the environmental cultures in which these arts evolved. Prerequisite: Art 100 or 101 or approval of instructor.

303 Historical Survey of Renaissance Art. 3 hrs.
The visual arts of the Renaissance in Italy and Europe. The emergence of the artists as a creative personality and the role of the visual arts in the development of Renaissance civilization. Renaissance sources of art forms used in later centuries. Prerequisite: Art 100, 101 or approval of instructor.

304 Historical Survey of Contemporary Art. 3 hrs.
A survey of the visual arts in the 20th century and their 19th century antecedents. Implications of the Cultural Explosion of the middle decades of the current century. The changing role of the artist in contemporary society. New concepts of media and relation to environment in the arts of today. Prerequisite: Art 100 or 101 or 109 or approval of instructor.

307 Historical Survey of Japanese Art and Culture. 3 hrs.
The art and culture of Japan and the sources of these developments from China and India or transmitted via Korea. The developing dichotomy of ancient traditions and modern technology and life in Japan. Contemporary art developments tempered by pervading heritage of artistry and design consciousness. Prerequisite: Art 100 or 101 or 109 or approval of instructor.

309 Period Styles in Interior Design. 3 hrs.
An illustrated survey of the historical development of period styles, European and American, including a discussion of contemporary trends. Pertinent styles of architecture are considered as backgrounds for related styles of furnishings. Design principles that provide a basis for selecting furnishings are presented.

320 Advanced Design. 2 hrs.
Experimental manipulation of imagery in two and three-dimensional media and in film. Research in contemporary art movements. Prerequisite: Art 100 or 101, 120, 121, or approval of instructor.

321 Advanced Design. 2 hrs.
Exploration of design relationships in our physical environment with problems, both real and hypothetical, necessitating individual response and solution. Prerequisite: Art 100 or 101, 120, 121, or approval of instructor.

322 Advanced Design Workshop. 2 hrs.
Selection of individual design problems in image media, requiring individual initiative and research. Drawings, models, research reports, etc. Prerequisite: Art 100 or 101, 120, 121, or approval of instructor.

Introduction to the tools and practices of the professional graphic designer. A
beginning study in the history of contemporary letter forms, with analysis and studio practice in historical calligraphic styles. Prerequisite: Art 100, 101, 120, 121, or approval of instructor.

331 Communication Graphics--Typography. 2 hrs.
Advanced practice in calligraphy. Investigation into the evolvement of contemporary type design and usage. Studio work in the basic techniques of typographic layout and typesetting. Prerequisite: Art 100 or 101, 120, 121, or approval of instructor.

332 Communication Graphics--Illustration. 2 hrs.
Studio practice in contemporary illustrational concepts and commercial techniques. Investigation in the development of the art of illustration from its origin to the present. Prerequisite: Art 100 or 101, 120, 121, or approval of instructor.

340 Sculptural Use of the Thermoset Plastics. 2 hrs.
Sculptural manipulation of thermoset resins and foams. Prerequisite: Art 101, 140, or approval of instructor.

341 Sculptural Use of the Thermoplastics. 2 hrs.
Manipulation of thermoplastics by bonding, dying, forming, and welding. Prerequisite: Art 101, 140, 141, or approval of instructor.

342 Casting Metal. 2 hrs.
Foundry work in wax and sand casting of bronze and aluminum. Prerequisite: Art 100 or 101, 140, 141, or approval of instructor.

370 Oil Painting. 2 hrs.
An advanced course dealing with the fluid nature and brilliance of oil paints. Prerequisite: Art 100 or 101; one of Art 120, 121; and one of Art 160, 161, 162, 163, or approval of instructor.

371 Tempera Painting. 2 hrs.
Advanced studio experience in traditional and synthetic tempera media. Prerequisite: Art 100 or 101; one of Art 120, 121; and one of Art 160, 161, 162, 163, or approval of instructor.

372 Mixed Media. 2 hrs.
Advanced experience in the combination of formerly separate media and motifs: for example, two and three-dimensional form, cut-out form, movies, psychedelia, kinetics, sound, environments, events, etc. Prerequisite: Art 100 or 101; one of Art 120, 121; and one of Art 160, 161, 162, 163 or approval of instructor.

373 Painting. 2 hrs.
Painting in various media. Suitable approaches in relation to the various characteristics of the media used will be encouraged. Some previous introductory work in drawing or painting desirable or approval of instructor. Credit not applicable to the requirements for the major in the painting specialty.

380 Graphics: Intaglio Printmaking. 2 hrs.
Beginning studio practice in etching and engraving. Prerequisite: Art 100 or 101, 121; and one of Art 160, 161, 162, 163, or approval of instructor.

381 Graphics: Planographic Printmaking. 2 hrs.
Beginning studio practice in lithography. Prerequisite: Art 100 or 101; and one of Art 160, 161, 162, 163, or approval of instructor.
382 Graphics: Printmaking: Relief and Silk Screen.  
Beginning studio practice in woodcut, wood engraving, contemporary relief printing techniques, and practice in silk screen printing using various stencil techniques including photographic stencils. Investigation into historical backgrounds. Prerequisite: Art 100 or 101, 121; and one of Art 160, 161, 162, 163, or approval of instructor.

Senior level courses involve the independent initiative of the degree candidate. He should have completed all foundation courses and all general education requirements before commencing the senior program.

400 Art History Seminar: Renaissance and Baroque.  
Initial survey of Baroque developments in relation to Renaissance art forms. Discussion and guided research on artists, works of art, and related cultural changes in these periods. A research paper is developed by each participant. Prerequisite: Art 100 or 101, 303, junior standing, and approval of instructor.

401 Art History Seminar: Modern Art.  
Discussion and guided research on the visual arts of the late 19th and 20th centuries. A research paper is developed by each participant. Prerequisite: Art 100, 101, or 109, 304; junior standing, and approval of instructor.

402 Art History Seminar: American Art.  
Discussion and guided research on the visual arts in America from the Colonial Period to the present. Research papers are developed during the term. Prerequisite: Art 100, or 101 or 109, and 300, at least junior standing, and approval of instructor.

430 Advanced Studio Problems in Communication Graphics.  
Individual content by consultation. Prerequisite: Senior standing.

431 Advanced Studio Problems in Communication Graphics.  
Individual content by consultation. Prerequisite: Senior standing.

432 Advanced Studio Problems in Communication Graphics.  
Individual content by consultation. Prerequisite: Senior standing.

440 Advanced Studio Problems in Sculpture.  
Individual content by consultation. Prerequisite: Senior standing.

441 Advanced Studio Problems in Sculpture.  
Individual content by consultation. Prerequisite: Senior standing.

442 Advanced Studio Problems in Sculpture.  
Individual content by consultation. Prerequisite: Senior standing.

470 Advanced Studio Problems in Painting.  
Individual content by consultation. Prerequisite: Senior standing.

471 Advanced Studio Problems in Painting.  
Individual content by consultation. Prerequisite: Senior standing.

472 Advanced Studio Problems in Painting.  
Individual content by consultation. Prerequisite: Senior standing.

490 Independent Study.  
Independent study in art history or in the candidate’s studio specialty leading to presentation of a research paper at a seminar meeting or a one-man exhibition in the last term of the senior year. Arrangements for independent
study must be completed within the third term prior to graduation following recommendation by an art faculty member and the approval of the department chairman.

491 Independent Study. 3 hrs.
Independent study in art history or in the candidate's studio specialty leading to presentation of a research paper at a seminar meeting or a one-man exhibition in the last term of the senior year. Arrangements for independent study must be completed within the third term prior to graduation following recommendation by an art faculty member and the approval of the department chairman.

495 Technical Problems. 1-2 hrs.
Technical problems in specific studio areas for which advanced course sequences in a studio field are not available. Based on introductory work in the studio area involved. Can be repeated for a total of six hours credit. Prerequisite: Advanced standing and course work or equivalent experience in the particular studio area concerned and prior permission of the instructor and the department chairman.

500 Special Problems in Art History. 1-3 hrs.
Directed reading and documented research. Prerequisite: Advanced standing, twelve hours of art history, previous course work in the area to be studied, and prior approval of instructor.
Education (ED)

Students in the Division of the Humanities, the Division of Natural Sciences and Mathematics, or the Division of Social and Behavioral Sciences who wish to qualify for the Class B Elementary or Secondary Professional Teachers Certificate must meet the following requirements.

Admission to the Teacher Education Program

During the winter or spring term of the sophomore year, students should make application for admission to the teacher education program. Applicants to the program should:

a. Have a cumulative quality-point average of 1.00 on all work attempted.
b. Have completed at least 70% of the General Education Requirements listed above.
c. Present confidential evaluations prepared on forms provided for this purpose.

Application for Student Teaching

Before April 15 of the student’s junior year, students admitted to the teacher education program should make application for a student teaching assignment for one term of the senior year. The following additional criteria must be met before the student teaching assignment is made.

1. The student must have acquired (a) a grade point average of 1.20 in all work attempted and a grade point average of 1.10 in all work attempted in the major field, or (b) a grade point average of 1.00 in all work attempted and a grade point average of 1.50 in all work attempted in the major field.
2. A grade point average of 1.00 in all work attempted in education courses.
3. Satisfactory completion of all General Education Requirements.

Application for Teacher Certification

Near the end of the teacher education program, the student must complete the State Department of Education certification application at the Office of Student Records.

In order to be recommended for the teaching certificate, a student in addition to fulfilling the general degree requirements must earn as many quality points as hours attempted in education courses.

Professional Elementary Education Curriculum

The curriculum in elementary education is planned to provide a broad
liberal education base and an in-depth study of a single discipline to prepare the elementary teacher for the emergent master teacher and team teaching role in the elementary and middle schools.

The scope of the PEEC makes it imperative that the student indicate during the freshman year, to the education office, his goal in elementary education. The student will be assigned an adviser in the education discipline who will aid him in planning an efficient course of study. This planning requires the student also to seek counseling with a professor who represents the department of the student's major for the AOC.

A student's major area of study determines whether he is working toward a B.A. or a B.S. degree. Upon successful completion of the PEEC, the student is eligible for the Alabama Class B Elementary Professional Teachers Certificate.

General Education Requirements

<table>
<thead>
<tr>
<th>Humanities</th>
<th>Semester Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>English Composition (EH 101-102 or 103-104)</td>
<td>6</td>
</tr>
<tr>
<td>Survey of English Literature (EH 205-206)</td>
<td>6</td>
</tr>
<tr>
<td>Speech (EH 110, 113, or 114)</td>
<td>3</td>
</tr>
<tr>
<td>Origins and Development of the Contemporary World (HY 101-102)</td>
<td>6</td>
</tr>
<tr>
<td>Art for the Elementary Teacher (ART 215)</td>
<td>3</td>
</tr>
<tr>
<td>Music for the Elementary Teacher (MU 215)</td>
<td>3</td>
</tr>
<tr>
<td>Physical Education for the Elementary Teacher (ED 215)</td>
<td>3</td>
</tr>
<tr>
<td>Modern Foreign Language (One Language)</td>
<td>6-12</td>
</tr>
</tbody>
</table>

Students who have a competence in a language will be placed at the appropriate level by the foreign language department and may complete this requirement with 6 hours beyond the elementary level in that language.

Social and Behavioral Sciences

Economics, Political Science or Sociology (6 hours from one discipline named above) | 6 |
Economics, Political Science, Sociology or History from the Division of Humanities. (A minimum of 3 hours in SBS in a discipline other than the one chosen above) | 6 |
Psychology (PY 103) | 3 |

Science-Mathematics

For B.A. Degree 8 hours in a physical science or biology; 4
hours in the other area 12
Mathematics 3
For B.S. Degree 8 hours in chemistry or physics; 8 hours in biology 16
Mathematics 9

Area of Concentration (AOC)

Major Area of Study

The elementary teacher may select a major area of study from any department offering a major. Specific requirements for each major are cited under the appropriate department.

Cluster in Professional Education

Pre-Professional Courses
Human Development (ED 230) 3
Foundations of Education in the U.S. (ED 261) 3
Educational Psychology (ED 263) 3
Group Processes (ED 265-266) 2
Professional Courses
Students must be admitted to the Teacher Education Program to enroll in the following courses:

Diagnostic and Prescriptive Teaching (ED 360) 3
Group Processes (ED 367) 1

Select one of the following courses:
Language Arts for the Early Elementary Grades (1-3), (ED 370) 2
Language Arts for the Later Elementary Grades (4-6), (ED 371) 2

Select two of the following courses outside of the major:
Teaching the Social Studies (ED 372) 2
Teaching the Natural Sciences (ED 373) 2
Teaching of Arithmetic (ED 374) 2

Student Teaching in the Elementary School (ED 491) 6

Electives

The number of elective hours possible is dependent upon the major area of study and the student’s high school curriculum.

Professional Secondary Education Curriculum

The curriculum in secondary education is planned to provide a broad liberal education base and an in-depth study of a single discipline to prepare the teacher for the emergent master teacher and team teaching roles in the junior and senior high schools.

A student’s major area of study determines whether he is working toward a B.A. or a B.S. degree. Upon successful completion of the curriculum the student is eligible for the Alabama Class B Secondary Professional Teachers Certificate.

General Education Requirements

<table>
<thead>
<tr>
<th></th>
<th>Semester Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>English</strong></td>
<td></td>
</tr>
<tr>
<td>a. English Composition</td>
<td>6</td>
</tr>
<tr>
<td>b. Survey of English Literature</td>
<td>6</td>
</tr>
<tr>
<td><strong>Social Sciences</strong></td>
<td></td>
</tr>
<tr>
<td>a. Origins and Development of the Contemporary World</td>
<td>6</td>
</tr>
</tbody>
</table>
b. Economics, Political Science, or Sociology (History majors are encouraged to choose Political Science or Economics)  

Natural Science  
Biological and physical science (must include two courses in either a biological or a physical science with the remaining credits in the other science).  

Mathematics  
Speech (EH 110, 113 or 114)  
Psychology  

Area of Concentration (AOC)  

In addition to the General Education Requirements listed above, students must complete an area of concentration including a major from the Division of the Humanities, the Division of Natural Sciences and Mathematics, or the Division of Social and Behavioral Sciences; a supportive cluster drawn from one or more of these three divisions; and satisfactorily complete all requirements for a degree in the appropriate division.  

Professional Education Courses  

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ED 261</td>
<td>Foundations of Education in the United States</td>
<td>3</td>
</tr>
<tr>
<td>ED 263</td>
<td>Educational Psychology</td>
<td>3</td>
</tr>
<tr>
<td>ED 388</td>
<td>Teaching Secondary School Subjects</td>
<td>3</td>
</tr>
<tr>
<td>ED 490</td>
<td>Principles of High School Teaching</td>
<td>3</td>
</tr>
<tr>
<td>ED 497</td>
<td>Secondary Student Teaching</td>
<td>9</td>
</tr>
</tbody>
</table>

Electives  
The number of elective hours possible is dependent upon the major area of study and the students’ high school curriculum.  

111 Career Exploration.  
Educational and Vocational Planning. Prerequisite: 9 hours college credit and placement tests.  

261 Foundations of Education in the United States.  
The development of education in America and its relation to prospective teachers. Prerequisite: Sophomore standing.  

263 Educational Psychology.  
Psychological principles basic to an understanding of the learner, the learning process, and the learning situation. Prerequisite: PY 103 and sophomore standing.  

85
411 Guidance for Teachers. 3 hrs.
The sociological, psychological, and philosophical bases for guidance in schools.

456 Mental Health in the School. 3 hrs.
Dynamics of behavior, the recognition of minor maladjustments, the criteria for referral, and classroom practices supporting good mental health. Prerequisite: ED 263 or equivalent and junior standing.

467 Tests and Measurements. 3 hrs.
Survey of standardized and teacher-made evaluation instruments.

500 Special Problems in Education. 1-3 hrs.
Independent study. Prerequisite: Senior standing.

549 Audio-Visual Instruction. 3 hrs.
Audio-visual media in teaching, the selection, use, and maintenance of audio-visual materials in educational programs. Open only to students in teacher-education curricula.

Elementary Education

215 Physical Education for the Elementary Teacher. 3 hrs.
Designed to give a basic understanding of body alignment, developmental exercises and movement exploration activities for physical education in the elementary grades. Additionally, there will be study of student needs to provide proper equipment, facilities, and leadership for the overall program.

230 Human Development. 3 hrs.
Overview of human development from conception to adulthood. Continuity stressed. Practical applications for teachers and parents.

231 Teaching the Young Child. 3 hrs.
Considers the total pattern of child development, curriculum, learning, methods, and guidance for the child from two to nine years of age.

265 Group Processes I. 1 hr.
Informal group counseling experiences to help the student attain a better understanding of himself and of others. A knowledge of group processes and their effective use in education is emphasized.

266 Group Processes II. 1 hr.
Informal group counseling experiences to help the student attain a better understanding of himself and of others. A knowledge of group processes and their effective use in education is emphasized. Prerequisite: ED 265.

360 Diagnostic and Prescriptive Teaching. 3 hrs.
Emphasis on analyzing and determining the strengths and deficiencies of a student in an academic area and subsequently devising a program which will enhance his strengths and remediate his weaknesses. Both group and individual processes are explored. Prerequisite: ED 263, junior standing, and admission to teacher education program.

365 Literature for Children. 3 hrs.
Selection and teaching of literature for elementary school children according to interests, needs, and abilities. Prerequisite: Junior standing and admission to the teacher education program.
367 Group Processes III. 1 hr.
Informal group counseling experiences to help the student attain a better understanding of himself and of others. A knowledge of group processes and their effective use in education is emphasized. Prerequisite: ED 266.

Note:
ED 370 thru 374 include a minimum of 16 hours laboratory experience in local elementary schools.

370 Language Arts for Early Elementary Grades (1-3). 2 hrs.
Current practices in reading instruction, the instructional materials, and the characteristics of the learner, with special attention to development of basic language skills appropriate to the level. Prerequisite: ED 360.

371 Language Arts for Later Elementary Grades (4-6). 2 hrs.
Current practices in language arts instruction, materials, and the characteristics of the students, with special attention to the development of all language arts skills appropriate to the level. Prerequisite: ED 360.

372 Teaching the Social Studies. 2 hrs.
Curriculum, instructional approaches, and materials for teaching social studies in grades 1-6. Emphasis placed on helping beginning teachers acquire background and skills in organizing and teaching units of work. Prerequisite: ED 360.

373 Teaching the Natural Sciences. 2 hrs.
A course stressing the examination, design, and evaluation of experiences for teaching the natural sciences in the elementary school. Prerequisite: ED 360.

374 Teaching of Arithmetic. 2 hrs.
The examination, design, and evaluation of experiences for teaching mathematics in elementary school. Modern trends in mathematics education. Prerequisite: ED 360.

491 Student Teaching in the Elementary School. 6 hrs.
Teaching experience in local elementary schools under supervision. Concurrent conferences to be arranged as needed.

492 Observation and Participation in Teaching. 3-6 hrs.
Selected observation and participation in elementary schools. For students in curricula designed for both elementary and secondary schools and for experienced teachers. Prerequisite: Senior standing.

Secondary Education

388 Teaching Secondary School Subjects. 3 hrs.
(Major area of teaching to be designated.) Materials and methods in the various major fields. Prerequisite: ED 263 and admission to the teacher education program.

490 Principles of High School Teaching. 3 hrs.
Prerequisite: ED 388 and senior standing. This course is taken concurrently with student teaching.

497 Secondary Student Teaching. 9 hrs.
(Major area of teaching to be designated.) Observation and student teaching in secondary schools. Prerequisite: ED 388 and senior standing.
Observation and Participation in Teaching. 3-6 hrs.
Selected observation and participation in secondary schools. For students in curricula designed for both secondary and elementary and for experienced teachers. Prerequisite: Senior standing and ED 388.

Special Education

Education of Exceptional Children and Youth. 3 hrs.
Introduction to the field of exceptional children and youth. Prerequisite: ED 263.

Student Teaching in Special Education. 3 hrs.
Prerequisite: ED 495, 496, and admission to the teacher education program.

Psychology and Education of the Mentally Retarded I. 3 hrs.
Social, emotional, physical, and learning characteristics of retarded children and youth. Prerequisite: ED 263.

Psychology and Education of the Mentally Retarded II. 3 hrs.
Continuation of ED 495 with emphasis upon educational organization and teaching techniques. Prerequisite: ED 493; 495 recommended.

Education and Care of Crippled Children and Youth. 3 hrs.
Analysis of special problems encountered in teaching orthopedically-involved children and youth; includes cerebral palsied and educational implications and adaptations.

Librarianship

Introduction to Libraries and Bibliography. 2 hrs.
Systems of library retrieval and their use; construction of bibliographies and footnotes; library resources of the area.

Library Operation and Management. 3 hrs.
Methods of organizing books and other library materials; includes ordering, processing, circulating, mending, binding, inventory, budgeting, business records, housing, and equipment.

Function and Use of the School Library. 3 hrs.
School libraries in education programs; includes historical development of libraries, standards, library service to teachers and pupils, use of the library.

Selection of Materials. 3 hrs.
Principles, policies, practices and problems in the selection of books and other materials and of techniques in the promotion of their use.

Books for Young People. 3 hrs.
Reading and evaluating books and related materials according to the interests, needs, and abilities of high school age youth.
Graduate Study in Education

A student admitted to the graduate program of the College of Education at the University of Alabama in Tuscaloosa may apply a maximum of 9 semester hours earned at UAH toward the master's degree.

A Master of Arts degree in developmental learning is described under Interdivisional Programs (see page 221). Options available under this degree are learning theory, learning disability, diagnostic and prescriptive procedures, and child development.

Graduate Education Courses

703 Sources of American Educational Thought. 3 hrs. (SAME AS UA EDH 203) - Sources of American Educational Thought

711 Principles of Guidance. 3 hrs. (SAME AS UA CGP 211) - Sociological, psychological, and educational foundations of guidance; history and growth of the guidance movement; functions, scope, organization, and administration of guidance.

722 Modern Elementary School Programs. 3 hrs. (SAME AS UA EED 222) - Evaluating new patterns of organization and the developing curriculum in the elementary school.

730 Modern Secondary School Programs. 3 hrs. (SAME AS UA SED 230) - Survey of important viewpoints and issues, re-organization trends, typical research findings by subject fields and analysis of current curriculum proposals at the national, state, and local levels.

733 Introduction to Public School Organization and Administration. 3 hrs. (SAME AS UA ACD 233) - Major areas and issues in the organization and administration of public education.

763 Contributions of Psychology to Teaching. 3 hrs. (SAME AS UA EPY 263) - Principles of educational psychology for teaching and for educational services in schools and colleges.

791 Principles of Curriculum Development. 3 hrs. (SAME AS UA ACD 291) - Principles, problems, and practice influencing curriculum planning.
English (EH)

Area of Concentration (AOC) with English Major

Requirements for a major: 24 to 40 semester hours, excluding General Education Requirements (EH 101-102 or 103-104 and EH 205-206.) The hours are identified as follows, with the provision that one group (but not more than one) must be fulfilled with a course devoted exclusively to the novel (courses marked with an asterisk), and that at least 6 semester hours be taken in courses numbered 400 or above.

<table>
<thead>
<tr>
<th>Semester Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic courses (EH 101-102 or 103-104 and EH 205-206)</td>
</tr>
<tr>
<td>Shakespeare (EH 360)</td>
</tr>
<tr>
<td>American Literature (EH 330, 331, 430*, 431*, 432, 530)</td>
</tr>
<tr>
<td>I. Middle Ages and Renaissance (EH 240, 450, 460, 471)</td>
</tr>
<tr>
<td>II. Restoration and 18th Century (EH 380, 381, 470, 492*)</td>
</tr>
<tr>
<td>III. 19th Century (EH 390, 391, 493*)</td>
</tr>
<tr>
<td>IV. Modern Literature (EH 241, 420, 421, 500)</td>
</tr>
<tr>
<td>Electives in English</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

The English major as defined above will form a part of an area of concentration which must include one of the following variations:

1. An established cluster drawn from one department now offering a major which includes a minimum of 21 semester hours, 6 hours of which must be numbered 300 or above;

2. A cluster drawn from a discipline other than those currently offering a major which includes a minimum of 21 semester hours, 6 hours of which must be numbered 300 or above;

3. A cluster drawn from two or more disciplines which include a minimum of 21 semester hours, of which 9 hours must be in courses numbered 300 or above.
A student majoring in English may plan a variety of AOC’s which will enable him to develop depth and breadth in English and some related areas chosen from the other humanities, the social sciences, mathematics, engineering, and the natural sciences. Help in planning, if needed, is available through English counselors and the AOC Committee of the English faculty.

Supportive English Clusters

A supportive cluster in English should include a minimum of 21 semester hours of which at least 3 must be taken in courses numbered 400 or above, identified as follows:

<table>
<thead>
<tr>
<th>Semester Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Courses (EH 101-102 or 103-104 and EH 205-206)</td>
</tr>
<tr>
<td>Shakespeare (EH 360)</td>
</tr>
<tr>
<td>One course chosen from Groups I, II, or III as listed in requirements for English major</td>
</tr>
<tr>
<td>Electives in English</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

No more than 3 semester hours credit in creative writing (EH 210, 211, 212, 213) may be applied to an English major or cluster without special approval of the English faculty.

Transfer students majoring in English must take at least 12 semester hours of advanced English courses (numbered 300 or above) at UAH. A student with a one-discipline cluster in English must take at least 6 semester hours of advanced English courses (numbered 300 or above) at UAH.

English (EH)

003 Writing Clinic. No credit. Designed for students whose placement test score or class performance indicates the need of remedial work.

101 Freshman Composition. 3 hrs. Emphasis on theme writing, including at least one documented paper related to close critical reading of short stories and the novel. Prerequisite: Placement tests.

102 Freshman Composition. 3 hrs. Emphasis on theme writing, including at least one documented paper related to close critical reading of poetry and drama. Prerequisite: EH 101.

103 Advanced Freshman Composition. 3 hrs. Similar to, but more intensive than EH 101. Required of and open only to students whose placement test score indicates superior ability. Prerequisite:
Placement tests.

104 Advanced Freshman Composition. 3 hrs.
Similar to, but more intensive than EH 102. Prerequisite: EH 103.

Courses below are open to students who have completed EH 102 or 104.

110 Public Speaking (Speech). 3 hrs.
Study and practice of the forms and methods of reasoned discourse in communicative speaking and listening. Meets requirements for teacher certification. Credit may not be applied to English major or supportive cluster in English. The course may be taken as an elective.

113 Voice and Diction (Speech). 3 hrs.
Study of voice and speech production with attention to the student's development of his vocal skills. Meets requirements of teacher certification. Credit may not be applied to English major or supportive cluster in English. The course may be taken as an elective.

114 Oral Interpretation (Speech). 3 hrs.
Study and practice of the artistic and communicative skills needed to read literature to others. Meets requirement for teacher certification. Credit may not be applied to English major or supportive cluster in English. The course may be taken as an elective.

115 Acting (Speech). 3 hrs.
Emphasis on role-playing and fundamentals. Credit may not be applied to English major or supportive cluster in English. The course may be taken as an elective.

118 Play Production (Speech). 3 hrs.
Study and practice in the methods of producing a play. Credit may not be applied to English major or supportive cluster in English. The course may be taken as an elective.

120 Persuasion (Speech). 3 hrs.
Study and practice in the techniques of problem-solving. Emphasis on the modes of discussion, persuasion, and argumentation. Credit may not be applied to English major or supportive cluster in English. The course may be taken as an elective.

205 Survey of English Literature. 3 hrs.
Anglo-Saxon literature through Milton. Prerequisite: Sophomore standing.

206 Survey of English Literature. 3 hrs.
Restoration through 20th century. Prerequisite: EH 205.

Courses below are open to students who have completed EH 206, with exceptions as indicated.

207 Modern English Grammar. 3 hrs.
Study of traditional grammar, with introduction to structural grammar and linguistics.

208 History of the English Language. 3 hrs.
Survey of the morphological, syntactic, and lexical development of the English language, with emphasis on the structure of the present-day English. Prerequisite: EH 205.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>210</td>
<td>Fiction Writing</td>
<td>3 hrs.</td>
<td>Practice in the writing of fiction, from conception to revision. Approval of instructor.</td>
</tr>
<tr>
<td>211</td>
<td>Fiction Writing</td>
<td>3 hrs.</td>
<td>Practice in the writing of fiction, from conception to revision. Approval of instructor.</td>
</tr>
<tr>
<td>212</td>
<td>Poetry Writing</td>
<td>3 hrs.</td>
<td>Practice in the writing of poetry, from conception to revision. Approval of instructor.</td>
</tr>
<tr>
<td>213</td>
<td>Poetry Writing</td>
<td>3 hrs.</td>
<td>Practice in the writing of poetry, from conception to revision. Approval of instructor.</td>
</tr>
<tr>
<td>240</td>
<td>World Literature</td>
<td>3 hrs.</td>
<td>Selected major contributions to Western civilization; Homer to Dante.</td>
</tr>
<tr>
<td>241</td>
<td>World Literature</td>
<td>3 hrs.</td>
<td>Selected major contributions to Western civilization; Rabelais to the present.</td>
</tr>
<tr>
<td>300</td>
<td>Bibliography</td>
<td>1 hr.</td>
<td>Lectures and practice in the techniques and materials of research in English and American literature.</td>
</tr>
<tr>
<td>330</td>
<td>Major American Writers</td>
<td>3 hrs.</td>
<td>Major writers from the Colonial period to Whitman and Melville.</td>
</tr>
<tr>
<td>331</td>
<td>Major American Writers</td>
<td>3 hrs.</td>
<td>Dickinson to Eliot and Faulkner.</td>
</tr>
<tr>
<td>360</td>
<td>Shakespeare</td>
<td>3 hrs.</td>
<td>Renaissance background and at least six plays, including, history, comedy, and major tragedies.</td>
</tr>
<tr>
<td>380</td>
<td>Restoration and Early 18th Century</td>
<td>3 hrs.</td>
<td>Dryden, Swift, Pope, and others.</td>
</tr>
<tr>
<td>381</td>
<td>Later 18th Century</td>
<td>3 hrs.</td>
<td>Johnson, Boswell, and others.</td>
</tr>
<tr>
<td>391</td>
<td>The Victorian Period</td>
<td>3 hrs.</td>
<td>Poetry and non-fictional prose, 1832-1901.</td>
</tr>
</tbody>
</table>

Courses below are open to students who have completed 18 semester hours in English, not including EH 110, 113, 114, 115, 118, or 120.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>421</td>
<td>Modern Drama</td>
<td>3 hrs.</td>
<td>A study of the major ideas and forces which originated new movements in drama from Ibsen to the present.</td>
</tr>
</tbody>
</table>
430 The American Novel.  
Theme and form of the American novel from Cooper to James.  
3 hrs.

431 The American Novel.  
Representative works from the school of naturalism to the present.  
3 hrs.

432 The Southern Renaissance.  
Origin and development of Southern myth with particular emphasis on major 
writers of the Southern Renaissance.  
3 hrs.

450 Chaucer.  
Emphasis on Canterbury Tales and Troilus and Criseyde in middle English.  
3 hrs.

460 Renaissance Non-Dramatic Poetry.  
Renaissance poetry exclusive of Shakespeare and Milton.  
3 hrs.

470 Milton and the 17th Century.  
Milton, cavalier and metaphysical poetry, and selected prose.  
3 hrs.

471 English Drama.  
From its beginnings to 1642, exclusive of Shakespeare.  
3 hrs.

492 The English Novel.  
Critical reading of representative novels, accompanied by historical survey of 
major trends. Fielding to Thackeray.  
3 hrs.

493 The English Novel.  
Critical reading of representative novels, accompanied by historical survey of 
major trends. George Eliot to present.  
3 hrs.

Courses below are open to students who have completed 24 semester hours of English.

500 Literary Criticism.  
Major theories and methods, with applications by the student.  
3 hrs.

530 American Literature Seminar.  
Intensive study of one or more writers, groups, or movements, announced in 
advance.  
3 hrs.

540 English Literature Seminar.  
Intensive study of one or more writers, groups, or movements, announced in 
advance.  
3 hrs.
History (HY)

General Education Requirement

Transfer students and students at UAH who have not completed HY 101 and 102 before reaching junior standing may substitute HY 391 and 392 in their General Education Requirements as well as in a history major. Students of senior standing may not take HY 101 or HY 102.

Area of Concentration (AOC) With History Major

A student who wishes to major in history must include in his academic program a minimum of 36 semester hours in history, including HY 101-102 (a part of the General Education Requirements), HY 221-222, and a minimum of 15 semester hours in courses numbered 300 or above (one of which must be HY 590 or 591.) A student wishing to concentrate in American history is required to take 6 semester hours in courses other than American history in addition to HY 101-102, preferably not HY 391 or HY 392. A student choosing to concentrate in European history is required to take 6 semester hours in American history above HY 221-222. For the purposes of this requirement, Latin American history courses, except HY 237, Colonial Latin American, are considered in the general field of American history.

A European history major who has substituted HY 391-392 for HY 101-102 is also required to take at least one course in medieval history.

The history major as defined above will form a part of an area of concentration which must include one of the following variations:
1. An established cluster drawn from one department now offering a major which includes a minimum of 21 semester hours, 6 hours of which must be numbered 300 or above;
2. A cluster drawn from a discipline other than those currently offering a major which includes a minimum of 21 semester hours, 6 hours of which must be numbered 300 or above;
3. A cluster drawn from two or more disciplines which include a minimum of 21 semester hours, of which 9 hours must be in courses numbered 300 or above.

A student majoring in history will find a variety of AOC’s which will enable him to develop depth and breadth in history and some related areas chosen from the other humanities, the social sciences, mathematics, and the natural sciences. Available history model AOC’s include the following: American Studies, American Foreign Relations, Graduate School Preparation, General, Pre-professional and Pre-law Preparation, International Studies, Secondary School Teaching, and the Fine Arts. A student who wishes to plan his own AOC can do so through his history advisor and with the coordination of the Department Chairman.
Courses listed below are open to students who have completed 12 semester hours in history or have junior standing.

337 Contemporary Latin America. 3 hrs.  
An analysis of politico-socio-economic developments since World War II including the forms of organization; the functions and operations of government; the interrelationship between demographic and other social phenomena; the writings of leading Latin American political figures; and industrial development. Prerequisite: HY 238 or approval of instructor.

341 Modern France. 3 hrs.  
A study of the political, economic, social, and cultural developments from the opening of the reign of Louis XIV to the post-de Gaulle era of the Fifth Republic. Prerequisite: HY 101-102.

343 Modern Germany. 3 hrs.  
A study of the Germanies from the Peace of Westphalia to the creation of the German Empire with special emphasis upon the emergence of Germany as a world power, her defeat in World War I, the Third Reich, and the division of post-war Germany. Prerequisite: HY 101 and HY 102.

344 History of Spain and Portugal. 3 hrs.  
A study of Spanish and Portuguese history from Roman times to the present with special emphasis on institutional development. Prerequisite: HY 101 and 102.

345 History of Italy Since the Renaissance. 3 hrs.  
An analytical study of Italian civilization from the sixteenth century to the present with special emphasis on the geopolitical, economic and cultural factors of the Italian states, their emergence as the nation-state of the nineteenth century and its subsequent role in the twentieth century.

364 The Westward Movement in American History Since 1803. 3 hrs.  
A study of pioneering society, Indian relations, land policies, expansion, and politics of the westward-moving frontier.

366 The Negro in Twentieth Century America. 3 hrs.  
A study of the interrelationship of the Negro and the industrial-urban environment of the United States.

369 Social and Cultural History of the United States to 1865. 3 hrs.  
A general study of the social, cultural, religious, and intellectual life of the United States to the end of the Civil War. Prerequisite: HY 221 or approval of instructor.

370 Social and Cultural History of the United States Since 1865. 3 hrs.  
A general study of the social, cultural, religious, and intellectual life of the United States since the end of the Civil War. Prerequisite: HY 222 or approval of instructor.

373 Foreign Relations of the United States to 1890. 3 hrs.  
A general survey of foreign relations to 1890 with particular attention to the formation of traditional policies. Prerequisite: HY 221, 222, or approval of instructor.

374 Foreign Relations of the United States Since 1890. 3 hrs.  
A general survey of foreign relations with particular attention to departures from traditional policies and the backgrounds of current situations. Prerequisite: HY 221, 222, or approval of instructor.
375 Imperial Russia. 3 hrs.
The formation and development of the Russian Empire from the reign of Peter the Great until the Revolution of 1905 with special attention to the multinational character of the Empire and its manifestation in political, economic, and cultural aspects of Russian life.

376 Twentieth-Century Russia. 3 hrs.
The last years of Imperial rule, the constitutional experiment, World War I and the resulting revolutions of 1917; the rise and development of the Soviet Union from its inception until the present.

381 Nationalist Movements in South Asia. 3 hrs.
A study of the nationalist movements in India, Pakistan, Ceylon, Nepal and Afghanistan—their origins, development and culmination in independence from British rule. (Same as PSC 381.)

382 Contemporary South Asia. 3 hrs.
An analysis of the political social, economic developments in India, Pakistan, Ceylon, Nepal and Afghanistan in the twentieth century. (Same as PSC 382.)

391 Europe, 1500-1815. 3 hrs.
An examination of the economic, commercial, scientific, social, political, and cultural developments in Europe from the Renaissance to the close of the Napoleonic Wars.

392 Europe Since 1815. 3 hrs.
A study of Europe from the end of the Napoleonic Wars to the present with equal emphasis on the nineteenth and twentieth centuries. Prerequisite: HY 391 or approval of instructor.

Courses listed below are open to students who have completed 15 semester hours in history or 12 semester hours in history with senior standing.

401 Problems in American Studies. 3 hrs.
A study of the evolution of a specific American cultural problem using polarities of experience as a method of approach (e.g. racism in America: black vs. white; the Machine in the Garden: industry vs. the pastoral ideal; the search for community: society vs. the individual). Prerequisite: HY 221, HY 222.

413 The Nineteenth Century South. 3 hrs.
The South through secession including the development and operation of plantation economy and its extension into new lands, emergence of the ante-bellum social and political patterns of the region, and relationship of the South to the United States. Prerequisite: HY 221, 222, or approval of instructor.

414 The South in the Twentieth Century. 3 hrs.
A study of the economic, social, and political readjustments of the late nineteenth century, and the vast changes in the South during the twentieth century. Prerequisite: HY 221, 222, or approval of instructor.

418 Constitutional History of the United States. 3 hrs.
A study in the growth and development of the American constitutional system with emphasis on those aspects of constitutional growth which relate closely to the fundamental structure of American government and social order. Prerequisite: HY 221, 222, or approval of instructor.
424 Colonial America to 1789. 3 hrs.
A study of the American colonies within the seventeenth and eighteenth century world as well as an examination of the American Revolution, the Confederation, and the ratification of the Constitution. Prerequisite: HY 221, 222, or approval in instructor.

425 The Emergence of the United States as a New Nation. 3 hrs.
An intensive study of the Revolutionary Era, the period of the Confederation and the development of the Young Republic.

439 Problems in American Foreign Relations Since 1939. 3 hrs.
An intensive study of selected problems in the light of ideological conflicts, domestic factors and the national interest. (Same as PSC 439.)

445 History of Inter-American Relations. 3 hrs.
A study of diplomatic and other relations of Latin American republics with each other and the United States with emphasis on the policies of the United States and on hemispheric cooperation. Prerequisite: HY 238 or approval of instructor.

446 The Relations of the United States and the Far East. 3 hrs.
A study of the interrelationships of the United States with the Far East since 1784 with particular attention to China and Japan. Prerequisite: HY 221, 222, or approval of instructor.

463 Philosophy of History. 3 hrs.
A critical evaluation of some of the major philosophies of history from Saint Augustine to Arnold Toynbee. Prerequisite: 6 hours of philosophy, HY 391 and HY 392 or approval of instructor. (Same as PHL 463.)

473 The High Middle Ages, C. 1000-1300. 3 hrs.
A study of the political, economic, and cultural features of Europe at the time when medieval civilization was at its height. Prerequisite: HY 391 or approval of instructor.

477 Europe in the Age of Revolution, 1789-1848. 3 hrs.
A study of revolution and reaction, nationalism, liberalism, and democracy from the French Revolutions of 1848. Prerequisite: HY 391 or approval of instructor.

483 Europe, 1848 to 1914. 3 hrs.
An intensive study of Europe in the period of intensification of national power and its reprecussions culminating in the outbreak of the War of 1914. Prerequisite: HY 392 or approval of instructor.

528 Jeffersonian-Jacksonian America. 3 hrs.
A study of the gradual democratization of the political system, the growth of nationalism, economic and geographical expansion, and the debate over the direction of national growth dramatized in economic, political and cultural sectionalism. Prerequisite: HY 221, 222, or approval of instructor.

534 The Civil War and Reconstruction. 3 hrs.
A study of the sectional struggle leading to secession of the South, and the political, military, economic, and social aspects of Civil War and Reconstruction. Prerequisite: HY 221, 222, or approval of instructor.

537 The Foundations of Modern America, 1865-1914. 3 hrs.
An intensive study of the expansion, industrialization and urbanization of the United States, of the emerging political, economic and social problems, and of the Progressive response. Prerequisite: HY 221, 222, or approval of instructor.
538 The United States in the Twentieth Century. 3 hrs.
An intensive study of the modern domestic development and international role of the United States with particular attention to the accelerating changes since 1945. Prerequisite: HY 221, 222, or approval of instructor.

574 The Renaissance and Reformation. 3 hrs.
A study of Europe during the Renaissance and Reformation with emphasis upon political, social, economic, and cultural developments. Prerequisite: HY 391 or approval of instructor.

576 The Age of Reason, 1713-1789. 3 hrs.
An analysis of the intellectual, social, economic, and political developments in Europe from the Peace of Utrecht to the outbreak of the French Revolution. Prerequisite: HY 391 or approval of instructor.

584 Europe Since 1914. 3 hrs.
An intensive study of Europe focusing on the impact of the world wars and the rise of totalitarianism. Prerequisite: HY 392 or approval of instructor.

590 Senior Seminar in American History. 3 hrs.
A course in historiography, research and writing, and recent interpretations in the field of American history. Open only to seniors who are majoring in, or who have a cluster in, history.

591 Senior Seminar in European History. 3 hrs.
A course in historiography, research and writing, and recent interpretations in the field of European history. Open only to seniors who are majoring in, or who have a cluster in, history.

598 Directed Readings in History. 3 hrs.
A program of independent reading in one field of history, to be selected in consultation with an advisor. Open only to seniors majoring in history.
Modern Foreign Languages

Course Numbers

In the course numbering system used here, the middle digit indicates the language:

<table>
<thead>
<tr>
<th>Language</th>
<th>Mid. Digit</th>
</tr>
</thead>
<tbody>
<tr>
<td>French</td>
<td>0</td>
</tr>
<tr>
<td>German</td>
<td>1</td>
</tr>
<tr>
<td>Spanish</td>
<td>2</td>
</tr>
<tr>
<td>Russian</td>
<td>3</td>
</tr>
<tr>
<td>Interdisciplinary</td>
<td>9</td>
</tr>
</tbody>
</table>

Students with previous language training

ML 102, 112, 122 are not open for credit to freshmen who have had two years of the indicated language in high school. ML 001, 011, 021 are review courses for students who have had two years of high school work in a language and whose placement score indicates need for further preparation before entering the intermediate course in that language. These review courses carry no credit toward meeting the language requirement but do apply toward elective credit.

Under special circumstances and upon the recommendation of the Department Chairman, this ruling may be waived. For example, if a student has not recently received language instruction in a high school, then he may be allowed to take the elementary courses in that same language and receive credit for it.
Proficiency

A student does not have to take all the courses listed as required if he can show acceptable proficiency in any one of them. But he will have to acquire a number of credit hours equal to the total number of hours waived through non-creditable proficiency examinations. These hours do not have to be in the language in which the student plans to major.

Program of Studies

The program of studies of a language major shall cover the following areas:

<table>
<thead>
<tr>
<th>Semester Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. General Education Requirements</td>
</tr>
<tr>
<td>II. Area of Concentration (27 above basic language courses)</td>
</tr>
<tr>
<td>III. Cluster</td>
</tr>
<tr>
<td>IV. Electives</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

Area of Concentration (AOC) With French Major

A student who plans to major in French will be required to take a minimum of 27 semester hours above the basic courses (101-102, 201-202).

The following courses must be included in his program of studies:

Required courses above basic level:

<table>
<thead>
<tr>
<th>Semester Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Language courses 303, 304, 308</td>
</tr>
<tr>
<td>2. Literature courses 305, 306 plus 3 courses at the 400 level</td>
</tr>
<tr>
<td>3. Electives 301, 307 or any course at the 400 level</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

A student majoring in French will find a variety of AOC's which will enable him to develop depth and breadth in French and some related areas chosen from the languages, other humanities, the social sciences, mathematics, engineering, the natural sciences and elementary or secondary education. French model AOC's are available in the Modern Foreign Language Office. A student who wishes to plan his own AOC can
do so through the AOC Committee of the French Faculty.

Area of Concentration (AOC) With German Major

A student who plans to major in German will be required to take a minimum of 27 semester hours above the basic courses:
6 hours of Elementary German (ML 111/112)
6 hours of Intermediate German (ML 211/212)
or 6 hours of Intermediate Scientific German (ML 213/214)
or a combination of both (ML 211/214 or ML 213/212)

The following courses must be included in his program of studies:
Required courses above basic level:

<table>
<thead>
<tr>
<th>Semester</th>
<th>Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Language courses&lt;br&gt;311, 312, 316 or 317</td>
<td>9</td>
</tr>
<tr>
<td>2. Literature courses&lt;br&gt;313, 314 plus 3 courses at the 400 level</td>
<td>15</td>
</tr>
<tr>
<td>3. Electives&lt;br&gt;310, 316, 317 or any course at the 400 level</td>
<td>3</td>
</tr>
</tbody>
</table>

A student majoring in German will find a variety of AOC’s which will enable him to develop depth and breadth in German and some related areas chosen from the languages, other humanities, the social sciences, mathematics, engineering, the natural sciences, and elementary or secondary education. German model AOC’s are available in the Modern Foreign Language Office. A student who wishes to plan his own AOC can do so through the AOC Committee of the German Faculty.
Cluster

The French or German major as defined above will form part of an area of concentration which must include one of the following variations:

1. An established cluster drawn from one department now offering a major which includes a minimum of 21 semester hours, 6 hours of which must be numbered 300 or above;
2. A cluster drawn from a discipline other than those currently offering a major which includes a minimum of 21 semester hours, 6 hours of which must be numbered 300 or above;
3. A cluster drawn from two or more disciplines which includes a minimum of 21 semester hours, of which 9 hours must be in courses numbered 300 or above.

Possible clusters for language majors:

- A second language
- English
- History
- Social and Behavioral Sciences
- Philosophy
- Art
- Math
- Music
- Natural Sciences
- Engineering

Language Cluster:

A supporting language cluster will require a minimum of 12 hours above the basic language courses (24 hours with those).

French

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>001</td>
<td>French Review.</td>
<td>No Credit</td>
</tr>
<tr>
<td>101</td>
<td>Elementary French.</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>(No credit without ML 102).</td>
<td></td>
</tr>
<tr>
<td>102</td>
<td>Elementary French.</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Prerequisite: ML 101.</td>
<td></td>
</tr>
<tr>
<td>201</td>
<td>Intermediate French.</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Prerequisite: ML 102 or placement</td>
<td></td>
</tr>
<tr>
<td>202</td>
<td>Intermediate French.</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Prerequisite: ML 201.</td>
<td></td>
</tr>
<tr>
<td>301</td>
<td>Advanced French.</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Rapid reading, conversation, literature. Prerequisite ML 202.</td>
<td></td>
</tr>
</tbody>
</table>
303 French Conversation. 3 hrs.
Oral drills, pronunciation exercises, simple oral reports. Prerequisite: ML 202.

304 Advanced French Composition. 3 hrs.
Primarily a composition course with emphasis on idiomatic expression. Prerequisite: ML 202 or 303 or approval of Department Chairman.

305 Survey of French Literature. 3 hrs.
A study of French literature from the medieval period through the eighteenth century. Reading of selections from the important authors, lectures, and reports. Prerequisite: ML 202 or approval of Department Chairman.

306 Survey of French Literature. 3 hrs.
A continuation of ML 305. French literature from 1800 to the present. Prerequisite: ML 202 or 305 or approval of Department Chairman.

307 French Civilization. 3 hrs.
Prerequisite: ML 202.

308 Phonology of Modern French. 3 hrs.
Prerequisite: ML 202.

403 Epic and Chivalric Poetry. 3 hrs.
A study of outstanding epic and chivalric poems. The list of authors on the program may vary from time to time (Chanson de Roland, Marie de France, Adenet le Roy, Chrestien de Troyes, Beroul, Thomas, etc.). Prerequisite: ML 305-306.

404 Classical Theater. 3 hrs.
A study of the masterpieces of French classic authors—Corneille, Racine, Molière. Prerequisite: ML 305-306.

405 The Century of the Enlightenment. 3 hrs.
A study of the representative writings of Voltaire, Diderot, Montesquieu, Rousseau. Prerequisite: ML 305-306.

406 Nineteenth Century French Novel. 3 hrs.

407 Twentieth Century French Drama. 3 hrs.
A study of prominent modern and contemporary French dramatists—Claudel, Anouilh, Montherlant, Giraudoux, Genet, Adamov. Prerequisite: ML 305-306.

408 Novelists from 1918 to 1939. 3 hrs.
A study of the most influential French novelists of the period—Proust, Gide, Bernanos, Malraux. Prerequisite: ML 305-306.

409 Great Names of Existentialism. 3 hrs.
A study of the major works of Sartre, Camus, Simone de Beauvoir, G. Marcel, Boris Vian. Prerequisite: ML 305-306.

499 Independent Studies. 1-3 hrs.
Prerequisite: Approval of Department Chairman.

501 The Contemporary Novel. 3 hrs.
A seminar on the “New Novel”—Robbe Grillet, Natalie Sarraute, Butor, etc. Prerequisite: ML 305-306.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>502</td>
<td>History of the French Language.</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>A phonological and morphological study of the developments of the French language from Vulgar Latin to Modern French. Prerequisite: ML 305-306.</td>
<td></td>
</tr>
<tr>
<td><strong>German</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>011</td>
<td>German Review.</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>(as an elective)</td>
<td></td>
</tr>
<tr>
<td>111</td>
<td>Elementary German I.</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>(No credit without ML 112.)</td>
<td></td>
</tr>
<tr>
<td>112</td>
<td>Elementary German II.</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Prerequisite: ML 111.</td>
<td></td>
</tr>
<tr>
<td>211</td>
<td>Intermediate German I.</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Prerequisite: ML 112 or placement.</td>
<td></td>
</tr>
<tr>
<td>212</td>
<td>Intermediate German II.</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Prerequisite: ML 211 or 213.</td>
<td></td>
</tr>
<tr>
<td>213</td>
<td>Intermediate Scientific German I.</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Prerequisite: ML 112 or placement.</td>
<td></td>
</tr>
<tr>
<td>214</td>
<td>Intermediate Scientific German II.</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Prerequisite: ML 211 or 213.</td>
<td></td>
</tr>
<tr>
<td>216</td>
<td>Intermediate German Conversation.</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Optional course for students taking intermediate German courses, but also open to other qualified students. Prerequisite: ML 112 or placement.</td>
<td></td>
</tr>
<tr>
<td>310</td>
<td>Advanced German.</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Rapid reading, conversation, literature. Prerequisite: ML 212 or 214 or approval of Department Chairman.</td>
<td></td>
</tr>
<tr>
<td>311</td>
<td>German Conversation.</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Oral drills, pronunciation exercises, simple oral reports. Prerequisites: ML 212 or ML 214 or approval of Department Chairman.</td>
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</tr>
<tr>
<td>312</td>
<td>Advanced German Composition and Usage.</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Primarily a composition course with emphasis on idiomatic expression. Prerequisite: ML 212 or 214 or approval of Department Chairman.</td>
<td></td>
</tr>
<tr>
<td>313</td>
<td>Survey of German Literature.</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>A study of German literature from its beginning to 1785. Prerequisite: ML 212 or 214 or approval of Department Chairman.</td>
<td></td>
</tr>
<tr>
<td>314</td>
<td>Survey of German Literature.</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>A continuation of ML 313. German literature from the end of the eighteenth century to the present. Prerequisite: ML 212 or 214 or approval of Department Chairman.</td>
<td></td>
</tr>
<tr>
<td>316</td>
<td>German Culture.</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Lectures and discussions on German cultural history. Prerequisite: ML 212 or 214 or approval of Department Chairman.</td>
<td></td>
</tr>
<tr>
<td>317</td>
<td>Advanced Conversational German.</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Prerequisite: ML 212 or 214 and 311 or approval of Department Chairman.</td>
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</tr>
</tbody>
</table>
410 German Literature of the Middle Ages. 3 hrs.
A study of important heroic and courtly epics of the middle ages (Nibelungenlied, Parzival, Arme Heinrich, Iwelin) and of chivalric poetry (Walter Von der Vogelweide, Wolfram Von Eschenbach, Hartmann von Aue). Prerequisite: ML 313-314 or approval of Department Chairman.

411 German Literature of the Eighteenth Century. 3 hrs.
A study of the various literary trends and selected works from “Late Baroque” to the movement of “Sturm und Drang”, including early works of Goethe and Schiller. Prerequisite: ML 313-314 or approval of Department Chairman.

412 Goethe and Schiller. 3 hrs.
Reading, discussion, and comparison of representative mature works of these two writers. Prerequisite: ML 313-314 or approval of Department Chairman.

413 German Romanticism. 3 hrs.
A study of the romantic period in German literature with emphasis on fictional works, with due consideration of philosophy and literary theory of German romanticism. Prerequisite: ML 313-314 or approval of Department Chairman.

414 The German “Novelle” From Goethe to Kafka. 3 hrs.
A study of this important literary genre with emphasis on representative novellas of the nineteenth century (Goethe, Tieck, Hoffmann, Kleist, Grillparzer, Droste-Hulshoff, Keller, C. F. Meyer, Kafka and others). Prerequisite: ML 313-314 or approval of Department Chairman.

415 Nineteenth Century German Drama. 3 hrs.
An analysis of works from Kleist to Hauptmann, showing the development and range of nineteenth century German drama from romanticism to naturalism. Prerequisite: ML 313-314 or approval of Department Chairman.

416 Great Writers of the Early Twentieth Century. 3 hrs.
A course focusing on selected works by Rainer M. Rilke, Stefan George, Thomas Mann, Hermann Hesse, and Franz Kafka. Prerequisite: ML 313-314 or approval of Department Chairman.

417 Contemporary German Literature. 3 hrs.
Current trends in Post-War German literature. Reading and discussion of works by Grass, Böll, Lenz, Aichinger, Walser, Uwe Johnson, Schnurre, and others. Prerequisite: ML 313-314 or approval of Department Chairman.

418 Modern German Drama. 3 hrs.
A study of contemporary German drama from the turn of the century to the present (Hofmannsthal, Wedekind, Kaiser, Brecht, Borchert, Dürrenmatt, and Frisch). Prerequisite: ML 313-314 or approval of Department Chairman.

419 German Lyric Poetry. 3 hrs.
A study and interpretation of selected masterpieces of major German poets from the eighteenth to the twentieth century. Prerequisite: ML 313-314 or approval of Department Chairman.

499 Independent Studies. 1-3 hrs.
Prerequisite: Approval of Department Chairman.

510 Goethe’s Faust. 3 hrs.
Goethe’s drama in the context of German and European literary tradition. Prerequisite: Approval of Department Chairman.
Spanish

021  Spanish Review.  No credit

121  Elementary Spanish.
     (No credit with ML 122.)  3 hrs.

122  Elementary Spanish.
     Prerequisite: ML 121.  3 hrs.

221  Intermediate Spanish.
     Prerequisite: ML 122 or placement.  3 hrs.

222  Intermediate Spanish.
     Prerequisite: ML 221.  3 hrs.

323  Spanish Conversation and Phonetics.
     Prerequisite: ML 222.  3 hrs.

324  Advanced Spanish Grammar and Composition.
     Recommended for teachers. Prerequisite: ML 222.  3 hrs.

325  Survey of Spanish Literature.
     A study of Spanish literature from its beginnings to 1700. Prerequisite: ML 222.  3 hrs.

326  Survey of Spanish Literature.
     A continuation of ML 325. Spanish literature from 1700 to the present. Prerequisite: ML 222 or 325.  3 hrs.

327  Spanish American Literature I.
     Essentials of Spanish-American literature through study of representative authors of the short story, novel, essay, and lyric poetry. Prerequisites: ML 326.  3 hrs.

328  Spanish American Literature II.
     A continuation of ML 327. Prerequisite: ML 326.  3 hrs.

329  Commercial Spanish.
     Translation of business correspondence, writing business letters, drafts, invoices, etc. Prerequisite: ML 324.  3 hrs.

426  Nineteenth Century Spanish Novel.
     Representative novelists and their works: Valera, Alarcon, Pereda, Galdos, Baroja. Prerequisite: ML 325-326.  3 hrs.

427  Spanish American Novel.
     Representative novels of the modern period which reflect the cultural, economic, political, and social concerns of the Spanish American republics, nationally and internationally. Prerequisite: ML 326.  3 hrs.

499  Independent Studies.
     Prerequisite: Approval of Department Chairman.  1-3 hrs.
<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
<th>Prerequisite(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>131</td>
<td>Elementary Russian</td>
<td>3 hrs.</td>
<td>(No credit without ML 132).</td>
</tr>
<tr>
<td>132</td>
<td>Elementary Russian</td>
<td>3 hrs.</td>
<td>Prerequisite: ML 131.</td>
</tr>
<tr>
<td>231</td>
<td>Intermediate Russian</td>
<td>3 hrs.</td>
<td>Prerequisite: ML 132.</td>
</tr>
<tr>
<td>232</td>
<td>Intermediate Russian</td>
<td>3 hrs.</td>
<td>Prerequisite: ML 231.</td>
</tr>
<tr>
<td>234</td>
<td>Intermediate Scientific Russian</td>
<td>3 hrs.</td>
<td>Prerequisite: ML 231.</td>
</tr>
<tr>
<td>331</td>
<td>Russian Conversation and Composition</td>
<td>3 hrs.</td>
<td>Prerequisite: ML 232, or 234, or approval of instructor.</td>
</tr>
<tr>
<td>332</td>
<td>Advanced Conversation and Composition</td>
<td>3 hrs.</td>
<td>Prerequisite: ML 331 or approval of instructor.</td>
</tr>
<tr>
<td>333</td>
<td>Russian Masterpieces in English Translation</td>
<td>3 hrs.</td>
<td>Prerequisite: EH 206, or ML 232, or approval of instructor.</td>
</tr>
</tbody>
</table>
335 Russian Culture and Civilization. 3 hrs.
Prerequisite: ML 232, or 234, or approval of instructor.

337 Survey of Russian Literature. 3 hrs.
A study of Russian literature from its beginnings to Pushkin. Prerequisite: ML 232, or 234, or approval of instructor.

338 Survey of Russian Literature. 3 hrs.
A continuation of ML 337. Russian literature from Pushkin to the present. Prerequisite: ML 232, or 234, or approval of instructor.

433 Major Writers of the Nineteenth Century. 3 hrs.
A study of representative works of Pushkin, Gogol and Dostoevsky. Prerequisite: ML 232 and approval of instructor.

434 Major Writers of the Nineteenth Century. 3 hrs.
A continuation of ML 433. A study of representative works of Tolstoy, Turgenev, and Chekhov. Prerequisite: ML 232 and approval of instructor.

439 Gogol. 3 hrs.
A thorough study of Gogol's major works especially Dead Souls. Style ideology and literary technique of the author shall be the main points considered. Prerequisite: Approval of Department Chairman.

499 Independent Studies. 1-3 hrs.
Prerequisite: Approval of Department Chairman.

531 Old Church Slavonic. 3 hrs.
A phonological and morphological study of Old Church Slavonic with special emphasis on grammar, reading and translating of old chronicles.

Slavic Studies

In addition to our regular offerings in Russian the Department of Modern Languages in cooperation with the Alabama Consortium of Eastern European/Russian Studies—would offer courses in Polish and Ukrainian to students desirous to continue their studies in the area of Slavic languages and literatures.

The teaching of such courses would be contingent upon a minimum enrollment figure. Interested students are to contact the Chairman of the Department of Modern Languages.

Music (MU)

A maximum of 6 semester hours in choral organization courses (190, 191, 192, 193) may be applied as elective credit toward total degree requirements; however, students may continue to participate in these courses and receive college credit for them.

A major in music is unavailable at this time. Students may formulate a cluster of music courses as supportive study to their major areas. A selection of combinations with majors in other disciplines are on file in
the music office, or a student may formulate his own with the approval of representative faculty advisors from the Departments involved.

**Music (MU)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>Fundamentals of Music</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>101</td>
<td>Theory of Music I</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>102</td>
<td>Theory of Music II</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>103</td>
<td>Theory of Music III</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>110</td>
<td>Introduction to Music</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>111</td>
<td>American Folk Music and Jazz</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>190</td>
<td>UAH Choir</td>
<td>1 hr.</td>
</tr>
<tr>
<td>191</td>
<td>Premier Singers</td>
<td>1 hr.</td>
</tr>
<tr>
<td>192</td>
<td>Huntsville Village Singers</td>
<td>1/2 hr.</td>
</tr>
<tr>
<td>193</td>
<td>Summer Chorus</td>
<td>1 hr.</td>
</tr>
<tr>
<td>201</td>
<td>Advanced Theory of Music IV</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>202</td>
<td>Advanced Theory of Music V</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>203</td>
<td>Advanced Theory of Music VI</td>
<td>3 hrs.</td>
</tr>
</tbody>
</table>

Basic music presented in a practical way for the student who has little or no musical training. Normally, students who expect to major in music should not expect degree credit in this course.

Intensive training in the fundamentals of musicianship, dealing principally with the mechanical aspects of music - clefs, notation, scales, intervals, meters, rhythms, and musical terminology. Extensive practice in sight-singing, melodic, harmonic, and rhythmic dictation, and practice at the keyboard. Prerequisite: Approval of instructor.

A continuation of MU 101. Prerequisite: MU 101.

A continuation of MU 102. Prerequisite: MU 102.

A general course designed to promote the understanding of music through better listening practices.

An introductory study of the history and development of American folk music and jazz. Special attention is given to current developments.

Mixed voices singing the serious choral repertoire. Open to all students of University. May be repeated.

Mixed voices singing "pop" and folk music. Open to all students of University. May be repeated.

Select, small ensemble of mixed voices. Open to all students of University by audition. May be repeated.

Mixed voices singing a variety of choral music. Open to all students of University. May be repeated.

A study of advanced principles involved in the art of musical composition, with extensive practice in advanced sight-singing, keyboard work, and dictation. Prerequisite: MU 103.

A continuation of MU 201. Prerequisite: MU 201.

204 Analysis of Music Form. 3 hrs.
An extensive study of representative small and large compositions of the
sixteenth through the twentieth centuries for structure and form.
Prerequisite: MU 103, 110, or approval of instructor. Offered upon demand.

215 Teaching Music in the Elementary School. 3 hrs.
A course for elementary education majors not trained in music to prepare
them to teach music in the classroom through experience in singing, reading,
planning and presentation.

220 Piano Pedagogy. 2 hrs.
A presentation of the materials, techniques and practices used in the teaching
of beginners and students through lower advanced grades of piano, combined
with practical experience.

227 Conducting. 2 hrs.
Basic techniques of choral and instrumental conducting. Prerequisite: MU 101
and 102 or approval of instructor. Offered upon demand.

311 History of Music I. 3 hrs.
A survey of the development of music as an art in Western civilization to 1750.
Emphasis is given to an acquaintance with representative musical works and
style and to the understanding of musical concepts in the light of their
historical background. Prerequisite: MU 103, 110, or approval of instructor.

312 History of Music II. 3 hrs.
A survey of the development of music as an art in Western civilization from
1750 to the present. Emphasis is given to an acquaintance with formal and
stylistic problems through the study of representative works and an
understanding of specific musical concepts in the light of their historical and
general cultural context. Prerequisite: MU 311.

Applied Music

All beginning and transfer students who plan to take private instruction
for music credit are required to demonstrate prior to registration their
level of proficiency to the instructor. To advance to the next one hundred
level of instruction (e.g., from 133 to 231), each student must perform
before a faculty jury. The jury may retain students at any level until
proper achievement is reached for advancement. Students not intending
to major in music who are enrolled in MU 130, 140, 150, 160, or 170 do
not require a jury and may repeat private instruction as long as the
instructor agrees that satisfactory progress is being made. Lessons are
normally sixty minutes in length.

130 Studio Instruction in Piano. 2/3 hr.
For non-music credit. May be repeated. Prerequisite: MU 100 or approval of
instructor.

Instruction in Piano. 1 1/3 hrs.
For music credit.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>140</td>
<td>Instruction in Voice.</td>
<td>2/3 hr</td>
<td>For non-music credit. May be repeated. Prerequisite: MU 100 or approval of instructor.</td>
</tr>
<tr>
<td>150</td>
<td>Studio Instruction in Strings (Violin).</td>
<td>2/3 hr</td>
<td>For non-music credit or secondary instrument credit. May be repeated. Prerequisite: MU 100 or approval of instructor.</td>
</tr>
<tr>
<td>151, 152, 153, 251, 252, 253, 351, 352, 353, 451, 452, 453.</td>
<td>Studio Instruction in Strings (Violin).</td>
<td>1 1/3 hrs</td>
<td>For music credit.</td>
</tr>
<tr>
<td>150</td>
<td>Studio Instruction in Strings (Viola).</td>
<td>2/3 hr</td>
<td>For non-music credit or secondary instrument credit. May be repeated. Prerequisite: MU 100 or approval of instructor.</td>
</tr>
<tr>
<td>151, 152, 153, 251, 252, 253, 351, 352, 353, 451, 452, 453.</td>
<td>Studio Instruction in Strings (Viola).</td>
<td>1 1/3 hr.</td>
<td>For music credit.</td>
</tr>
<tr>
<td>160</td>
<td>Studio Instruction in Woodwinds.</td>
<td>2/3 hr</td>
<td>For non-music credit or secondary instrument credit. May be repeated. Prerequisite: MU 100 or approval of instructor.</td>
</tr>
<tr>
<td>161, 162, 163, 261, 262, 263, 361, 362, 363, 461, 462, 463.</td>
<td>Studio Instruction in Woodwinds.</td>
<td>1 1/3 hr.</td>
<td>For music credit.</td>
</tr>
<tr>
<td>170</td>
<td>Studio Instruction in Brass.</td>
<td>2/3 hr</td>
<td>For non-music credit or secondary instrument credit. May be repeated. Prerequisite: MU 100 or approval of instructor.</td>
</tr>
</tbody>
</table>

**Philosophy (PHL)**

**Electives**

It is recommended that beginning students take PHL 101. Prerequisite requirements will occasionally be waived for students interested in particular branches and/or periods of philosophy. Such requests must be approved by the instructor.

**Supportive Philosophy Clusters**

Students interested in a philosophy cluster are required to take at least 21 semester hours in philosophy including at least 6 semester hours in courses numbered 300 or above. Recommended clusters are available upon request from the philosophy faculty.
Appropriate philosophy courses may also be used to form part of a cluster with other disciplines. Such a cluster must include at least 21 semester hours including at least 9 semester hours in courses numbered 300 or above and must be approved by the philosophy faculty.

**Philosophy (PHL)**

101 Introduction to Philosophy. 3 hrs.
An introduction to the fundamental problems of experience.

102 Introduction to Logic. 3 hrs.
An introduction to the methodology of correct reasoning.

109 Introduction to Criticism and Appreciation of Art: Aesthetics in the Visual Arts 3 hrs.
Introduction to basic aspects of and factors in criticism and appreciation of art, including an introduction to phenomenological aesthetics. Exploration of avenues of appreciation open to and used by individuals of varying backgrounds. A brief review of art movements of the nineteenth and twentieth centuries in relation to pertinent influences in the environment as modified or structured by individual creativity. (Same as Art 109.)

120 Philosophical Aspects of Contemporary Problems. 3 hrs.
Focuses on one or more current problems such as racial, social, political and/or economic conflicts, violence, campus, and youth movements, religious movements, drug use, public morality, technological change and environmental problems.

201 History of Western Philosophy. 3 hrs.
From the earliest Greek philosophers to Plato: an introduction to the presocratic philosophers, Socrates and Plato, with emphasis on Plato. Prerequisite: PHL 101 or approval of instructor.

202 History of Western Philosophy. 3 hrs.
From Aristotle to the Renaissance: an introduction to such philosophers as Aristotle, the Stoics, the Epicureans, Saint Augustine and Thomas Aquinas, with emphasis on Aristotle. Prerequisite: PHL 101 or approval of instructor.

203 History of Western Philosophy. 3 hrs.
The seventeenth century: an introduction to such philosophers as Descartes and Spinoza. Prerequisite: PHL 101 or approval of instructor.

204 History of Western Philosophy. 3 hrs.
The eighteenth century: an introduction to such philosophers as Leibniz, Locke, Berkeley and Hume. Prerequisite: PHL 101 or approval of instructor.

205 History of Western Philosophy. 3 hrs.
Kant and the nineteenth century: an introduction to such philosophers as Kant, Hegel and Nietzsche. Prerequisite: PHL 101 or approval of instructor.

212 Philosophical Ideas in Literature. 3 hrs.
An examination of philosophical ideas found in selected works of literature beginning with Greek drama and proceeding to the present. Extensive use will be made of recorded drama and poetry during the class sessions.

220 Intermediate Logic. 3 hrs.
A continuation of symbolic deductive logic. Prerequisite: PHL 102.
252 Philosophy of Value.  3 hrs.
An investigation of the problems of individual and social ethics, ethical and social policy and the relation of moral theories to moral practices.

272 American Philosophy.  3 hrs.
From the earliest American philosophers to Emerson: an introduction to such philosophers as Jonathan Edwards, Benjamin Franklin, Thomas Paine, Thomas Jefferson, James Madison, John C. Calhoun and Ralph Waldo Emerson.

273 American Philosophy.  3 hrs.
From the early pragmatists to the twentieth century: an introduction to such philosophers as Charles Pierce, Josiah Royce, William James, Alfred North Whitehead and John Dewey. Prerequisite: 3 hours of philosophy or approval of instructor.

302 Epistemology.  3 hrs.
A critical investigation of the fundamental problems of knowledge, such as knowledge and belief, truth and falsity, certainty and scepticism, perception, logic, explanation, and justification. Prerequisite: 6 hours of philosophy including PHL 101 or approval of instructor.

312 Metaphysics.  3 hrs.
A critical investigation of the fundamental problems of reality, such as appearance and reality, substance and universals, matter and life, mind and body, space and time, causality, necessity and freedom, and the nature and possibility of metaphysics. Prerequisite: 6 hours philosophy including PHL 101 or approval of instructor.

332 Philosophy of Religion.  3 hrs.
A critical investigation of the philosophical aspects of religion, such as the nature of religion, religious concepts and language, religious creeds and dogma, the nature and existence of God, and the problems of evil and immortality. Prerequisite: 6 hours of philosophy or approval of instructor.

362 Introduction to Political Philosophy.  3 hrs.
The fundamental issues of politics as treated by some representative thinkers of the Western world. (Same as PSC 362.)

366 Social Philosophy.  3 hrs.
An examination of such problems as human rights, freedom, equality, law, justice, and the philosophical aspects of the human and/or social sciences. Prerequisite: 6 hours of philosophy or approval of instructor.

372 Contemporary European Philosophy.  3 hrs.
An examination of some twentieth century European philosophers such as Bergson, Husserl, Heidegger and Sartre, with emphasis on phenomenology and existentialism. Prerequisite: PHL 101 and one course in the history of philosophy (PHL 204 is recommended) or approval of instructor.

376 Contemporary British Philosophy.  3 hrs.
An examination of some twentieth century British philosophers and trends such as Bertrand Russell and logical atomism, Carnap and logical positivism, and Wittgenstein and philosophical analysis. Prerequisite: PHL 101 and one course in the history of philosophy.

385 Selected Topics in the History of Philosophy.  3 hrs.
More intensive examination of particular problems, periods or movements in the history of philosophy. Prerequisite: to be determined in accordance with the content of the course.
403  The Philosophy of Plato.  
3 hrs.  
A critical evaluation of the major contributions of Plato to epistemology, metaphysics and ethics. Prerequisite: 9 hours of philosophy including PHL 201 and 3 hours at the 300 level or approval of instructor.

425  The Philosophy of Spinoza.  
3 hrs.  
A critical evaluation of the major contributions of Spinoza to metaphysics and ethics. Prerequisite: 9 hours of philosophy including PHL 203 and 3 hours of philosophy at the 300 level or approval of instructor.
Division of Social and Behavioral Sciences

Social and behavioral sciences encompass those areas of knowledge relating to the behavior of man and the culture he has created. As the world grows more complex it becomes necessary to understand the nature of man and his relationship with his fellows. While the approach is scientific in terms of assumptions and methods, it is also humanistic in its implications since the problems it addresses relate to the kind of social milieu which is possible and desirable. The social and behavioral sciences perform a dual function. On the one hand they constitute particularly complex areas of technical knowledge, while on the other they function as carriers and critics of the value system in our society. The undergraduate program at UAH is designed to perform both roles.

Undergraduate Degrees and Study

Within the Division a student seeking a Bachelor of Arts degree must declare his area of concentration (AOC) no later than the close of his sophomore year. This AOC must include a major chosen from either economics, political science, sociology, or psychology, and must include one of the following variations:

1. An established cluster drawn from one department currently offering a major at The University of Alabama in Huntsville. The cluster must include a minimum of 21 semester hours as prescribed by the department, 6 of which must be numbered 300 or above; or
2. A cluster drawn from one discipline without an established major which includes 21 semester hours of courses of which at least 6 hours are numbered 300 or above; or
3. A cluster supporting the major drawn from two or more disciplines which must include a minimum of 21 semester hours, 9 of which must be taken in courses numbered 300 or above.

Any cluster chosen by a student is subject to the approval of (1) the student's major department; (2) the other discipline or disciplines from which courses in the cluster are drawn; and, (3) the Division Director. Each major department has developed appropriate areas of concentration designed to provide a sound curriculum in various areas of interest; however, a student who wishes to deviate from any of the standard AOC's may work out an individual program with the advice of his major department subject to the above regulations concerning approval.

A student cannot choose a major and a cluster in the same department even if the course titles indicate different sub-departments.
Graduate Study

An interdisciplinary degree of Master of Administrative Science is also offered. Description of the requirements for this degree are listed along with course offerings on pages 143-145.

Economics (EC)

Area of Concentration (AOC) with Economics Major

(No student may enroll in courses out of sequence without the explicit approval of the economics faculty.)

The economics department requires that the student desiring an area of concentration (AOC) in economics must include in his program 21 semester hours of core courses (in addition to EC 142-143) which include the following: EC 231, 310, 340, 341, 345, 352, 448. In addition to these courses, the student can take an additional 15 hours of other courses offered in the department in his area of interest.

An example of an AOC for a degree in economics for students interested in graduate work in economics may be:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC 231</td>
<td>Applied Statistics for Social and Behavioral Sciences</td>
<td>3</td>
</tr>
<tr>
<td>EC 241</td>
<td>Marketing Economics</td>
<td>3</td>
</tr>
<tr>
<td>EC 310</td>
<td>Introduction to the use of Mathematics in Economics</td>
<td>3</td>
</tr>
<tr>
<td>EC 325</td>
<td>Intermediate Statistics</td>
<td>3</td>
</tr>
<tr>
<td>EC 340</td>
<td>Macro Economic Analysis</td>
<td>3</td>
</tr>
<tr>
<td>EC 341</td>
<td>History of American Economic Growth</td>
<td>3</td>
</tr>
<tr>
<td>EC 345</td>
<td>Micro Economic Analysis</td>
<td>3</td>
</tr>
<tr>
<td>EC 352</td>
<td>Money and Banking</td>
<td>3</td>
</tr>
<tr>
<td>EC 353</td>
<td>Public Finance</td>
<td>3</td>
</tr>
<tr>
<td>EC 430</td>
<td>Introduction to Econometrics</td>
<td>3</td>
</tr>
<tr>
<td>EC 446</td>
<td>International Economics and Trade</td>
<td>3</td>
</tr>
<tr>
<td>EC 448</td>
<td>Development of Economic Theory</td>
<td>3</td>
</tr>
<tr>
<td>EC 585</td>
<td>Comparative Economic Systems</td>
<td>3</td>
</tr>
</tbody>
</table>

39

An example of an AOC for a degree in economics for students interested in entering the labor force with a degree in economics may be:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC 111</td>
<td>Principles of Accounting</td>
<td>3</td>
</tr>
<tr>
<td>MGT 200</td>
<td>Principles of Management</td>
<td>3</td>
</tr>
<tr>
<td>EC 231</td>
<td>Applied Statistics for Social and Behavioral Sciences</td>
<td>3</td>
</tr>
</tbody>
</table>

120
An example of an AOC with a major in economics and a supportive mathematics cluster:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MA 153</td>
<td>Calculus and Analytic Geometry</td>
<td>3</td>
</tr>
<tr>
<td>MA 154</td>
<td>Calculus and Analytic Geometry</td>
<td>3</td>
</tr>
<tr>
<td>MA 233</td>
<td>Calculus and Analytic Geometry</td>
<td>3</td>
</tr>
<tr>
<td>MA 244</td>
<td>Introduction to Linear Algebra</td>
<td>3</td>
</tr>
<tr>
<td>MA 251</td>
<td>Calculus and Analytic Geometry</td>
<td>3</td>
</tr>
<tr>
<td>MA 352</td>
<td>Introduction to Differential Equations</td>
<td>3</td>
</tr>
<tr>
<td>MA 385</td>
<td>Introduction to Probability Theory</td>
<td>3</td>
</tr>
</tbody>
</table>

Supportive Economics Cluster

A student whose area of interest is in a discipline other than economics, but wishing a supportive cluster in economics, may, in consultation with and approval of the economics faculty, choose (a) 21 semester hours of appropriate courses offered in the economics department, or (b) appropriate courses offered in economics as part of a cluster with other disciplines to support his major area of interest.

The following are examples of possible clusters with a major in various other disciplines:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC 142</td>
<td>Principles of Economics</td>
<td>3</td>
</tr>
<tr>
<td>EC 143</td>
<td>Principles of Economics</td>
<td>3</td>
</tr>
<tr>
<td>EC 231</td>
<td>Applied Statistics for Social and Behavioral</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Sciences</td>
<td></td>
</tr>
<tr>
<td>EC 352</td>
<td>Money and Banking</td>
<td>3</td>
</tr>
</tbody>
</table>

And any three of the following four courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC 340</td>
<td>Macro Economic Analysis</td>
<td>3</td>
</tr>
<tr>
<td>EC 341</td>
<td>History of American Economic Growth</td>
<td>3</td>
</tr>
<tr>
<td>EC 345</td>
<td>Micro Economic Analysis</td>
<td>3</td>
</tr>
<tr>
<td>EC 448</td>
<td>Development of Economic Theory</td>
<td>3</td>
</tr>
</tbody>
</table>
With History
EC 142 Principles of Economics 3
EC 143 Principles of Economics 3
EC 322 Public Policy Toward Business 3
EC 341 History of American Economic Growth 3
EC 344 European Economic History 3
EC 510 Survey of Economic Theory 3
EC 585 Comparative Economic Systems 3

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With Industrial Engineering and Systems
EC 142 Principles of Economics 3
EC 143 Principles of Economics 3
EC 231 Applied Statistics for Social and Behavioral Sciences 3
EC 235 Intermediate Statistics 3
EC 340 Macro Economic Analysis 3
EC 345 Micro Economic Analysis 3
EC 430 Introduction to Econometrics 3

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With Psychology
EC 142 Principles of Economics 3
EC 143 Principles of Economics 3
EC 241 Marketing Economics 3
EC 322 Public Policy Toward Business 3
EC 325 Intermediate Statistics 3
EC 341 History of American Economic Growth 3
EC 510 Survey of Economic Theory 3
EC 585 Comparative Economic Systems 3

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Economics (EC)

No student may enroll in courses out of sequence without the explicit approval of the economics faculty.

142 Principles of Economics I. 3 hrs.
Introduction to economic analysis and its use in dealing with business or governmental problems. Material in the first term concentrates on national income, price levels, employment, and simple demand and supply theory.

143 Principles of Economics II. 3 hrs.
A continuation of EC 142. Concentrates on more advanced value theories, including problems of monopoly or partial monopoly, distribution of income along functional lines, international economics, and economic growth. Prerequisite: EC 142.

Collection, classification, and presentation of data, measures of central tendency and dispersion, introduction to probability distribution and sampling theory, confidence limits and tests of significance, chi-square and “t” distribution. Prerequisite: MA 105, or college algebra or its equivalent, or the approval of the instructor. (Same as PY 231 and SOC 231.)
235 Economic Geography. 3 hrs.
Spatial relationships between various resources, location factors in primary, secondary, and tertiary activities, geographic patterns of production, processing, and distribution of commodities.

241 Marketing Economics. 3 hrs.
Survey of marketing activities, principles, structures, functions, policies, prices, costs, and quantitative problems from the social, consumer, and management points of view. Prerequisite: EC 143.

310 Introduction to Mathematics for Students of Economics. 3 hrs.
An introductory treatment of differential and integral calculus, difference and differential equations, determinants and matrices with application to economic problems. Prerequisite: Junior standing, EC 143, MA 105.

321 Engineering Economy. 3 hrs.
Deals with economic evaluation of engineering alternatives. Topics include interest, depreciation, time-value of investments, learning curves, and replacement analysis. Prerequisite: EC 142, MA 233 or EC 310. (Same as EG 321.)

322 Government and Business. 3 hrs.
Analysis of regulations which government may impose upon business and a survey of basic constitutional principles and legal aspects of the more recent federal legislation affecting business. Prerequisite: FIN 251, MGT 262.

325 Intermediate Economic & Business Statistics. 3 hrs.
Index numbers and index number construction, analysis of time series (trends, cyclical, seasonal, and random factors affecting time series), linear regression and correlation, the "F" distribution, introduction to multiple regression and analysis of variance. Prerequisite: EC 231. (Same as BUS 325.)

340 Macro Economic Analysis. 3 hrs.
Comprehensive study of the national economy as a whole including analysis of the national income accounts, consumption, saving, investment, money, interest, employment, price level, monetary and fiscal policy, and economic growth. Prerequisite: EC 143, EC 310.

341 History of American Economic Growth. 3 hrs.
A survey of the origins of basic economic institutions in Europe followed by a detailed study of the historical development of these institutions in the United States. Prerequisite: EC 143.

344 European Economic History. 3 hrs.
Industrial Revolution to current developments covering institutions, activities, economic systems, and policies. Prerequisite: EC 143.

345 Micro Economic Analysis. 3 hrs.
More intensive examination of the economic principles underlying value and distribution with additional training in the application of these principles to problems of analysis. Prerequisite: EC 310.

352 Money & Banking. 3 hrs.
Organization, operation and economic significance of the monetary and banking systems. Prerequisite: EC 143. (Same as FIN 352.)

353 Public Finance. 3 hrs.
Principles of taxation, government expenditures, borrowing, and fiscal administration. Prerequisite: EC 143. (Same as FIN 353 and PSC 353.)
430 Introduction to Econometrics.  
Use of statistical and mathematical tools in economics, structural relationships of economic models, and introduction to economic model building. Prerequisite: EC 310, 325, 340 and 345, or approval of instructor.  

448 Development of Economic Theory.  
Study of the historical development of economic thought from ancient times to the nineteenth century and from early modern times to present. Prerequisite: EC 345, EC 340.  

452 State and Local Finance.  
A study of administration, fiscal importance and economic effects of state and local finances. The recent trends in state and local revenue and expenditure and their significance will be emphasized. Prerequisite: EC 142. (Same as FIN 452.)

Courses for graduate and undergraduate credit--offered upon sufficient demand.

510 Survey of Economic Theory.  
This course is primarily designed for students who have had no prior training in economics and who wish to take further courses in economics. The course will be a rigorous treatment of basic principles underlying economic theory. The topics to be considered will be introduction to: theory of national income determination, theory of market structures, principles of value and distribution theory. Prerequisite: Approval of the instructor.

546 International Economics and Trade.  
Theoretical principles underlying international trade with an application of these principles to recent historical developments and to current national policies. Prerequisite: EC 345 or approval of instructor. (EC 510 and the approval of the instructor for non-economics majors.)

564 Regional Economics.  
Introduction to location theory and regional economics, analysis of factors affecting location of economic activity, and consideration of differential growth rate among regions, and introduction to methods of regional analysis. Prerequisite: EC 235, 340, and 345 or equivalent. (EC 510 and the approval of the instructor for non-economics majors.)

585 Comparative Economic Systems.  
Analysis of principal economic systems comparing resource allocation consumption, pricing, production, investment, income distribution and central planning. Prerequisite: EC 345. (EC 510 and the approval of the instructor for non-economics majors.)

Courses for graduate credit--offered upon sufficient demand

600 Theory of Income and Employment.  
This is a continuation of EC 340. In this course more advance treatment of theory of national income determination and associated concepts are considered. Prerequisite: EC 340 or equivalent. (EC 510 and the approval of the instructor for non-economics majors.)

610 Theory of Value and Distribution.  
This course is a continuation of EC 345. Consideration of classical and neoclassical theory of value and distribution. Prerequisite: EC 345 or equivalent. (EC 510 and the approval of the instructor for non-economics majors.)
620 Econometrics. 3 hrs.
Least-square estimation of single-equation linear models, properties of the estimators, significance tests and confidence intervals of estimation, and problems in the estimation of single-equation models (autocorrelation, multicollinearity, heteroscedasticity). Prerequisite: EC 430. (EC 510 and the approval of the instructor for non-economics majors.)

630 Evolution of Economic Thought. 3 hrs.
Methodology and social philosophy of outstanding economists, and their part in shaping economic development. The treatment will be selective and will emphasize the systematic nature of theories involved. Prerequisite: EC 448, EC 600, EC 610 or equivalent.

640 Seminar in Economics. 3 hrs.
Intensive analysis of selected theoretical and applied aspects of economics. Prerequisite: EC 630 or consent of the instructor. (EC 510 and the approval of the instructor for non-economics majors.)

700 Research in Economics. 3 hrs.
Special topics in the area of student interest. Prerequisite: EC 630.

Requirements for the Cooperative Program—Bachelor of Science Degree in Business Administration

This degree is offered in cooperation with Alabama Agricultural and Mechanical University. Courses identified as “offered at Alabama A&M” may be taken by UAH students, subject to institutional and catalog limitations, toward a major in a degree to be conferred by The University of Alabama in Huntsville.

Total Requirements

Minimum requirements for the Bachelor of Science Degree in Business Administration are 128 hours. To meet the requirements for a BSBA degree, a student will take 53 hours listed in the general education requirements (below). In addition, a student will take no more than 64 semester hours in his total AOC program (a major in one of the options listed and a supportive cluster). He may take up to 52 semester hours in his major including courses in his major listed in General Education Requirements, however, the latter courses may not be included in the 64 hours maximum in the total AOC program.

General Education Requirements

<table>
<thead>
<tr>
<th>Humanities</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>English Composition</td>
<td>6</td>
</tr>
<tr>
<td>Survey of English Literature</td>
<td>6</td>
</tr>
<tr>
<td>Origins &amp; Development of the Contemporary World</td>
<td>6</td>
</tr>
</tbody>
</table>

Social & Behavioral Sciences
Economics, Political Science, Psychology or Sociology (or
Philosophy from the Division of the Humanities: one discipline

Natural Sciences 8
Biology, Chemistry, or Physics

Mathematics 9
MA 105, 133, 153 (or demonstrated competency through 153)

Languages
A student may choose one of the following options:
(a) 12 hours in a foreign language
(b) 12 hours in one of the following areas:
   (i) Mathematics beyond MA 153
   (ii) Statistics other than EC 231, EC (BUS) 325
   (iii) Computer other than CS 113, or
(c) 12 hours combination from i, ii, or iii of (b).

Area of Concentration Requirements

The following courses are needed to satisfy the requirements for AOC for a Bachelor of Science degree in Business Administration in the three options below:

Option I.
Management Science: AC 111, CS 113, EC 142, EC 143, EC (BUS) 231, EC (BUS) 325, EC 345, FIN 251, MGT 200, MGT 201, MGT 262, MGT 300, MGT 361, EG 220, EG 427.

Option II.
Accounting--Quantitative Methods: AC 111, AC 112, AC 213, AC 214, AC 314, AC 415, AC 416, CS 113, EC 142, EC 143, EC (BUS) 231, EC (BUS) 325, EC 345, FIN 251, EG 525.

Option III.
Finance: AC 111, AC 112, EC 142, EC 143, EC 340, EC 345, FIN 251, FIN (EC) 352, FIN (EC) 353, FIN 452, FIN 531, FIN (EC) 590, MGT 200, MGT 201.

Supportive Cluster

A student may form a supportive cluster of 21 hours drawn from one or more disciplines at the UAH.

Supportive Business Administration Cluster

A student interested in Business Administration cluster may choose a minimum of 21 semester hours in one of the options stated above, of
which a minimum of 6 hours must be courses numbered 300 or above.

**Business (BUS)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>262</td>
<td>Management &amp; Labor Economics.</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>(Same as MGT 262.)</td>
<td></td>
</tr>
<tr>
<td>321</td>
<td>Business Law.</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Introductory course emphasizing the legal environment in business. (Offered at A&amp;M, A&amp;M Catalog No. BUS 417.)</td>
<td></td>
</tr>
<tr>
<td>322</td>
<td>Public Policy Toward Business.</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Analysis of regulations which government may impose upon business and a survey of basic constitutional principles and legal aspects of the more recent federal legislation affecting business. (Same as PSC 322.)</td>
<td></td>
</tr>
<tr>
<td>361</td>
<td>Principles of Business Organizations: Theory and Practice.</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>(Same as MGT 361.)</td>
<td></td>
</tr>
<tr>
<td>363</td>
<td>Personnel Administration.</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>(Same as MGT 363.)</td>
<td></td>
</tr>
<tr>
<td>420</td>
<td>Business Policy.</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>(Same as MGT 420.)</td>
<td></td>
</tr>
</tbody>
</table>

**Accounting (AC)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>111</td>
<td>Principles of Accounting I.</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Basic principles of accounting emphasizing individual proprietorships.</td>
<td></td>
</tr>
<tr>
<td>112</td>
<td>Principles of Accounting II.</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Accounting principles for partnerships and corporations. Prerequisite: AC 111.</td>
<td></td>
</tr>
<tr>
<td>213</td>
<td>Intermediate Accounting I.</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Detailed theoretical and sequential treatment of topics introduced in beginning accounting courses to include: survey of contemporary basic accounting principles; analysis of working capital items and non-current items; concepts of measuring profit and loss in the firm. Prerequisite: AC 112.</td>
<td></td>
</tr>
<tr>
<td>214</td>
<td>Intermediate Accounting II.</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Theoretical analysis of present-day accounting practice with particular regard to cost approach; income tax implications in measuring financial position; going-concern assumption; practices of conservatism and consistency and full disclosure; examination of analytical processes of statement preparation including funds-flow and cash-flow reporting in financial statements adjusted for price-level changes. Prerequisite: AC 213.</td>
<td></td>
</tr>
<tr>
<td>313</td>
<td>Income Tax Procedure.</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Determination of taxable income and selected aspects of tax accounting for individuals. Prerequisite: AC 112. (Offered at A&amp;M, A&amp;M Catalog No. BUS 451.)</td>
<td></td>
</tr>
<tr>
<td>314</td>
<td>Cost Accounting.</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>Basic theory and procedures involving materials, labor, and manufacturing expenses in job order and process cost systems. Prerequisite: AC 213. (Offered at A&amp;M, A&amp;M Catalog No. BUS 452.)</td>
<td></td>
</tr>
</tbody>
</table>
315 Introduction to Auditing. 3 hrs.
Auditing theory and practice, working papers, financial statements, and professional ethics. Prerequisite: AC 214. (Offered at A&M, A&M Catalog No. BUS 441.)

415 Advanced Accounting I. 3 hrs.
Treatment of recent developments in accounting thought; advanced techniques of partnership accounting; venture accounting; assignments; installment sales, statement of affairs, realization and liquidation reports, accounting applications of compound interest and annuities; estates and trusts. Prerequisite: AC 214. (Offered at A&M, A&M Catalog No. BUS 421.)

416 Advanced Accounting II. 3 hrs.
Extended examination of home, office and branch accounting; parent and subsidiary accounting (consolidated statements); public and foreign accounts. Prerequisite: AC 415.

417 Governmental Accounting. 3 hrs.
Special features of budgetary and fund accounting as applied to municipalities, other governmental units and institutions such as schools and hospitals. Prerequisite: AC 416. (Offered at A&M, A&M Catalog No. BUS 442.)

Management (MGT)

200 Fundamentals of Management I. 3 hrs.
Theory and practice of business management: the enterprise and its environment, evolution of management concepts, managerial functions and processes, and organization structures. Integrative case studies are included. Prerequisite: EC 143.

201 Fundamentals of Management II. 3 hrs.
Theory and practice of business management: Management models, the planning process, the controlling process, social responsibility issues, and problems multinational firms. Integrative case studies are included. Prerequisite: MGT 200.

220 Industrial Management. 3 hrs.
A comprehensive introduction to the industrial organization, its structure, environment, functions and systems as well as to industrial engineering, its role and methods. (Same as EG 220.)

262 Management and Labor Economics. 3 hrs.
Psychological and institutional factors as well as economic analysis of the major aspects of such problems as employment, wages, hours, unionism, labor-management relations, and social security. Prerequisite: EC 143. (Offered at A&M, A&M Catalog No. BUS 326.)

300 Introduction to Quantitative Methods in Management. 3 hrs.
An introduction to the use of quantitative methods in solving business problems and improving decision making. Prerequisite: MA 133, MGT 201, EC (BUS) 231.

361 Introduction to Business Organizations: Theory and Practice. 3 hrs.
Examination of current business organization theories in the literature. Applications, via cases, both textual and actual, of these organizational and decisional postulates to the modern business firm. Prerequisite: MGT 201.

363 Personnel Administration. 3 hrs.
Examination of traditional as well as dynamic theories, issues, problems of personnel administration and evaluation of the latest findings of
organizational and administrative theories as the altered framework to place personnel administrative practices on a firmer basis than provided by the usual bureaucratic assumption tied together by ideas of human relation skills. The personnel administration needs of today's large, complex business enterprise operations are examined. Prerequisite: MGT 361. (Offered at A&M, A&M Catalog No. BUS 433.) (Same as BUS 363.)

420 Business Policy.  
Analysis of fundamental factors in organization and management. Effects of policy decisions on sales, production, finance, and personnel. The role of the public relations process, the measurement of public opinion as applied to employee, stockholder, community, consumer, and supplier relations. The examination of the theoretical foundation of industrial organization and public responsibilities. Prerequisite: MGT 361. (Same as BUS 420.)

427 Management Systems Analysis.  
A system approach to the study of formal organizations. Presents analytical techniques for making decisions about organizational design. Prerequisite: EG 220, EG 390, (EC (BUS) 325 may be substituted for EG 390.) (Same as EG 427.)

450 Wage and Salary Administration.  
Examination of complexities of the modern corporation's total compensation system, study of administration of systematic wage and salary policies, review of central concepts relating to personnel recognition and reward. Prerequisite: MGT 363. (Same as BUS 450.)

Graduate and Undergraduate Credit

531 Managerial Finance.  
Examination of principles and tools of analysis available to management. Topics include financial decision making as a coordinating process, administrative responsibility, short and long term financial instruments, government regulation, promotion, refunding, capital investment decisions, capital cost, and the process of security issues. Prerequisite: MGT 201, FIN 251, FIN (EC) 352. (Same as FIN 531.)

561 Managerial Economics.  
Analysis of managerial concepts from the multiple fields of business administration, quantitative and qualitative decision methods including case problems related to the process of economic decision making and to the formulation of policy at the top level of the firm. Prerequisite: EC 345.

570 Seminar in Management.  
Treatment of selected topics in management. Prerequisite: Senior or graduate standing and approval of instructor.

Finance (FIN)

251 Corporate Finance.  
Promotional, financial, structural features of the basic types of business organizations. Prerequisite: AC 112, EC 143.

352 Money and Banking.  
Organization, operation, and economic significance of the monetary and banking systems. Prerequisite: EC 143. (Same as EC 352.)

353 Public Finance.  
This is a general course in principles of taxation, government expenditures, borrowing, and fiscal administration. Prerequisite: EC 143.
452 State and Local Finance. 3 hrs.
A study of administration, fiscal importance and economic effects of state and local finances. The recent trends in state and local revenue and expenditure and their significance will be emphasized. Prerequisite: EC 142.

Graduate and Undergraduate Credit

531 Managerial Finance. 3 hrs.
Examination of principles and tools of analysis available to management. Topics include financial decision making as a coordinating process, administrative responsibility, short and long term financial instruments, government regulation, promotion, refunding, capital investment decision, capital costs, and the process of security issues. Prerequisite: MGT 201, FIN 251, FIN (EC) 352. (Same as MGT 531.)

554 International Finance. 3 hrs.
Study of foreign exchange rates under different monetary standards, methods of financing international trade, international financial institutions, proposals for fostering international trade through specialized forms of reserves and problems of international liquidity. Prerequisite: FIN (EC) 352.

590 Monetary and Credit Policy. 3 hrs.
Analysis of monetary and federal reserve policies, their influence on money, price, interest rate and employment with special emphasis on the maintenance of economic stability and progress. Prerequisite: FIN (EC) 352, EC 340. (Same as EC 590.)

Political Science (PS)

Area of Concentration (AOC) With Political Science Major

A student who wishes to major in political science must include in his academic program a minimum of 33 semester hours in political science, including PSC 101, 231 (statistics), and a minimum of 15 semester hours in courses numbered 300 or above, one of which must be PSC 499.

A student developing an area of concentration with a political science major must choose a supportive cluster consisting of 21-30 semester hours of courses drawn from one or a combination of disciplines other than political science. Supportive clusters drawn from one discipline must include a minimum of six semester hours in courses numbered 300 or above. Clusters combining two disciplines must include at least one upper-level course in one subject and two upper-level courses in the other.

Freshmen considering a major in political science should consult with a faculty advisor in the department during their freshman year. In most cases, it will be advisable for majors to enroll in 200-level courses when they have completed PSC 101. Some electives should be chosen from economics, history and sociology. General education requirements should include MA 105 (College Algebra) unless placement tests indicate Level II or above. Transfer students are advised to consult with a faculty member in the department before scheduling courses at UAH.
Sophomores must file AOC declarations before the end of their sophomore year. The AOC provides the student an opportunity to develop an academic program which will meet his individual interests and objectives. Guidelines for curriculum planning in political science are available in the departmental office. These guidelines are designed to consider such intellectual and vocational interests as pre-law training, international studies, public service, graduate-school preparation, criminal justice, and integrated studies with the social sciences, humanities, or environmental sciences.

Political Science (PS)

101 American Government. 3 hrs.
A survey of the principles, institutions, and practices of American national government.

102 Problems of American National Government. 3 hrs.
A survey of selected problems encountered by governmental units in areas of foreign and domestic policy such as defense, agriculture, business regulation, education, civil rights, and social welfare. Prerequisite: PSC 101.

205 Western European Constitutional Systems. 3 hrs.
An examination of the political systems of Great Britain, France, and West Germany. Prerequisite: Sophomore standing or approval of the instructor.

212 State and Local Government. 3 hrs.
A study of the institutions and functions of American state and local government and their relationship to the political process.

215 Introduction to International Policies. 3 hrs.
An examination of the basic factors underlying the conduct of international relations focusing upon the evolution of the present state system. Special attention is given to the problems of balance of power, bipolarity, sub-systems, and diplomacy. Prerequisite: sophomore standing or approval of the instructor. Recommended for all political science majors.

231 Applied Statistics for Social and Behavioral Science. 3 hrs.
Collection, classification, and presentation of data, measures of central tendency and dispersion, introduction to probability distribution and sampling theory, confidence limits and tests of significance, chi-square and “t” distribution. Prerequisite: College algebra or approval of instructor.

247 English Constitutional History to 1603. 3 hrs.
An interdisciplinary course appropriate for students of history, government, or literature. Attention will be given to the condition of society and the impact of ideas and social forces on historical developments and to the origins and evolution of English governmental and legal institutions such as common law, parliament, the judiciary, and national administration. (Same as HY 247.)

248 English Constitutional History Since 1603. 3 hrs.
A continuation of PSC 247. Additional themes include the impact of revolutions and industrialization upon English society, the expansion of English liberties, and the development of the cabinet, political parties, and the welfare state. (Same as HY 248.)

271 Principles of Public Administration. 3 hrs.
An examination of administrative principles and practices in public
organizations and agencies. Prerequisite: PSC 101.

Courses listed below are open to students who have completed 9 semester hours in political science or who have junior standing.

305 **Totalitarian Governments.** 3 hrs.
An examination of the nature of totalitarianism and a study of political practices, ideologies, and behavior in selected communist and non-communist countries.

313 **Problems of Federalism.** 3 hrs.
An examination of intergovernmental relationships in selected policy areas with attention given to grant-in-aid programs and other devices of cooperative federalism.

322 **Public Policy toward Business.** 3 hrs.
An analysis of regulations which government may impose upon business and a survey of basic constitutional principles and legal aspects of the more recent federal legislation affecting business. (Same as EC 322.)

325 **The Politics of Change in the Non-Western World.** 3 hrs. (Formerly the Politics of Developing Nations)
An examination of the political process in the new nations of Asia and Africa. Attention is given to the development of adequate political processes to implement economic and social change and to overcome general problems relating to traditionalism and ethnic and tribal diversity.

327 **The Comparative Development of China and Japan.** 3 hrs.
A comparative examination of the political and economic development of the major East Asian powers in the twentieth century. For China attention is given to Mao-Tse-Tung’s rise to power, the Chinese Communist Party, the political culture of Maoism, and Chinese ideology. For Japan emphasis is given to Japan’s rise as a world power, the degeneration of politics into fascism, post-war recovery and political change. Prerequisite: PSC 325 recommended but not required.

333 **International Law and Organization.** 3 hrs.
An examination of the contribution of international law and organization to world order since World War II. Emphasis is given to the role of the United Nations in the third world, and to the political and sociological origins of international law and its application to selected contemporary problems. Prerequisite: PSC 215.

339 **Mass Electoral Behavior.** 3 hrs.
The nature and causes of political activity in mass electorates, the dynamics of the decision to vote and who to vote for, and the mediating effects of election law. Emphasis on American presidential elections.

340 **Political Socialization.** 3 hrs.
The development of attitudes and behavior patterns relevant to politics. Topics include developmental models, belief systems, consequences for political institutions. Data emphasizes mass publics and single elite actors.

353 **Public Finance.** 3 hrs.
An examination of the principles of taxation, government expenditures, borrowing, and fiscal administration. Prerequisite: EC 143. (Same as EC 353.)
357 The American Legislative Process. 3 hrs.
An examination of the constitutional and theoretical foundations of Congress and state legislatures emphasizing problems of structure, procedure, leadership, and legislative reform.

358 The American Presidency. 3 hrs.
An examination of the role of the President.

359 Social Foundations of Revolutionary Change. 3 hrs.
An examination of theories of revolution, extremist behavior, and political and social systems under stress in selected western and non-western societies. (Same as Sociology 359.)

362 Introduction to Political Philosophy. 3 hrs.
A study of the fundamental issues of politics as treated by some representative thinkers of the western world. (Same as PHL 362.)

363 Modern Political Ideologies. 3 hrs.
An examination of political ideologies in the twentieth century such as nationalism, liberalism, democratic socialism, fascism, Marxism and its variants.

372 Civil Liberties. 3 hrs.
An examination of judicial interpretations of contemporary questions involving the rights of individuals and the limits of freedom of action in American society.

375 Political Analysis. (Formerly PSC 462) 3 hrs.
A study of the application of behavioral methods in the collection, organization, and analysis of political data. Emphasis is given to the development of research skills. (SOC 300 may be substituted with permission of advisor.)

381 Nationalist Movements in South Asia. 3 hrs.
A study of the nationalist movements in India, Pakistan, Ceylon, Nepal, and Afghanistan—their origins, development, and culmination in independence from British rule. (Same as HY 381.)

382 Contemporary South Asia. 3 hrs.
An analysis of the political, social, and economic developments in India, Pakistan, Ceylon, Nepal, and Afghanistan in the twentieth century. (Same as HY 382.)

Courses listed below are open to students who have completed 15 hours of political science or who have senior standing.

405 The Commonwealth of Nations. 3 hrs.
A study of the development and organization of the British Commonwealth with particular emphasis upon Canada, Australia, New Zealand, and South Africa. PSC 205 recommended but not required.

410 Local Government and Urban Problems. 3 hrs.
An examination of the relationship between local governing institutions and the problems of urban society, focusing on intergovernmental power relationships.
423 Comparative Foreign Policies of Non-Western States. 3 hrs.
An examination of the foreign policies of Japan since World War II, the People's Republic of China, and selected African states. Emphasis will be placed on the problems of revolutionary foreign policies, the dilemma of the small state in the world dominated by super-powers, and the importance of economic factors in the formation of foreign policy. Prerequisite: PSC 215 or permission of the instructor.

427 Government and Crisis in Sub-Saharan Africa. 3 hrs.
An examination of the development of government in tropical Africa since the end of colonialism. Pan-Africanism, militarism, tribal and ethnic diversity, and the struggle against colonialism in southern Africa are among the topics discussed. Prerequisite: PSC 325 or permission of the instructor.

439 Recent and Contemporary American Foreign Policy. 3 hrs.
An intensive study of selected problems in American foreign policy since 1939 in the light of ideological conflicts, domestic factors, and the national interest. (Same as HY 439.)

493 Advanced International Politics. 3 hrs.
An intensive examination of the theoretical approaches to the study of international politics with a focus on systems theory, defense planning, and game theory. Prerequisite: PSC 215.

495 Advanced Comparative Politics. 3 hrs.
An intensive study of comparative aspects of democratic political cultures, and a study of theoretical approaches to the study of comparative politics. Prerequisite: PSC 205.

496 Comparative Politics of Race. 3 hrs.
An examination of the role of the race factor in contemporary political systems through the comparative study of South Africa, the United States, and Portuguese Africa. (Same as SOC 496.) Prerequisite: PSC 325 or permission of the instructor.

499 Seminar in Political Science. 3 hrs.
A consideration of selected problems in political science. Open only to seniors. Required of all students majoring in political science.

Courses listed below are open to advanced undergraduates and to graduate students in the administrative sciences program.

510 Administration of Major Federal Programs. 3 hrs.
A comparison of administrative techniques used in the administration of diverse federal programs such as Model Cities, Appalachia, Defense, and Agriculture. Emphasis is given to the patterns of administration created by the nature of the programs, their clientele, and administrative traditions.

512 Public Personnel Administration. 3 hrs.
Purpose, functions, and processes of personnel management at the national, state, and local levels.

515 Budgetary Processes. 3 hrs.
Governmental revenue and expenditure policies with emphasis on budget as a method of administrative and fiscal control. Prerequisite: PSC 271, EC 353. (Same as EC 515.)

560 Public Policy Determination. 3 hrs.
A survey of political and economic implications of decision making at
national, state and local levels. Recommended as an option for graduate students in the administrative sciences program.

568 Administrative Law and Regulation. 3 hrs.
Judicial influences and controls on the exercise of administrative authority together with an analysis of governmental regulatory policies.

572 The American Judicial Process. 3 hrs.
A study of the American judiciary with attention given to the institutional setting and the process of litigation, recruitment and political socialization of judges, influences and limitations on judicial decision making, and the impact of judicial decisions within the political system.

591 The Transportation Crisis. 3 hrs.
The course considers: a brief history of the role of transportation in society; the goals of a transport system; modal coordination of divergent systems; the social implications of such phenomena as mass transit, airports and automobiles; and the international ramifications of governmental policies relative to transport expansion and trade. Factors dealing with consumer attitudes and acculturation toward transport characteristics, as well as ecological patterns and problems created by contemporary transport vehicles and terminals will be considered.

599 Directed Readings in Political Science. 3 hrs.
A program of independent reading in an area of political science selected in consultation with a faculty advisor.

Psychology (PY)

Area of Concentration (AOC) with Psychology Major

Requirements for a major are 36 semester hours of psychology, including PY 100, 103, 204, 231, 426, and any two of the three Experimental Psychology courses.

In order to be familiar with laboratory procedures and basic concepts used in psychology, any student taking more than 15 semester hours in psychology and/or who accumulates more hours in psychology than in any discipline other than his major will be expected to have completed PY 204 and two of the three Experimental Psychology courses.

Below are examples of course clusters in psychology for students who wish to pursue various aspects of the subject. A student may follow one of these approved programs; however, a student is encouraged to select another course pattern if it better serves his objectives.

One possible psychology major for a liberal arts student planning graduate work in psychology:

<table>
<thead>
<tr>
<th>Semester</th>
<th>Hrs.</th>
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<tbody>
<tr>
<td>PY 100</td>
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<tr>
<td>Course Code</td>
<td>Course Title</td>
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</tr>
<tr>
<td>PY 103</td>
<td>General Psychology</td>
</tr>
<tr>
<td>PY 204</td>
<td>Laboratory Procedures</td>
</tr>
<tr>
<td>PY 231</td>
<td>Applied Statistics for Social &amp; Behavioral Sciences</td>
</tr>
<tr>
<td>PY 302</td>
<td>Experimental Psychology B: Motivation</td>
</tr>
<tr>
<td>PY 304</td>
<td>Experimental Psychology C: Perception</td>
</tr>
<tr>
<td>PY 313</td>
<td>Psychometrics</td>
</tr>
<tr>
<td>PY 315</td>
<td>Developmental Psychology</td>
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<td>PY 401</td>
<td>Personality</td>
</tr>
<tr>
<td>PY 406</td>
<td>Physiological Psychology</td>
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<td>PY 408</td>
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<tr>
<td>PY 420</td>
<td>Seminar in Psychology I</td>
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<tr>
<td>PY 426</td>
<td>History and Systems in Psychology</td>
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**Supportive Psychology Clusters**

With Economics

<table>
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<tr>
<th>Course Code</th>
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<th>Hrs.</th>
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<tbody>
<tr>
<td>PY 100</td>
<td>Introduction to Psychology</td>
<td>3</td>
</tr>
<tr>
<td>PY 103</td>
<td>General Psychology</td>
<td>3</td>
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<tr>
<td>PY 204</td>
<td>Laboratory Procedures</td>
<td>3</td>
</tr>
<tr>
<td>PY 300</td>
<td>Experimental Psychology A: Learning</td>
<td>4</td>
</tr>
<tr>
<td>PY 302</td>
<td>Experimental Psychology B: Motivation</td>
<td>4</td>
</tr>
<tr>
<td>PY 311</td>
<td>Individual Differences</td>
<td>3</td>
</tr>
<tr>
<td>PY Elective above 300 level</td>
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<td>3</td>
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<td><strong>Total</strong></td>
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</table>

Social Psychology (SOC 375) is strongly recommended.

With Mathematics

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hrs.</th>
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<tbody>
<tr>
<td>PY 100</td>
<td>Introduction to Psychology</td>
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<tr>
<td>PY 103</td>
<td>General Psychology</td>
<td>3</td>
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<tr>
<td>PY 204</td>
<td>Laboratory Procedures</td>
<td>3</td>
</tr>
<tr>
<td>PY 300</td>
<td>Experimental Psychology A: Learning</td>
<td>4</td>
</tr>
<tr>
<td>PY 304</td>
<td>Experimental Psychology C: Perception</td>
<td>4</td>
</tr>
<tr>
<td>PY 311</td>
<td>Individual Differences</td>
<td>3</td>
</tr>
<tr>
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<td>3</td>
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With Biology

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<th>Hrs.</th>
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<tbody>
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<td>Introduction to Psychology</td>
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<tr>
<td>PY 103</td>
<td>General Psychology</td>
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<tr>
<td>PY 204</td>
<td>Laboratory Procedures</td>
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<td>PY 302</td>
<td>Experimental Psychology B: Motivation</td>
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<td>PY 304</td>
<td>Experimental Psychology C: Perception</td>
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<td>PY 315</td>
<td>Developmental Psychology</td>
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<td>PY 406</td>
<td>Physiological Psychology</td>
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<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Credits</td>
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<tr>
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</tr>
<tr>
<td>PY 100</td>
<td>Introduction to Psychology</td>
<td>3</td>
</tr>
<tr>
<td>PY 103</td>
<td>General Psychology</td>
<td>3</td>
</tr>
<tr>
<td>PY 204</td>
<td>Laboratory Procedures</td>
<td>3</td>
</tr>
<tr>
<td>PY 207</td>
<td>Principles of Personal Reconciliation</td>
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</tr>
<tr>
<td>PY 302</td>
<td>Experimental Psychology B: Motivation</td>
<td>4</td>
</tr>
<tr>
<td>PY 304</td>
<td>Experimental Psychology C: Perception</td>
<td>4</td>
</tr>
<tr>
<td>PY 390</td>
<td>Readings in Psychology</td>
<td>3</td>
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</table>

<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>PY 100</td>
<td>Introduction to Psychology</td>
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<td>4</td>
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<tr>
<td>PY 408</td>
<td>Human Learning</td>
<td>3</td>
</tr>
<tr>
<td>PY 426</td>
<td>History and Systems in Psychology</td>
<td>3</td>
</tr>
</tbody>
</table>

### Note:

The 6 hour General Education Social Sciences requirement may be satisfied by taking both PY 100 and PY 103. PY 100 and PY 103 are both required for all students taking more than 15 hours in Psychology and whose AOC is declared after the Spring of 1971. Either PY 100 or PY 103 may be taken first, but they may not be taken at the same time.

### Psychology (PY)

**100 Introduction to Psychology.**

An introduction to fundamental principles governing the relationship between behavior and the environment, with a primary focus on the principles of reinforcement, extinction, discrimination and chaining. (See note above.)

**103 General Psychology.**

A survey of the empirical findings of the major areas of psychology, with primary focus on general methodology, development, personality, abnormal and social psychology. (See note above.)

**204 Laboratory Procedures.**

An introduction to behavioral research techniques and descriptive statistics. Includes laboratory. Prerequisite: PY 100, 103. PY 231 is strongly recommended before PY 204.

**207 Principles of Personal Reconciliation.**

An examination of the application of basic principles in psychology to the origin and resolution of personal conflicts. Prerequisite: PY 100, 103.

**231 Applied Statistics for Social & Behavioral Sciences.**

Collection classification, and presentation of data, measures of central tendency and dispersion, introduction to probability distribution and sampling theory, confidence limits and tests of significance, chi-square and "t" distribution. Prerequisite: College algebra or equivalent or approval of instructor. (Same as EC 231 and SOC 231.)
300 Experimental Psychology A: Learning. 4 hrs.
The study of the role of reinforcement in the acquisition and modification of behavior. Both empirical and theoretical material is considered. Includes laboratory. Prerequisite: PY 100 and 103.

302 Experimental Psychology B: Motivation. 4 hrs.
The study of the origin and value of the concept of motivation. Includes laboratory. Prerequisite: PY 100 and 103.

304 Experimental Psychology C: Perception. 4 hrs.
A functional analysis of the processing and interpretation of sensory information. Includes laboratory. Prerequisite: PY 100, 103.

311 Individual Differences. 3 hrs.
A study of the factors, both learned and innate, that lead to individually unique patterns of behavior. Prerequisite: PY 100, 103.

313 Psychometrics. 3 hrs.
Theory and practice within psychological testing. Prerequisite: PY 100, 103, 231.

315 Developmental Psychology. 3 hrs.
The developmental process from infancy through adolescence. Special attention is given to the role of the environment in the developmental process. Prerequisite: PY 100, 103.

390 Readings in Psychology. 3 hrs.
Supervised readings in depth in an area of particular interest to the student. Prerequisite: 15 hours PY and approval of instructor. May be taken twice for credit.

401 Personality. 3 hrs.
Various theories of personality are examined, along with possible implications for research. Prerequisite: 15 hours PY.

403 Abnormal Psychology. 3 hrs.
An examination of major behavioral exceptionalties, with an emphasis on empirical findings. Prerequisite: PY 401, or approval of instructor.

406 Physiological Psychology. 3 hrs.
A functional analysis of the neural and endocrinological systems underlying behavior. Prerequisite: 15 hours PY.

408 Human Learning. 3 hrs.
Study of contemporary issues and theoretical contingencies regarding factors influencing human learning and forgetting. Prerequisite: 15 hours PY.

409 Behavior Modification. 3 hrs.
The application of principles of human learning to the treatment of behavioral problems, neuroses and psychoses. Prerequisite: PY 403.

420 Seminar in Psychology. 3 hrs.
Student reports on psychological problems within a particular area are presented and discussed. Prerequisite: 15 hours PY and approval of instructor. May be taken twice for credit.

422 Individual Research. 3 hrs.
The student, with the advise of an instructor, will design and execute an original experiment in psychology. Prerequisite: 15 hours PY and approval of instructor. May be taken twice for credit.
426 History and Systems in Psychology. 3 hrs.
A study of the history of psychology as it has led to the development of
systematic study within the field. Prerequisite: 12 hours PY.

502 Industrial Psychology. 3 hrs.
Application of the basic principles of learning, motivation and perception to
typical industrial problems. Prerequisite: Approval of instructor.

503 Advanced General Psychology. 3 hrs.
A comprehensive survey of the various major areas of psychology. Open only
to senior psychology majors. Prerequisite: 15 hours PY.

504 Introduction to Clinical Psychology. 3 hrs.
This course goes beyond the traditional abnormal psychology course and
introduces the student to non-adaptive behavior dynamics, diagnosis and
current treatment techniques. Open only to senior psychology majors.
Prerequisite: 15 hours psychology.

506 Individual Mental Testing: Stanford-Binet. 3 hrs.
Various assessment techniques stressed, but particular emphasis is given to the
Stanford-Binet. Both theory and practice are utilized. Includes laboratory.
Prerequisite: Approval of instructor.

508 Individual Mental Testing: Wechsler. 3 hrs.
Individual testing with the Wechsler tests, along with practical experience.
Includes laboratory. Prerequisite: PY 506.

Sociology (SOC)

Area of Concentration (AOC) with Sociology Major

Requirements for a major are 36 semester hours of sociology including
SOC 100, 102, 231, 300, and 465. A minimum of 15 hours should be
taken in courses numbered 300 or above.

Up to six hours of the 36 hour major may be satisfied by related courses in
disciplines other than sociology. These courses must be determined to
relate to a specific area of interest within the major, and such courses may
count toward the major only with the approval of the student’s faculty
advisor.

A student developing a supportive cluster exclusively in sociology, with a
major in another discipline, would be required to complete 21 hours of
sociology courses including SOC 100 and 300. A minimum of 9 hours
should be in courses numbered 300 or above. Supportive clusters which
involve combinations of courses from disciplines other than sociology
should be worked out with the advice of the sociology faculty.

Sociology (SOC)

100 Introduction to Sociology. 3 hrs.
An introduction to the perspective, methods, concepts, and general findings
of the sociologist. Includes discussion of historical and conceptual
development of sociology.
Courses listed below are open to students who have completed SOC 100 with exceptions as noted.

102 **Analysis of Social Problems.** 3 hrs.
A sociological interpretation of contemporary social problems as they relate to significant trends in complex societies.

106 **Marriage and the Family.** 3 hrs.
Analysis of the family as a social institution, its structure and function in contemporary societies, dating, marital interaction, the life cycle, and the socialization process.

200 **Cultural Anthropology.** 3 hrs.
The basic study of the origin and development of man's ways of life. Special emphasis is placed on the analysis of pre-literate societies.

231 **Applied Statistics for Social and Behavioral Sciences.** 3 hrs.
Collection, classification and presentation of data, measures of central tendency and dispersion, introduction to probability distribution and sampling theory, confidence limits and tests of significance, chi-square and "t" distribution. Prerequisite: College algebra or equivalent or approval of instructor. (Same as EC 231 and PY 231.)

250 **Introduction to Social Work.** 3 hrs.
Designed to introduce the student to social case work, methods, functions, and services. Includes a survey of the principal fields and areas of social work. No prerequisite.

300 **Research Methods.** 3 hrs.
Techniques and tools utilized in sociological research. Emphasis is placed on logic of proof, theory of measurement, and allied topics. SOC 231 will be helpful but not required.

305 **Urban Sociology.** 3 hrs.
An analysis of the origin and growth of cities, demographic and spatial characteristics of communities, attitude and value systems in urban society, and the impact of urbanization on institutional structures.
310 Social Psychology: Socialization. 3 hrs.
An analysis of personality development in the social environment. Includes basic introduction to learning theory, comparative family child-rearing practices, and factors accounting for the development of aggression, achievement, and self-control in children. Prerequisite: SOC 100 or PY 100.

315 Population and Ecology. 3 hrs.
Surveys the growth and distribution of world population, and the environmental problems created in relation to population growth.

320 Criminal Behavior. 3 hrs.
An analysis of theories of criminal behavior and criminal control procedures. Emphasis is placed on causation, criminal and chancery laws, and crime control by police and criminal or juvenile courts. Prerequisite: SOC 100 or approval of instructor.

325 The Sociology of Education. 3 hrs.
A sociological approach to the study of education as a social institution; its structure, function and role in contemporary life. Prerequisite: SOC 100 or approval of instructor.

330 Minority Groups. 3 hrs.
Nature of minorities: status differentiation and group structure; institutional trends; intergroup relations. Prerequisite: SOC 100 or approval of instructor.

350 Social Stratification. 3 hrs.
The analysis of social class, social status, and social mobility. Emphasis placed on the study of social power and prestige. Close analysis is given to the differential opportunities and resultant behaviors of the upper, middle, and lower social classes.

359 Social Foundations of Revolutionary Change. 3 hrs.
An examination of theories of revolution, extremist behavior, and political and social systems under stress in selected western and non-western societies. (Same as PSC 359.)

375 Social Psychology: Group Dynamics. 3 hrs.
An analysis of the fundamental principles of group structure. Emphasis is placed upon such topics as development of group solidarity, cohesion, intergroup conflict and cooperation, and the effects of different patterns of leadership. Prerequisite: SOC 100 or PY 100.

385 Complex Organizations. 3 hrs.
Basic introduction to the theory and structure of past and present complex organizations on the larger social structure. Included will be an analysis of military, industrial and political bureaucracies. Prerequisite: SOC 100. May be taken twice for credit with approval of instructor.

390 Readings and Individual Research. 3 hrs.
Supervised readings and/or research in depth in an area of specialized interest to the student or the instructor. Prerequisite: At least nine hours in sociology including sociology 100 and 300 and junior or senior standing.

400 Research in Sociology I. 3 hrs.
The logic of social field research and development of appropriate tools for the collection of relevant data. Prerequisite: SOC 100, 231, 300 and invitation or approval of the instructor.

401 Research in Sociology II. 3 hrs.
Designed to give advanced students actual experience in designing research
projects, collection and analysis of data, and report writing. Prerequisite: SOC 100, 231, 300, 400, and invitation or approval of the instructor.

420  The Sociology of Corrections and Rehabilitation.  3 hrs.
An analysis of the social variables involved in restructuring the behavior of the social offender. Special attention is given to the basic problems faced by correctional institutions. Prerequisite: SOC 100 and SOC 211.

440  Sociology of Religion.  3 hrs.
The application of sociological principles to religious institutions focusing primarily on the function, development and change of these institutions. Prerequisite: SOC 100 or approval of instructor.

450  Medical Sociology.  3 hrs.
Surveys the relationship of sociology, and social psychology to the field of medicine. It covers the role and status of medical and paramedical personnel in the United States, as well as analysis of health care delivery systems and problems encountered therein.

455  Industrial Sociology.  3 hrs.
Social interaction in the industrial setting. Historical development of production systems, industrial roles and personality; labor-management relations. Prerequisite: SOC 100 or EC 112.

465  Development of Sociological Theory.  3 hrs.
A study of the development of the discipline of sociology in terms of the major trends of sociological theory, past and present, and the major theoretical problem areas of the discipline. Includes study of the nature of sociological theory in relation to other disciplines. Prerequisite: SOC 100 and junior or senior standing.

475  Mass Communications and Public Opinion.  3 hrs.
An examination of the mass media as a social force in modern society. Emphasis is placed on the role of the mass media in forming public opinion and policy. Offered on demand. Prerequisite: SOC 100 or approval of instructor.

480  Social Change and the Future.  3 hrs.
Designed to cover the major theories of social change. Emphasis is placed upon the impact of technology on social institutions with a brief introduction to technology forecasting and assessment. The primary focus of the course is upon future development of social institutions.

490  Sociology of Poverty and Deprivation.  3 hrs.
A sociological analysis of poverty and deprivation as variables in social life. Emphasis is placed on the social and psychological effects of deprivation and on the nature and effectiveness of programs to combat it. Offered on demand. Prerequisite: SOC 100 or approval of instructor.

496  Comparative Politics of Race.  3 hrs.
An examination of the role of the race factor in contemporary political systems through the comparative study of South Africa, the United States, and Portuguese Africa. Prerequisite: PSC 325. (Same as PSC 496.)

A Masters Degree Program In Administrative Science (AS)

An interdisciplinary degree program in administrative science designed for practicing administrators is offered at The University of Alabama in
Huntsville. The basic unit of analysis is a complex organization based on the premise that administration is a necessary function in all organizations and that it requires a common body of knowledge and skill. The program requires 21 credit hours in a core curriculum and 12 hours in a specialized option. While most common options will be in economics, business administration, public administration, educational administration, and industrial engineering, every effort will be made to allow options tailored to the career needs of the individual.

The program is designed primarily for mid-career executives. While no specific undergraduate social science prerequisites will be required as a condition for admission to the core program, students who wish to take certain options will have to meet the prerequisites in those courses or have permission from the instructor for a waiver. Since the program is thought of as professional in character, no thesis is required but the student must show in terms of a research paper in one of the courses his capacity for analytical writing.

To be admitted to the graduate program in administrative science, a student must meet the general requirements to Graduate School as indicated on page 228 of this catalog.

Certain courses (at present, AS 609 through AS 613 and AS 650) are given AS labels because they are interdisciplinary. These courses may be used to satisfy requirements in any option, but are not considered a part of the required core curriculum.

**Administrative Science Core Curriculum**

The following courses (AS 601 through AS 608) are required of all students enrolled in the Administrative Science program.

601 *Introduction to Complex Organizations.* 3 hrs.
Survey of the basic theoretical tools necessary to the understanding of complex organizations. Introduces the students to such major facets of organization as the organization as a part of the larger social system, the comparative study of organizations, both cross and intraculturally, some facets or organizational cohesion and structure such as authority and the division of work; organization as it relates to goals and clientele groups; the study of the problems of organizational survival and decay. (Should be first course for all students.)

602 *Human Behavior in Organization.* 3 hrs.
The behavior of individuals and groups in an organizational context. Considers the organization as a continuing social system. Analyzes the problems of motivation and incentives. Looks at the problem of organizational communication and the blockages thereto. In a general way, it deals with the problem of the elections, training, promotion and severance of organizational members.

603 *The Organization and its Environment.* 3 hrs.
Evaluation of relation of the organization to the world outside its confines. Examines the conditions leading to flexibility and inertia in organizational
behavior. Looks at the focus in public organizations on the epicenters of power, the executive, the legislative committees, the media and the generalized public; in private organizations the processes of marketing and "selling" as well as finding goods and services which are in demand.

604 Organizational Planning and Innovation. 3 hrs.
Analysis of various theories of planning and approaches to planning including incremental and holistic planning; the politics of planning; the twin problems of predicting and controlling the environment and the limitations of each. Examines the organizational situations which foster hospitality or resentment at the introduction of new ideas; organizational structure and innovation; the phenomenon of individual and group creativity; the time lag between invention and the application of invention. (Formerly PA 564.)

605 Organizational Coordination and Control. 3 hrs.
Analyzes means of welding complex organizations into purposive wholes. Uses of techniques such as hierarchy; fiscal controls; staff agencies; rewards and motivation; planning, programming, and budgeting (PPB), accounting and statistical review (variances); computer and systems analysis are considered. Analyzes responsiveness of organizations to controls by the public.

607 Quantitative Methods in Management Science I. 3 hrs.
Involves the consideration of basic concepts which underly mathematical and quantitative techniques of operations research and decision. Theory used in solving problems involving managerial decisions. Students with a substantial mathematical background may be excused from this course with the permission of the Director.

608 Quantitative Methods in Management Science II. 3 hrs.
Basic review of the scientific method as it relates to concepts, hypothesis and proofs. Introduces the student to the concepts of probability theory and applied statistics, interviewing techniques, sampling procedures, simulation and the like. Basic computer language and the uses and limitations of the computer as a data processing and analysis mechanism. Prerequisite: AS 607 or permission of instructor.

609 The Contract State. 3 hrs.
An analysis of the political and economic implications of using contractual devices in the handling of economic and social problems with particular reference to such program as Defense, NASA, Model Cities, etc.

610 Introduction to Policy Sciences. 3 hrs.
Examines the interdependence among the functional components of a policy process, i.e., contrast policy formulation of a Southeast Asia policy with the formulation of a domestic civil rights policy. It explores the subsystems as they relate to policy interplay within a large entity. It identifies the participants, the base values or capabilities available for use in seeking to effect outcomes, strategies employed, the outcome and finally the post-outcome effects, or the second-order consequences not considered in the original formulation. It includes some forays into forecasting and planning, and into the Bauer-Biderman-Gross social indicator effects on policy, the work of Wilbert Moore and Daniel Bell at the Russell Sage Foundation, and of Etzioni in the Center for Policy Research.

611 Interpersonal and Organizational Communications. 3 hrs.
Organizations have been often described as communication networks. The purpose of this course is to examine the communication process within the organization and between the organization and the outside world. Among other aspects, we will consider some problems in basic linguistics; formal and
informal communications; barriers to communication created by differing assumptions, private language, frames of reference, status barriers, cultural and cross-cultural differences; geographical and other classification problems. We will also consider the organization of communications networks; the relation of communications to organization structure; attempts to alleviate communication difficulties through sensitivity training; participatory democracy; “flat” organization structure, etc.

612 Civil Systems Planning. 3 hrs. Analysis of currently used predictive models to illustrate the values and dangers inherent in heuristic modeling applied to public systems. As both private firms and public agencies turn their attention to “social problems” new tools and methods are required. Information from economics, sociology, psychology, and political science must be integrated with the purely technical if we are to make progress in solving these problems. The general analysis of planning developed in AS 604 will be applied in terms of specific techniques and actual planning situations. There will be an equal mixture of classroom work and laboratory visits to community agencies.

613 Socio-Economic Consequences of Government Procurement. 3 hrs. This course will provide an analysis of the nature of Federal Government Procurement (Contracting: the Government’s organization and procedures for managing the contractual system; its impact upon participating private industry; implication of the contractual system on the political, economic, and social system—individual states, small business, minority groups and labor employment areas.)

650 Selected Research Topics. 3 hrs. Students who have completed their core curriculum with the consent of a member of the administrative science faculty, may take a course which involves a research into a particular topic relevant to administrative science. This may be done individually or by a group of students. The resulting paper must be an original research contribution showing a research design and results meeting the highest standards of social science research.

Courses with 500 numbers listed in political science and economics may be taken for graduate credit in connection with the Administrative Science Program.
Division of Natural Sciences and Mathematics

The faculty of the Division of Natural Sciences and Mathematics will assist students in planning programs to meet various educational, vocational, and professional goals. Students may select programs of study to provide the background for advanced study in mathematics, the sciences, engineering, medicine or dentistry; to obtain a secondary teaching certificate; to prepare for immediate employment in industrial or government laboratories; or to obtain a scientific background for a future career in business, law, or management.

The course sequences in the Division are divided into three major groups:
1. Course sequences in mathematics, biology, chemistry, natural science, and physics satisfy the minimum natural science and mathematics General Education Requirements.
2. A core curriculum in natural sciences and mathematics for the student who wishes to obtain a more thorough knowledge in the natural sciences offered in this Division. Although the courses serve as the science core for the B.S. curricula, they may appeal to students who do not concentrate their work in the sciences but who do wish to obtain a greater understanding of the sciences and their relationships to professional objectives than provided by the sequences in Group 1.
3. Advanced courses in mathematics, statistics, physics, chemistry, and biology provide in-depth training in these disciplines.

Undergraduate Degree Programs

A student seeking a Bachelor of Science degree must satisfy the total AOC requirements (see section on Undergraduate Academic Programs) and complete a core curriculum consisting of 9 semester hours of calculus and a two semester sequence in each of two of the basic sciences--biology, chemistry, and physics--preferably in all three. A student may select biology, chemistry, mathematics, or physics as the major subject in his AOC. In addition to the courses in his major, a student will usually complete his AOC through courses in other departments in the Division of Natural Sciences and Mathematics or in the Division of Engineering. The Division strongly urges a student to select his remaining number of courses from those offered in the Division of the Humanities and the Division of Social and Behavioral Sciences.

The Division of Natural Sciences and Mathematics offers programs leading to a Bachelor of Arts degree with a major in biology, mathematics or mathematics education.

In addition to courses in the major, a student will usually complete his
AOC through courses offered in the Division of the Humanities and the Division of Social and Behavioral Sciences.

Specific programs are found at the beginning of each section of course descriptions. These programs are presented as models. A student may follow one of these approved programs; however, a student is encouraged to select another course pattern if it better serves his objectives. The proposed programs should be discussed with the chairman of the department responsible for the largest number of courses. The Department Chairman will assist him in obtaining the necessary approvals.

A student must declare his AOC no later than the end of his sophomore year.

**Graduate Degree Programs**

The Division of Natural Sciences and Mathematics offers programs leading to the degree of Master of Arts with a major in mathematics and Master of Science with a major in chemistry or physics. (Refer to section on Division of Graduate Programs.) Early in his graduate program, a student must review his proposed program of study with a faculty advisor. A student majoring in mathematics may select either Plan I or Plan II. Students majoring in chemistry and physics must follow Plan I. Special course requirements are stated in the section of the catalog related to course descriptions.
Biology (BY)

Undergraduate Programs

A student may elect a program leading to either a Bachelor of Arts or a Bachelor of Science degree. In most areas of biological interest, a Bachelor of Science degree is deemed more desirable; however, a Bachelor of Arts degree may be preferred in areas of concentration (AOC) relating biology to some of the humanities, social sciences, and economics.

All areas of concentration with a major in biology will include the core courses as indicated below. This does not apply to students in premedical and medical technology programs. The biology courses BY 113-114 must be taken or exempted but cannot be counted toward a major. BY 221, 319, two of the biology seminars (597, 598, 599) and at least one from each of the following groups: 278, 575; 317, 354; 431, 432; 371, 372, 534, 539, and 8 additional hours of biology related to the student's individual goal must be taken. BY 592 is strongly recommended for students in curricula preparatory to graduate study.

For these students who elect premedical and medical technology programs, the AOC will include courses as follows: BY 221, 317 or 354; 319, 431 or 432, two biology seminars (597, 598, 599) and at least 12 additional hours of biology in support of the specific program. (See sample curricula VI and VII.)

Curricula I-VIII are offered as models of appropriate programs designed to fulfill the University's degree requirements and achieve diverse goals in the biological sciences with various related areas of emphasis. Any curriculum may be modified to fit individual aims with the approval of the biology faculty.

Students placing in chemistry and mathematics courses below the level indicated in the curricula listed below are considered deficient in these areas. These students will be required to take the necessary courses to remove deficiencies. Courses taken to remove deficiencies cannot be counted toward the hours required in each curriculum (may be counted as elective hours).

Curriculum I

B.A. Degree Appropriate for a Biology Major with an Associated Cluster in Social Sciences.

<table>
<thead>
<tr>
<th>Semester</th>
<th>Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Education Requirements (humanities and social sciences)</td>
<td>30-36</td>
</tr>
</tbody>
</table>
Basic and core biology courses
Biology--BY electives
Chemistry--CH 101, 105, 131
Physics--PH 101, 102
Mathematics--MA 133, 153
Humanities, social sciences, economics or associated cluster
Electives (Education core if a Class B Secondary Professional Teaching Certificate is desired)

Curriculum II

B.S. Degree for Secondary Teachers of Biology and Chemistry.

<table>
<thead>
<tr>
<th>Semester</th>
<th>Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Education Requirements (humanities and social sciences)</td>
<td>30-36</td>
</tr>
<tr>
<td>Basic and core biology courses</td>
<td>24</td>
</tr>
<tr>
<td>Biology--BY electives</td>
<td>8</td>
</tr>
<tr>
<td>Chemistry--CH 121-122, 105, 126, 223, 331-332-333, 335-336</td>
<td>19</td>
</tr>
<tr>
<td>Mathematics--MA 133, 153, 154</td>
<td>9</td>
</tr>
<tr>
<td>Physics--PH 109-110</td>
<td>8</td>
</tr>
<tr>
<td>Education core</td>
<td>27</td>
</tr>
<tr>
<td>Electives</td>
<td>0-7</td>
</tr>
</tbody>
</table>

Curriculum III

B.S. Degree, Preparatory for General Graduate Study.

<table>
<thead>
<tr>
<th>Semester</th>
<th>Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Educational Requirements (humanities and social sciences)</td>
<td>30-36</td>
</tr>
<tr>
<td>Basic and core biology courses</td>
<td>24</td>
</tr>
<tr>
<td>Biology--BY electives</td>
<td>8</td>
</tr>
<tr>
<td>Chemistry--CH 121-122, 105, 126, 223, 331-332-333, 335-336, (341 desirable)</td>
<td>19</td>
</tr>
<tr>
<td>Mathematics--MA 133, 153, 154</td>
<td>9</td>
</tr>
<tr>
<td>Physics--PH 109-110</td>
<td>8</td>
</tr>
<tr>
<td>Electives</td>
<td>27-35</td>
</tr>
</tbody>
</table>

150
Curriculum IV

B.S. Degree with Chemistry Cluster, Preparatory for Graduate Study.

<table>
<thead>
<tr>
<th>Semester</th>
<th>Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Education Requirements (humanities and social sciences)</td>
<td>30-36</td>
</tr>
<tr>
<td>Basic and core biology courses</td>
<td>24</td>
</tr>
<tr>
<td>Biology--BY electives</td>
<td>8</td>
</tr>
<tr>
<td>Chemistry--CH 121-122, 105, 126, 223, 331-332-333, 335-336, 341, 342</td>
<td>24</td>
</tr>
<tr>
<td>Mathematics--MA 153, 154, 233, 244, 385</td>
<td>15</td>
</tr>
<tr>
<td>Physics--PH 109-110, 201</td>
<td>11</td>
</tr>
<tr>
<td>Electives</td>
<td>12-20</td>
</tr>
</tbody>
</table>

Curriculum V

B.S. Degree with Physics-Chemistry Cluster, Preparatory for Graduate Study.

<table>
<thead>
<tr>
<th>Semester</th>
<th>Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Education Requirements (humanities and social sciences)</td>
<td>30-36</td>
</tr>
<tr>
<td>Basic and core biology courses</td>
<td>24</td>
</tr>
<tr>
<td>Biology--BY electives</td>
<td>8</td>
</tr>
<tr>
<td>Chemistry--CH 121-122, 105, 126, 223, 331-332-333, 335-336</td>
<td>15</td>
</tr>
<tr>
<td>Mathematics--MA 153, 154, 233, 244, 385</td>
<td>15</td>
</tr>
<tr>
<td>Physics--PH 109-110, 201, 202, 203, 301</td>
<td>20</td>
</tr>
<tr>
<td>Electives</td>
<td>12-20</td>
</tr>
</tbody>
</table>

Curriculum VI

B.S. Degree, Pre-Medical, Pre-Dental, Pre-Veterinary. (See chemistry section for an alternate pre-medical curriculum.)

<table>
<thead>
<tr>
<th>Semester</th>
<th>Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Education Requirements (humanities and social sciences)</td>
<td>30-36</td>
</tr>
<tr>
<td>Basic and core Biology courses</td>
<td>16-18</td>
</tr>
</tbody>
</table>

151
Biology--BY 569, 542 and one elective 12
Chemistry--CH 121-122, 105, 126, 223, 331-332-333, 335-336 (341 desirable) 19
Mathematics--MA 133, 153, 154 9
Physics--PH 101-102 8
Electives 26-34

Curriculum VII

Medical Technology and Paramedical Services Leading to a B.S. Degree.

(The Medical Technology internship must be in a school meeting the requirements of the American Society of Clinical Pathologists.)

<table>
<thead>
<tr>
<th>Semester</th>
<th>Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic biology courses</td>
<td>30-36</td>
</tr>
<tr>
<td>Biology--BY 421, 569, 579</td>
<td>16-18</td>
</tr>
<tr>
<td>Chemistry--CH 121-122, 105, 126, 223, 331-332-333, 335-336</td>
<td>12</td>
</tr>
<tr>
<td>Mathematics--MA 133, 153, 154</td>
<td>19</td>
</tr>
<tr>
<td>Physics--PH 109-110</td>
<td>9</td>
</tr>
<tr>
<td>Internship in an accredited school (or electives)</td>
<td>8</td>
</tr>
</tbody>
</table>

152
Curriculum VIII

B.S. Degree, Preparatory for Graduate Study in Biology-Mathematics (Biometrics).

<table>
<thead>
<tr>
<th>Semester</th>
<th>Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Education Requirements (humanities and social sciences)</td>
<td>30-36</td>
</tr>
<tr>
<td>Basic and core biology courses</td>
<td>24</td>
</tr>
<tr>
<td>Biology--BY electives</td>
<td>8</td>
</tr>
<tr>
<td>Chemistry--CH 121-122, 105, 126, 223, 331-332-333, 335-336</td>
<td>19</td>
</tr>
<tr>
<td>Mathematics--MA 153, 154, 233, 244, 251, 352 or 353, 385</td>
<td>21</td>
</tr>
<tr>
<td>Physics--PH 109-110</td>
<td>8</td>
</tr>
<tr>
<td>Electives</td>
<td>14-22</td>
</tr>
</tbody>
</table>

Biology (BY)

<table>
<thead>
<tr>
<th>113</th>
<th>General Biology.</th>
<th>4 hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A study of the origin, structure, function and evolution of living organisms, as well as their classification interrelationships. Includes laboratory.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>114</th>
<th>General Biology.</th>
<th>4 hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Continuation of BY 113. Includes laboratory.</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>213</th>
<th>Human Ecology I.</th>
<th>4 hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A fundamental course concerning the impact of the changing physical and biological environment upon man. Prerequisites: BY 113-114, or N.S. 111-112-113 or equivalent. (Does not apply toward a major in biology.)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>214</th>
<th>Human Ecology II.</th>
<th>4 hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Continuation of BY 213. Prerequisite: BY 213.</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>221</th>
<th>General Microbiology.</th>
<th>4 hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A fundamental course in microbiology which includes the cultivation and observation of micro-organisms and their relation to foods, water, industrial processes and disease. Includes laboratory. Prerequisite: BY 113-114 or equivalent, CH 101 or 121.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>238</th>
<th>Local Flora.</th>
<th>2 hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Identification of local flowering plants. Prerequisite: BY 113-114.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>245</th>
<th>Human Anatomy and Physiology, Part I.</th>
<th>3 hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Introduction to human anatomy and physiology. Introductory study of the structure and function of organs and systems of the human body. Includes laboratory. (Not open to pre-med or pre-dental students. Does not apply toward a major in biology.)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>246</th>
<th>Human Anatomy and Physiology, Part II.</th>
<th>3 hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A continuation of BY 245. Prerequisite: BY 245 or approval of instructor.</td>
<td></td>
</tr>
</tbody>
</table>
278 Invertebrate Zoology. 4 hrs.
A phylogenetic consideration of the invertebrate phyla including morphology and ecology. Includes laboratory. Prerequisite: BY 113-114 or approval of instructor.

Courses listed below are open to students who have completed BY 113-114 or equivalent with exceptions as noted.

317 Vertebrate Zoology. 4 hrs.
A study of the morphology of vertebrate animals with emphasis upon the relationship of organs and systems and their phylogenetic significance. Includes laboratory.

319 Genetics. 2 hrs.
An introduction to the principles of inheritance and application of these principles to plants and animals to the human. Not open to freshmen. Prerequisite: BY 113-114 or equivalent.

320 Genetics Lab. 2 hrs.
Prerequisite or parallel: BY 319.

321 Advanced Microbiology. 4 hrs.
Continuation of BY 221. Emphasis is placed on advanced fundamental theories, techniques and methods, and instrumentation. Prerequisite: BY 221, 8 hours chemistry, or approval of instructor.

354 Vertebrate Embryology. 4 hrs.
The embryology of the vertebrates including gametogenesis, fertilization of the egg, stages of cleavage, and development of organs and organ systems. Includes laboratory.

371 Biology of the Lower Plants. 4 hrs.
Field and laboratory studies of locally common and economically important nonvascular plants. Includes laboratory.

372 Biology of the Higher Plants. 4 hrs.
Field and laboratory studies of ferns, "fern allies" and seed plants, their habitats, life histories, and relationships. Includes laboratory.

412 General Ecology. 4 hrs.
The basic principles of ecology including population dynamics, speciation, ecosystems, communities and habitats. Includes field work and laboratory. Prerequisite: BY 278, 371, or 372 and 8 hours of Chemistry, or approval of instructor.

421 Medical Microbiology. 4 hrs.
A study of bacteria in relation to infectious diseases. Includes laboratory. Prerequisite: BY 221.

431 Plant Physiology. 4 hrs.
An elementary study of physical and chemical processes occurring in plants and the conditions which influence them. Includes laboratory. Prerequisite: CH 131 or 331 and 8 semester hours of physics, or approval of instructor.

432 Animal Physiology. 4 hrs.
A fundamental study of physical and chemical processes occurring in animals and conditions which influence them. Includes laboratory. Prerequisite: CH 131 or 331 and 8 semester hours of physics, or approval of instructor.
*500 Marine Biology. 4 hrs.
A general survey of the invertebrates, vertebrates, and marine plants as communities with emphasis on local examples of these principal groups. Student will have an opportunity to examine marshland, estuarine, beach, dune, inlet and neritic habitats, and niches. Lecture, laboratory, and field work will be included. Prerequisites: general biology and consent of instructor.

*501 Marine Ecology. 4 hrs.
Bioenergetics, community structure, population dynamics, predation, competition, and speciation in marine ecosystems will be studies. Lecture and laboratory work will be included, although considerable time will be spent in field work. Students who have not previously had marine courses may enroll; however, Marine Invertebrate Zoology or Marine Biology would be very helpful. This would be an excellent course for engineers and other non-biologists interested in the marine environment because individual species will be studied as they relate to ecological principles which they exemplify providing both a taxonomic and ecologic background. Prerequisites: general biology, general chemistry, general physics, and consent of instructor.

*502 Marine Vertebrate Zoology. 4 hrs.
A study of marine fishes, reptiles, and mammals, with an in-depth, comprehensive treatment of their systematics, zoogeography, and ecology. Lectures will encompass subject matter on a non-regional basis. Field and laboratory work will stress the vertebrate fauna of the northern Gulf of Mexico. Most of the course will be devoted to fishes. Students will have an opportunity to assemble a collection of vertebrate species. Prerequisites: general biology and consent of instructor.

*503 Marine Invertebrate Zoology. 4 hrs.
A survey, based upon local examples of the principal groups of marine invertebrates with emphasis on reproduction, distribution, taxonomy, systematics, and ecology. Lecture, laboratory, and field work are included. Students will have ample opportunity to acquire a collection of local fauna. Prerequisites: general biology and consent of instructor.

*504 Fisheries Science. 4 hrs.
An in-depth study of the principles and methods of fishery biology and their application to conservation. Lecture and laboratory work are included. Prerequisites: general biology and consent of instructor.

*505 Coastal Ornithology. 4 hrs.
Study of coastal and pelagic birds with emphasis on ecology, taxonomy, and distribution. This course includes identification, population dynamics, and behavior of coastal birds and overnight trips to offshore islands. Prerequisites: general biology and consent of instructor.

Courses listed below are open to students who have completed BY 113-114 or equivalent and 6 additional semester hours in biology.

534 Plant Taxonomy. 4 hrs.
Principles and practice in the identification and classification of flowering plants. Includes laboratory. Prerequisite: BY 238.

*Course available only at the Marine Environmental Sciences Consortium, Dauphin Island, Alabama.
539 Plant Anatomy. 4 hrs.
A study of the ontogeny, differentiation and maturation of the various tissues and organs of angiosperms. Each student solves investigative problems into the growth and development of an angiosperm, using histological techniques. Includes laboratory. Prerequisite: BY 372.

568 Cytology. 4 hrs.
The detailed study of structural components of cells. Laboratory includes slide preparation and micro-technique.

569 Animal Histology. 4 hrs.
The microscopic study of the various tissues and organs of the mammalian body. Includes laboratory. Prerequisite: BY 317, 354, or approval of instructor.

570 Biological Techniques. 4 hrs.
Museum techniques for collecting, preserving, mounting, illustrating and displaying plants and animals. Includes herbarium mounts, skeleton preparations, study skins, bioplastics, photomicrography and instrumentation. Two lectures and two labs. Prerequisite: 8 hours Chemistry, 8 hours Physics or approval of instructor.

575 General Entomology. 4 hrs.
The study of classification, habits and economic importance of insects including their collection, preservation, and identification. Includes laboratory.

579 Parasitology. 4 hrs.
A survey of the parasitic protozoa and helminths found in man, together with a comparison with certain forms found in other animals. Emphasis is placed on history, geographical distribution, morphology, habitat, life-cycles and methods of reproduction, transmission, pathogenesis and symptomatology, diagnosis, and prevention. Includes laboratory.

592 Projects in Biology. 2 to 4 hrs.
Individual investigations into biological problems under the direct supervision of an instructor. Designed for advanced senior level biology students with a biology grade point average of 2.5 or above. Prerequisite: Approval of instructor. May be taken at the Marine Environmental Sciences Consortium, Dauphin Island, Alabama.

597, 598, 599 Biology Seminar. 1 hour ea.
Discussions of biological literature, careers in biology, graduate schools, and specialty schools. Pertinent discussions on current biological topics. Seniors must take a minimum of two. No more than 3 hours of Seminar may be counted toward a major. One term may be taken at the Marine Environmental Sciences Consortium.

Courses listed below are open to students who have completed BY 113-114, 8 additional semester hours in biology, and CH 331.

524 Immunology. 4 hrs.
Theory and practice of immunological principles. Includes laboratory. Prerequisite: BY 421.

542 Cellular Physiology. 4 hrs.
A study of the underlying principles governing some basic cellular phenomena.
Phycology. 4 hrs.
A study of the life cycles (sexual and asexual reproduction), structure and metabolism of fresh water algae commonly found in surrounding habitats. Laboratory included. Prerequisite: 371 or approval of instructor.

Advanced Invertebrate Zoology. 4 hrs.
Phylogenetic consideration of the invertebrate, including structural, functional, embryological and physiological relationships leading to an understanding of the progressive complexity of animals. Includes laboratory and field trips. Prerequisite: BY 278 or approval of instructor.

Limnology. 4 hrs.
A study of fresh-water environments and organisms exemplified by lakes, ponds, and streams in Northern Alabama. Includes laboratory and field trips. Prerequisite: 8 hours of chemistry, 4 hours of physics, BY 221, 278, 371 or approval of instructor.

Chemistry (CH)

Undergraduate Programs

The University of Alabama in Huntsville is on the American Chemical Society’s List of Approved Schools as a result of its strong faculty and excellent facilities available for high quality undergraduate instruction.

Requirements for a chemistry major:
1. Satisfactory completion of the University’s 55-61 hours General Education Requirements which includes MA 153, 154, 233, PH 201, 241, 331, or PH 109-110, 201, and CH 105, 121-122 and 126;
2. Completion of one of the approved six AOC curricula below (or a different one, appropriately approved) each of which includes the 18 semester hours of CH 223, 331-332-333, 335-336, 341, 342, and 345;
3. And completion of a number of electives which will vary depending on the particular curriculum chosen. German or Russian is recommended for the language requirement.

The 25 hours of science and mathematics included in Requirement 1 are not included in the AOC, while the 18 hours of chemistry included in Requirement 2 are included in the AOC.

The Chemistry Department offers courses leading to a B.S. degree with a chemistry major and supports the undergraduate programs of other disciplines. A minimum of 9 semester hours must be completed at UAH in chemistry courses numbered 300 or above. All other grade and general requirements are equivalent to those established by UAH for all degree programs.

No AOC credit is granted to chemistry majors for CH 101 or any mathematics course numbered less than MA 153. Any student requiring
these courses must understand that the total semester hours of course work taken as an undergraduate may exceed the 128 semester hour guideline for a baccalaureate program.

Unless attention is given to the sequence in which courses are scheduled, chemistry majors may experience difficulty in getting the required courses within a four year period. Students should plan to take CH 223, 333, and PH 201 prior to the fall term of their junior year.

Six approved curricula, which emphasize chemistry as the major in an area of concentration (AOC), are shown below. The student is allowed considerable flexibility in planning his program but all course patterns which differ from those listed require faculty approval. The six approved programs include those courses listed above as requirements for a chemistry major and are:

| General Education Requirements (humanities and social sciences) | 30-36 |
| General Education Requirements (science and mathematics)       | 25    |
| Chemistry (Requirement 2 above)                                | 18    |

Curriculum I
Pre-Medical Program.
The pre-medical program conforms to the requirements of most medical schools and contains sufficient chemistry to meet the requirements of a chemistry major. Prospective medical students are encouraged to explore their areas of interest outside of the sciences and to strive for maximum scholastic achievement. Students should consult with faculty members early in their college program and should be prepared to take the Medical College Aptitude Test during the spring of their junior year.

(An alternative pre-medical curriculum is included in the Biology section.)

| Chemistry, one or two electives (CH 337, 343, 346, 401, 491) | 3    |
| Biology--BY113-114 and one elective                          | 12   |
| Science electives                                             | 12   |
| Humanities and social sciences electives                      | 22-28|
Curriculum II

For Class B Secondary Professional Teaching Certificate.

This program meets state certification standards in chemistry and in biology, mathematics, or physics as the student may elect. Only economics, political science, and sociology satisfy the 6 hours social sciences requirement in this curriculum.

<table>
<thead>
<tr>
<th>semester</th>
<th>hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry--CH 401</td>
<td>3</td>
</tr>
<tr>
<td>Biology--BY 113-114</td>
<td>8</td>
</tr>
<tr>
<td>Secondary Education core</td>
<td>27</td>
</tr>
<tr>
<td>Physics or</td>
<td>8.9</td>
</tr>
<tr>
<td>Biology or</td>
<td>12</td>
</tr>
<tr>
<td>Mathematics</td>
<td></td>
</tr>
<tr>
<td>Electives</td>
<td>3.9</td>
</tr>
</tbody>
</table>

Curriculum III

Graduate Preparatory Program. ACS Approved Program.

This curriculum is approved by the American Chemical Society's Committee on Professional Training. It is intended for a student who plans to do graduate work or who desires an industrial position which requires a strong chemical background. German is the recommended language for this program.

<table>
<thead>
<tr>
<th>semester</th>
<th>hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry--CH 337, 343, 346, 401, 421, 431, one elective, and a senior project</td>
<td>19</td>
</tr>
<tr>
<td>Mathematics--MA 244, 251</td>
<td>6</td>
</tr>
<tr>
<td>Mathematics or physics elective</td>
<td>3</td>
</tr>
<tr>
<td>Electives</td>
<td>21-27</td>
</tr>
</tbody>
</table>

Curriculum IV

General Education Curriculum with a Chemistry Major.

Deficiencies may exist with respect to graduate school entrance requirements.
Chemistry—CH 337, 343, 346, 401, one elective and a senior project
Mathematics—MA 244
Science Electives
Electives

Curriculum V

Chemistry-Physics Program Appropriate for Pre-graduate Education.

Chemistry—CH 337, 343, 346, 401, 421, and a senior project
Physics (a) PH 241, 331, 351, one laboratory from 310-312, and one elective, or
(b) PH 331, 351, one laboratory from 310-312, and one elective

Sequence (a) requires prior completion of PH 109, 110, 201, while sequence (b) requires PH 201, 331, 351.

Mathematics—MA 244, 251, 352, and one elective
Electives
Typical Chemistry-Biology Program Appropriate for Pre-graduate Education in Biochemistry or for Students Interested in Clinical Chemistry.

In addition to providing sound pre-graduate school training for biochemists, this program exceeds the minimum requirements of the American Association of Clinical Chemistry; thus, a person who completes one year of acceptable experience in clinical chemistry subsequent to the B.S. degree may apply for certification as a Clinical Chemical Technologist. Further successful experience may lead to certification as a Clinical Chemist.

<table>
<thead>
<tr>
<th>Semester</th>
<th>Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry--CH 337, 343, 346, 361, 421, and a senior project</td>
<td>14</td>
</tr>
<tr>
<td>Biology--BY 113-114; 221, and two electives</td>
<td>20</td>
</tr>
<tr>
<td>Mathematics--MA 244</td>
<td>3</td>
</tr>
<tr>
<td>Electives</td>
<td>12</td>
</tr>
</tbody>
</table>

Graduate Program

A Master of Science degree with a major in chemistry is offered. Additional courses are available. The doctoral degree is awarded through a cooperative program with the Tuscaloosa campus. (See section on Graduate Programs.)

It is emphasized that graduate courses are conducted at a level which assumes the student possesses a B.S. degree in chemistry as recommended by the American Chemical Society (see Curriculum III). Graduation from an undergraduate program not equivalent to ACS standards does not preclude entrance into the UAH program. The student should realize, however, that if deficiencies exist, the time required to obtain the M.S. degree is correspondingly increased. (See section on Graduate Programs.)

Degree Requirements

General requirements of the Division of Natural Sciences and Mathematics and the Graduate School under Plan 1 must be satisfied.

A particular program must be planned in consultation with a member of the chemistry faculty assigned by the Department Chairman as a temporary advisor. When the student selects his thesis topic, a supervisory committee will be appointed.
Specific requirements:
1. 24 semester hours of graduate course work and a thesis.
2. Reading competence in German or Russian. The faculty may accept other languages under special circumstances.

All other general and grade requirements are identical with those discussed in the section Division of Graduate Programs.

Chemistry (CH)

101 General Chemistry. 3 hrs.
An introduction is presented to the properties of solids, liquids, gases, and solutions, to atomic theory and bonding, and to the physical and chemical properties of the more common elements and their compounds. No credit given for AOC involving chemistry. Prerequisite: MA 104 or 105 or Mathematics placement at Level II. Parallel: CH 105.

105 General Chemistry Laboratory. 1 hr.
Laboratory work is designed to introduce the student to laboratory fundamentals and to basic chemical principles. Parallel: CH 101 or 121.

121 Introduction to Chemistry. 3 hrs.
Beginning course for science and engineering majors. An introduction is presented to those principles concerned with gases, liquids, solids, and solutions. Discussions include the nature of the chemical bond, kinetics, chemical equilibrium, electrochemistry, thermochemistry, the chemical properties of the elements, their periodic groups and their compounds, and an introduction to nuclear chemistry. Prerequisite: CH 101 or placement test and MA 104 or MA 105 or placement at Level II in Mathematics. Prerequisite or Parallel: CH 105.

122 Introduction to Chemistry. 2 hrs.
A continuation of CH 121. Prerequisite: CH 121.

126 Qualitative Inorganic Analysis Laboratory. 1 hr.
Application of chemical equilibrium to the systematic separation and qualitative detection of the elements. Familiarizes students with the chemical and physical properties of numerous metal and complexes, and compounds.

131 Introduction to Organic Chemistry. 4 hrs.
An extension of CH 101 for those students desiring an understanding of the broad concepts of organic chemistry. Not open to chemistry majors. Includes laboratory. Prerequisite: CH 101, 105.

223 Quantitative Analysis. 4 hrs.
Provides a background in fundamental quantitative analytical chemistry with an introduction to instrumentation. Data treatment, ionic equilibria, elementary electrochemical, spectrochemical, gravimetric, and volumetric techniques are discussed. Includes laboratories. Prerequisite: CH 126.

261 Nutritional Biochemistry. 4 hrs.
A treatment of the major classes of nutrients with emphasis on the metabolic processes involving carbohydrates, lipids, and proteins. Includes laboratory. (Not open to students seeking the B.S. degree in Biology or Chemistry). Prerequisite: BY 114, CH 131.
331 Elementary Organic Chemistry.  
2 hrs.
The chemistry of organic compounds is systematically studied. Discussion includes synthetic methods, theory and reaction mechanisms. Prerequisite or Parallel: CH 223.

332 Elementary Organic Chemistry.  
2 hrs.
Continuation of CH 331. Prerequisite: CH 331.

333 Elementary Organic Chemistry.  
2 hrs.
Continuation of CH 332. Prerequisite: CH 332.

335 Elementary Organic Chemistry Laboratory I.  
1 hr.
Introduces techniques of organic chemistry including synthesis, separation, and identification of organic compounds with the use of chemical and spectroscopic methods. Prerequisite or Parallel: CH 331.

336 Elementary Organic Chemistry Laboratory II.  
1 hr.
Continuation of CH 335. Prerequisite: CH 335. Prerequisite or Parallel: CH 332.

337 Organic Chemistry Laboratory.  
2 hrs.
A more advanced organic chemistry laboratory treating reactions and techniques not covered in CH 335 and 336. Each student is expected to pursue a special open-ended problem. Prerequisite: CH 336 and approval of instructor.

341 Chemical Thermodynamics.  
3 hrs.
Introduces the theory of classical thermodynamics and applies it to the chemistry of solids, liquids, gases, and solutions. Prerequisite: CH 223, PH 201. Prerequisite or Parallel: MA 233.

342 Chemical Dynamics.  
2 hrs.
Discussion includes kinetic theory of gases, theory and formulation of rate equations, mechanisms of chemical reactions, and applications. Prerequisite: CH 341.

343 Introduction to Quantum Chemistry.  
2 hrs.
An introduction to the quantum mechanical treatment of the chemical bond including discussions on structure, symmetry, spectroscopy, and statistical thermodynamics. Prerequisite: CH 342, MA 244.

345 Experimental Physical Chemistry I.  
1 hr.
Laboratory investigations into the general area of thermodynamics. Prerequisite: CH 341.

346 Experimental Physical Chemistry II.  
1 hr.
Laboratory investigations into the general area of kinetics and spectroscopy. Prerequisite: CH 345. Parallel: 343.

401 Inorganic Chemistry.  
3 hrs.
A survey of certain fundamental topics in inorganic chemistry including atomic structure, chemical bonding, periodic relationships, acid-base theories, non-aqueous solvents, and reaction mechanisms. Prerequisite or Parallel: CH 342.

421 Chemical Instrumentation.  
4 hrs.
An introduction to the use of basic instrumentation in electrochemical,
chromatographic and spectrophotometric analysis. Laboratory work emphasizes the general utility of operational amplifiers in making chemical measurements and provides an introduction to digital logic. Prerequisite: CH 346.

431 Techniques in Experimental Chemistry. 3 hrs.
Includes inorganic and organic synthetic techniques, use of chemical instrumentation to characterize the products, and use of scientific languages including computer languages as necessary. Includes laboratory. Prerequisite: CH 337 and 346 or approval of the instructor.

461 Introduction to Biochemistry. 3 hrs.
An introduction to contemporary molecular biochemistry. Emphasis is on mechanisms of biochemical reactions. Prerequisite: CH 332, BY 114.

491, 492, 493. Introduction to Chemical Research. 1-3 hrs.
A personalized program designed to round out the undergraduate curriculum of students with various goals. Prerequisite or Parallel: CH 345 and Senior Standing. Requires approval of the supervising faculty member and the Chemistry Chairman. Registration utilizes last digit of course number to designate semester hour credit. (Students normally may elect only up to six hours).

505 Nuclear and Radiochemistry. 3 hrs.
Theory and description of chemical phenomena which are related to nuclear properties and processes. Includes radioactive decay and growth, interactions of radiations with matter, decay processes, nuclear models, and types of nuclear reactions. Prerequisite: CH 343 or approval of instructor.

506 Nuclear Chemistry Laboratory. 2 hrs.
Theory and use of nucleonics measuring equipment and techniques of nuclear and radiochemistry. Prerequisite or Parallel: CH 505.

525 Environmental Chemistry. 3 hrs.
Principles of quantitative analyses related to the minor components of a sample. Applications will be selected from the principal analyses necessary to maintaining environmental quality of air, water, and soil. Emphasis will be placed on selection of conditions for collecting reliable samples; concentration of components with techniques for increasing concentration of selected component; relationships between physical and chemical changes in the sample and the signal output of the predominant transducers; and the translation of the chemical analysis into meaningful specifications. Lecture only. Prerequisite: CH 421; or CH 122-126, EG 342, and EG 311.

540 High Polymer Chemistry. 3 hrs.
The theory of polymer formation and the structural dependence of polymer properties are discussed. Prerequisite: CH 337, 342.

549 Spectroscopy and Molecular Structure. 3 hrs.
An intermediate level treatment of the principles of spectroscopy and their application to the determination of molecular structure. Prerequisite: CH 343.

553 Introductory Quantum Mechanics I. 3 hrs.
Same as PH 551. Prerequisite: CH 343, PH 351.

554 Introductory Quantum Mechanics II. 3 hrs.
Same as PH 552. Prerequisite: CH 553.
600 Advanced Inorganic Chemistry. 3 hrs.
A survey course with emphasis on the structure and reactivity of inorganic compounds. Prerequisite: CH 401.

601 Structural Methods in Inorganic Chemistry. 3 hrs.
The study of various physical methods applied to the determination of the structure of inorganic compounds. Prerequisite: CH 600.

602 Chemistry of Coordination Compounds. 3 hrs.
Modern bonding theory and stereochemistry of coordination compounds will be presented. Prerequisite: CH 601.

603 Chemistry of Non-Metal Compounds. 3 hrs.
A study of the chemistry of selected non-metal compounds. Prerequisite: CH 601.

621 Methods of Chemical Analysis. 3 hrs.
A literature, seminar course which emphasizes the theory and methodology of various techniques of chemical analysis. Prerequisite: CH 421.

630 Physical Organic Chemistry. 3 hrs.
An introduction to theoretical organic chemistry. Topics stressed include bonding, methods for determining reaction mechanisms, reactive intermediates, and stereochemistry. Prerequisite: CH 333, 343, or approval of instructor.

631 Advanced Organic Chemistry I. 3 hrs.
A systematic study of the reaction mechanisms of various types of organic compounds. Prerequisite: CH 630.

632 Advanced Organic Chemistry II. 3 hrs.
A course which is complementary to previous courses and treats special classes of compounds and natural products.

633 Synthetic Organic Chemistry. 3 hrs.
A study of the reactions and principles involved in the synthesis of simple and complex organic compounds. Prerequisite: CH 632.

640 Advanced Chemical Thermodynamics. 3 hrs.
Presents a thorough treatment of the first, second, and third laws of thermodynamics, and applications. Includes a brief introduction to statistical thermodynamics. Prerequisite: CH 343, MA 251, or approval of instructor.

641 Statistical Thermodynamics. 3 hrs.
A discussion of principles leading to the development of Maxwell-Boltzmann, Bose-Einstein, and Fermi-Dirac statistics is presented and thermodynamic properties are calculated from the partition function. Prerequisite: CH 640.
642 Advanced Chemical Dynamics. 3 hrs.
Concepts related to the velocity of chemical reactions in homogeneous and heterogeneous systems are discussed. Included are the absolute rate theory, collision theory, scattering, and the concept of reaction cross sections. Prerequisite: CH 640.

643 Quantum Chemistry. 3 hrs.
An application of theory to the chemical bond in the spirit of Coulson and Murrell, Kettle, and Tedder. Prerequisite: CH 640.

705 Selected Topics in Inorganic Chemistry. 3 hrs.
Prerequisite: CH 603.

735 Selected Topics in Organic Chemistry. 3 hrs.
Prerequisite: CH 633.

745 Selected Topics in Physical Chemistry. 3 hrs.
Prerequisite: CH 643.

780 Chemistry Seminar. 3 hrs.
A minimum of two terms required of all students working toward the M.S. degree.

799 Master's Thesis. 3 hrs.
Required each term a student is working and receiving direction on his master's thesis. A minimum of two terms required for M.S. students. A maximum of 9 hours of credit is awarded upon successful completion of the master's thesis.

Earth Sciences (ES)

Courses in the Earth Sciences are offered as electives only. No credit toward the General Education Requirements is obtained.

101 Earth Sciences I. 4 hrs.
Spatial relationships of the earth, moon, and sun that determine the figure of the earth, earth motions, time, seasons, atmospheric and oceanic circulation, weather, and climates. Includes practical and field work. Student may enter ES 102 without this course.

102 Earth Sciences II. 4 hrs.
Minerals and rocks; earth history and development of life; interior of the earth; evolution of continents, ocean basins, and mountains; rock weathering and soil forming processes; and shaping of land forms by running water, glacial ice, winds, and waves. Includes practical and field work.

304 Meteorology. 3 hrs.
Same as EG 394. Prerequisite: ES 101 or permission of instructor.

Mathematics, Statistics, and Computer Science

Undergraduate Programs

The mathematics faculty offers courses in mathematics (MA), statistics
(ST), and computer science (CS) to satisfy requirements for a B.S. or B.A. degree in mathematics, a B.S. or B.A. degree in mathematics education, and clusters in mathematics for students majoring in other areas as well as to satisfy individual needs for courses to supplement other areas of study and to satisfy General Education Requirements.

All areas of concentration (AOC's) with a major in mathematics must include: MA 153, 154, 233, 244, 251, 442, 453 (basic core-21 semester hours); MA 352 or 385; MA 333 or 533 or 570; MA 521 or 551 or 554 (not required in Curriculum II); 6 hours of electives in MA courses numbered above 300. The options and electives must be approved by the student's faculty advisor.

All AOC's with a major in mathematics education (Curriculum III) must satisfy the requirements of the Professional Elementary Education Curriculum (PEEC) and must include: MA 153, 154, 243, 244, 333, 350, 385, 442 and one approved MA course numbered above 200.

Students majoring in other academic areas may include only MA courses numbered above 140 in their AOC. A typical mathematics cluster consists of MA 153, 154, 233, 244, 251 and two approved MA courses numbered above 300. All MA clusters should include MA 442 or 453.

No student may enroll in his first MA course at the UAH prior to determination of his placement level. Students who have no prior college credit in mathematics are placed at Level I, II, or III according to their high school mathematics background and their ACT scores in mathematics.

Students who are not planning to continue in mathematics but need 3 to 9 hours to satisfy General Education Requirements should make their choice from the sequence MA 104, 143, 243, 350, 385 beginning with the appropriate course.

Students who may continue in mathematics and need 3 to 9 hours to satisfy General Education Requirements should make their choice from the sequence MA 105, 133, 153, 154, 244 beginning with the appropriate course.

Students with various placement levels must begin their MA courses as follows: Level I--MA 104 or 105; Level II--MA 133 or 143; Level III--MA 153 or 243.

Students in the Division of the Humanities who begin their MA courses with MA 104 or 143 or 243 and later choose to continue in mathematics may select a cluster in mathematics without loss of credit. One typical such cluster consists of MA 143, 243, 244, 333, 350, 385, and 442.

The following curricula are given as examples of approved curricula.
Students who feel that substitutions can produce a program better suited for their needs are encouraged to consult their faculty advisor about the feasibility of such substitutions.

Curriculum I

For B.A. or B.S. Degree with a Major in Mathematics.

<table>
<thead>
<tr>
<th>General Education Requirements</th>
<th>Semester Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>English and History</td>
<td>18</td>
</tr>
<tr>
<td>Language (French, German or Russian)</td>
<td>6-12</td>
</tr>
<tr>
<td>Social Sciences</td>
<td>6</td>
</tr>
<tr>
<td>Mathematics (courses numbered below 150)</td>
<td>0-6</td>
</tr>
<tr>
<td>Laboratory Science</td>
<td>0-16</td>
</tr>
</tbody>
</table>

For B.A.: 8 hrs. in one science or a science cluster with no additional science

For B.S.: 8 hrs. in one science with the cluster in another, or 8 hrs. in each of two sciences.

Mathematics Major (minimum requirements)
MA Basic Core and MA 352 | 24
MA 333 or 353 or 570; MA 521 or 551 or 554 | 6
MA 570 and 554 are recommended choices for students preparing for graduate study in mathematics.
MA Electives (numbered above 300) | 6
Cluster (see examples below) | 21-24
Electives (to bring total number of semester hours to 128) | 10-41

Curriculum II

For B.A. or B.S. Degree with Major in Mathematics; Meets Requirements for a Class B Secondary Professional Teaching Certificate.

<table>
<thead>
<tr>
<th>General Education Requirements</th>
<th>Semester Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>English, History, Speech and Psychology</td>
<td>24</td>
</tr>
<tr>
<td>Language (French, German, or Russian)</td>
<td>6-12</td>
</tr>
<tr>
<td>Social Sciences (Economics, Political Science, or Sociology)</td>
<td>6</td>
</tr>
<tr>
<td>Mathematics (courses numbered below 150)</td>
<td>0-6</td>
</tr>
</tbody>
</table>

168
Science

For B.A.: one of the following options
(a) 4 hrs. in Biology with a Physical Science cluster
(b) 4 hrs. in a Physical Science with a Biology cluster
(c) 4 hrs. in Biology and 8 hrs. in a Physical Science
(d) 4 hrs. in a Physical Science and 8 hrs. in Biology

For B.S.: one of the following options
(a) 8 hrs. in Biology with a Physical Science cluster
(b) 8 hrs. in a Physical Science with a Biology cluster
(c) 8 hrs. in a Physical Science and 8 hrs. in Biology

Professional Education Courses
(ED 261, 263, 388, 490, 497) 21

Mathematics Major (minimum requirements)
MA Basic Core, MA 333, and MA 385 27
MA Electives (numbered above 300) 6

Cluster (see examples below) 21-24

Electives (to bring total number of semester hours to 128) 0-9

Note:
Unless carefully planned, this curriculum may require more than the minimal total of 128 semester hours.
Curriculum III

For B.A. or B.S. Degree with a Major in Mathematics Education; Meets Requirements for the Professional Elementary Education Curriculum.

General Education Requirements
As in Curriculum II
Additional Humanities (ART 215, MU 215, ED 215) 48-64
Additional Social Sciences (see PEEC Requirements) 9
Mathematics (minimum requirements)
(MA 153, 154, 243, 244, 333, 350, 385, 442, and one MA elective numbered above 200) 6
Pre-Professional Courses (ED 230, 261, 263, 265, 266) 27
Professional Education Courses
(ED 360, 367, 370 or 371, 372, 373, 491) 11
Electives (to bring total number of semester hours to 128) 16

Note:
Unless carefully planned, this curriculum may require more than the minimal total of 128 semester hours. Students who elect this curriculum will not be adequately prepared for graduate study in mathematics.

The following list of approved clusters are typical of clusters chosen by students who major in mathematics. Students who feel that substitutions can produce a program better suited for their needs are encouraged to consult their faculty advisor on the feasibility of such substitutions. Clusters (g) and (h) require the prior approvals of the student's mathematics faculty advisor and representatives of all other involved departments.

<table>
<thead>
<tr>
<th>Cluster</th>
<th>Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Biology</td>
<td>BY 113, 114, 221, 319, 320, one BY elective numbered above 300, CH 101 or 121, and CH 105.</td>
</tr>
<tr>
<td>(b) Chemistry</td>
<td>CH 105, 121, 122, 126, 331, 332, 333, 335, 336, 341, 342, and 345.</td>
</tr>
<tr>
<td>(c) Physics</td>
<td>PH 101-102 or 109-110, 201, 241, 321, 331, and 351.</td>
</tr>
<tr>
<td>(d) Psychology</td>
<td>PY 100 or 101, 104, 200, 401, ST 287, and PY 303 or MA 385 or MA 585.</td>
</tr>
<tr>
<td>(e) Economics</td>
<td>EC 142, 143, 340, 341, 345, 448, and ST 287.</td>
</tr>
</tbody>
</table>
(f) Operations Research—EG 196, 220, 390, 421, and any four of EG 523, 524, 525, 591, MA 585.

(g) A cluster of 21 hours in one discipline, including at least 6 hours numbered above 300, which is approved by the department concerned and the student’s mathematics faculty advisor.

(h) A cluster of courses consisting of a minimum of 15 hours in one discipline and a minimum of 9 hours in another discipline, including 9 hours in courses numbered above 300, which is approved by the departments concerned and the student’s mathematics faculty advisor.

Note:
Students who expect to pursue graduate study in applied mathematics are urged to select a cluster in science or engineering.

Graduate Programs

The mathematics graduate faculty offers courses in mathematics (MA) and statistics (ST) to satisfy the requirements for an M.A. degree in mathematics and to satisfy individual needs for courses to supplement other areas of study.

In addition to fulfilling the Graduate School requirements, each student’s program (except in the probability-statistics option noted below) must include MA 642, 671, 653, 656 and one of the following:

(a) An approved thesis, and 12 hours of electives which must be selected so that the program includes an approved 6 hour sequence; or

(b) 21 hours of approved electives including any two of MA 644, 742 or 743, 754, 756, and 771.

With prior approval of the mathematics graduate faculty, a student may instead choose a program with emphasis in probability and mathematical statistics. Students interested in this program should consult the Graduate Coordinator for Mathematics.

Normally, no more than 6 hours of non-MA courses are applicable to the M.A. degree in mathematics. Students choosing the thesis option may include at most 9 hours from 500 level courses. Students who choose the non-thesis option may include at most 12 hours from 500 level courses. In all cases, all 500 level courses and all electives must receive prior approval of the student’s advisor.

In addition to fulfilling the Graduate School requirements, all applicants
for graduate study in mathematics must have completed the equivalent of MA 153, 154, 233, 244, 251, 442, 453 and 9 additional hours in upper division courses including one additional course in analysis. Students who are deficient more than two undergraduate courses in mathematics must remove these deficiencies prior to admission. All potential applicants for graduate study in mathematics are urged to consult a member of the mathematics graduate faculty prior to submission of their application.

Applicants for graduate study in mathematics must present a satisfactory undergraduate scholastic record and satisfactory Graduate Record Examination (GRE) scores in both the aptitude and mathematics portions of the examination. Each applicant must:

(a) Have a minimum overall undergraduate quality point average of at least 2.0 (A=3.0), or at least 2.0 for the last 60 hours of work, and

(b) Score at least 1,100 on the aptitude portion of the GRE, including at least 450 on the verbal portion of the aptitude examinations and at least 600 in the quantitative portion.

An applicant whose scholastic record does not fully meet the requirements for admission may be admitted conditionally (see section on Division of Graduate Programs, page 228).

Mathematics (MA)

Note:
No student may receive more than 6 hours credit in MA courses numbered below 150, nor more than 3 hours credit in MA courses numbered below 110. No student whose placement is Level II or above, or who has completed MA 133 or 143, may receive more than 3 hours credit for courses numbered below 150. Students with deficiencies of high school algebra or high school geometry credit must remove these deficiencies prior to enrollment in other MA courses. No student may enroll in his first MA course at the UAH prior to determination of his placement levels.

004 High School Algebra (Formerly 091). 3 hrs. No credit
For students with a deficiency of high school credit in algebra.

033 High School Geometry (Formerly 092). No Credit
For students with a deficiency of high school credit in geometry. Prerequisite: MA 004 or one unit of high school algebra.

104 Introduction to Contemporary Mathematics (Formerly 101). 3 hrs.
No credit given to students who have received credit for another MA course or who are placed at Level II or above. Introduction to mathematical reasoning: sets, set operations and relations; the system of whole numbers; numeration systems; fundamental algorithms; systems of integers and rational numbers; real numbers; elementary number theory. Prerequisite: One unit of high school algebra and Level I placement.

105 College Algebra (Formerly 109). 3 hrs.
No credit given to students who have received credit for another MA course or who are placed at Level II or above. Sets, set operations, the real number
system, introduction to complex numbers, polynomials, algebraic systems, exponents and radicals, equations and inequalities, systems of equations and inequalities, functions, relations and graphs. Prerequisite: One unit of high school algebra and Level I placement.

133 Algebra and Trigonometry (Formerly 115). 3 hrs.
No credit given to students who have successfully completed an MA course numbered above 140 or who are placed at Level III. Polynomial functions, rational functions, graphs, continuity, rational roots, exponential and logarithmic functions, trigonometric functions of angles, polar coordinates, solution of triangles, trigonometric functions of a real variable, inverse trigonometric functions, periodicity and graphs, complex numbers and DeMoivre's theorem, introduction to analytic geometry, slopes, direction cosines and conic sections. Prerequisite: MA 105 or Level II placement.

143 Finite Mathematics (Formerly 118). 3 hrs.
No credit given to students who have successfully completed MA 133 or a higher level MA course or who are placed at Level III. Elementary logic, sets, partitions and counting, elementary probability, introduction to matrices, systems of equations, vectors and linear programming. Prerequisite: MA 104 or 105 or 133 or Level II placement.

153 Calculus and Analytic Geometry (Formerly 125). 3 hrs.
Introduction to plane analytic geometry, functions, limits, continuity, differentiation of algebraic functions, applications of the derivative, antidifferentiation. Prerequisite: MA 133 or Level III placement.

154 Calculus and Analytic Geometry (Formerly 149). 3 hrs.
The definite integral, applications of definite integrals, logarithmic and exponential functions, trigonometric functions. Prerequisite: MA 153.

233 Calculus and Analytic Geometry (Formerly 150). 3 hrs.
Techniques of integration, polar coordinates, the conic sections, vectors in the plane, parametric equations, hyperbolic functions, indeterminate forms and improper integrals. Prerequisite: MA 233.

243 Mathematical Structures. 3 hrs.
Cardinal numbers; mathematical induction; elementary number theory including primes, some classical problems, and congruences; groups, finite and cyclic groups, and isomorphisms; rings, fields, integral domains, and polynomials; introduction to geometry, affine and projective planes. Prerequisite: MA 133 or 143 or Level II placement.

244 Introduction to Linear Algebra. 3 hrs.
No credit given to students who have successfully completed either MA 442 or 453. Such students must substitute MA 544. Systems of linear equations and matrices; matrix operations; bases and coordinates; dimensions of vector spaces; linear transformation, matrix products, inverses and determinants; similar and symmetric matrices, diagonalization and brief application to spectral theory. Prerequisite: MA 233 or MA 243 and approval of instructor.

251 Calculus and Analytic Geometry. 3 hrs.
Vectors in three space and solid analytic geometry, differential calculus of functions of several variables (limits, continuity, partial derivatives, directional derivatives), multiple integrals, sequences and infinite series. Prerequisite: MA 233. Prerequisite or parallel: MA 244.

333 Introduction to Geometry (Formerly 363). 3 hrs.
Sensed lines and segments, fundamental theorems and relations, cross ratio, transformations of the plane, introduction to projective and non-euclidean
geometry, and selected topics on the foundations of geometry. Prerequisite: MA 243 or MA 244.

350 Logic and the Real Number System. 3 hrs. Symbolic logic, set theory, the axiomatic method, abstract algebra, number systems, the real number system and the limit concept. No credit given to students who have successfully completed either MA 442 or MA 453. Prerequisite: MA 243 or MA 244.

352 Introduction to Differential Equations. 3 hrs. First order equations; linear equations, series solutions; systems of equations; existence theory, numerical methods and Laplace transforms. Prerequisite: MA 244, MA 251.

385 Introduction to Probability 3 hrs. No credit given to students who have successfully completed MA 585. Probability spaces, discrete random variables, conditional probability, expectation; Bernoulli, Poisson and other random processes, basic distributions. Prerequisite: MA 244, or 251, or MA 243 and approval of instructor.

415 Elementary Numerical Methods (Formerly 513). 3 hrs. Integration techniques including Newton, Bairstow, Bernoulli and difference techniques; interpolation and approximation; eigenvalues. Prerequisite: MA 251, 244, or approval of instructor.

442 Introduction to Abstract Algebra (Formerly 373). 3 hrs. Introductory study of groups, rings, integral domains and fields. Elementary theory of numbers. Prerequisite: MA 244 or 251 or 350.

453 Introduction to Real Analysis I (Formerly 491). 3 hrs. Elementary set theory, the real number system, convergence of sequences, open and closed sets, the Bolzano-Weierstrass and Heine-Borel theorems, limits and properties of limits, continuous functions and their properties, uniformly continuous functions and their properties, derivatives, and Taylor's theorem. Prerequisite: MA 251, or MA 350 and approval of instructor.

490 Senior Seminar. 1-3 hrs. The purpose of this course is to enable the mathematics faculty to offer selected undergraduate topics in mathematics. Prerequisite: Approval of instructor.

515 Numerical Methods in Analysis (Formerly 514). 3 hrs. The Euler-Cauchy, predictor corrector, Milne and Runge-Kutta methods; error bounds and convergence. Prerequisite: MA 352, 453 or approval of instructor.

521 Introduction to Complex Analysis. 3 hrs. Complex algebra, analytic functions, Cauchy integral theorem, Taylor and Laurent series, classification of singularities, residue theorem, evaluation of definite integrals, and selected topics. Prerequisite: MA 453 or approval of instructor.

525 Intermediate Differential Equations. 3 hrs. Systems of linear ordinary differential equations with constant coefficients, plane autonomous systems, stability, and selected topics related to properties and characterization of solutions. Prerequisite: MA 352.
526 Partial Differential Equations. 3 hrs.
Systems of first order ordinary differential equations, first order quasilinear partial differential equations, the general first order partial differential equation via Cauchy's method of characteristics, higher order equations, canonical forms, separation of variables, Fourier series, transform methods, and selected topics. Prerequisite: MA 352.

527 Advanced Vector Calculus. 3 hrs.
A brief review of vector algebra and the calculus of vector-valued functions; representation of vector operators in curvilinear coordinates; line and surface integrals; the theorems of Gauss, Green, and Stokes; the Jacobian, and changes of variables in multiple integrals. Prerequisite: MA 352.

533 Differential Geometry. 3 hrs.
Theory of space curves, the concept of a surface, first and second fundamental forms, foundations of tensor calculus; Gaussian, mean and geodesic curvature. Prerequisite: MA 352.

544 Linear Algebra. 3 hrs.
Vector spaces, linear transformations, matrices, determinants, eigenvalues, similarity, linear functionals, bilinear forms, quadratic forms, orthogonal matrices, unitary matrices, and normal matrices. Prerequisite: MA 442 or 453.

551 Functions of Several Variables (Formerly 552). 3 hrs.
Topology of \( \mathbb{R}^n \), limits and continuity of functions of several real variables, differentiation, applications of partial differentiation, Jacobians, the implicit function theorem and extremum problems. Prerequisite: MA 453.

554 Introduction to Real Analysis II (Formerly 492). 3 hrs.
Infinite series and convergence, sequences and series of functions, power series and their properties, functions of bounded variation, the Riemann-Stieltjes integral and its properties. Prerequisite: MA 453.

570 Metric and Normed Spaces. 3 hrs.
Vector and metric spaces, normed spaces, inner product spaces, sequences, continuous functions, separability, total boundedness, compactness, completeness, completions, Banach and Hilbert spaces, finite product spaces, and the fixed point theorem with applications. Prerequisite: MA 453.

585 Probability (Formerly 581). 3 hrs.
An introduction to probability theory and its applications. Independent trials, Markov dependent Bernoulli trials, discrete and continuous random variables, the law of large numbers, basic distributions, sums of independent random variables, sequences of random variables, the central limit theorem and convergence in distribution. Prerequisite: MA 251.

590 Selected Topics in Mathematics. 3 hrs.
The purpose of this course is to enable the mathematics faculty to comply with requests for courses in selected topics. Prerequisite: Approval of instructor.

621 Special Functions (Formerly 523). 3 hrs.
The gamma function and its properties, probability integral and related functions, exponential integral and related functions, orthogonal polynomials, cylinder functions, spherical harmonics and hypergeometric functions. Prerequisite: MA 521.

625 Calculus of Variations (Formerly 766). 3 hrs.
Types of problems in the calculus of variations, a study of necessary
theorem, analytic continuation, Riemann surfaces, and selected topics. Prerequisite: MA 656.

771 General Topology II (Formerly 773). 3 hrs. Review of elementary global topological properties, Moore-Smith convergence, quotient spaces, types of compactness, advanced separation axioms, Urysohn’s lemma, Tietze’s extension theorem, filters, local connectivity, local compactness, and metrization. Prerequisite: MA 671.

785 Advanced Theory of Probability (Formerly 686). 3 hrs. Probability measure, stochastic independence, modes of convergence, limit theorems, and introduction to Brownian motion. Prerequisite: MA 585, 754.

799 Master’s Thesis. 3 hrs. Required each term a student is working and receiving direction on his master’s thesis. A minimum of two terms is required for Plan I M.A. students. A maximum of 9 hours of credit is awarded upon successful completion of the master’s thesis.

Statistics (ST)

287 Applied Statistics I. 3 hrs. Collection and presentation of data; averages, dispersion and skewness; binomial, normal, X², t- and F-distributions; estimation, confidence intervals and tests of significance. Includes laboratory. Prerequisite: MA 104 or MA 105 or Level I placement.

387 Applied Statistics II. 3 hrs. Time series, trends, seasonal and cyclical factors; index numbers; linear and non-linear regression; rank and Pearson correlations; an introduction to multiple regression and analysis of variance. Prerequisite: ST 287.

687 Theory of Statistics I (Formerly MA 582). 3 hrs. 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. Prerequisite: MA 244, 585.

787 Theory of Statistics II (Formerly MA 781). 3 hrs. Continuation of hypothesis testing, likelihood ratio and unbiased tests, uniformly most powerful tests, and power function; non-parametric tests, statistical decision theory, Bayes and minimax decision rules, relation to testing and estimation, multivariate normal distribution and linear models. Prerequisite: ST 687.

Natural Science (NS)

The Natural Science sequence (12 semester hours) is an integrated course designed specifically as a terminal science course for liberal arts (non-science) majors. Contemporary aspects of science are used as a framework for the study of the impact of science on the individual’s life. Stressed throughout the course are: (1) The interaction of science with social, economic, and political forces; (2) The strengths and limitations of
science; and (3) An understanding of science as a human endeavor. The laboratory is used to encourage students to become aware of modern-day problems and to illustrate the need for careful, experimental investigation of technical problems. As well as meeting the university's General Education science requirements, the Natural Science sequence also satisfies the physical and biological science requirement for teacher certification.

**Natural Science (NS)**

111 **Natural Science Part I.**  
4 hrs.  
Fundamental ideas of chemistry, physics, and biology are treated so as to minimize the distinctions between the three disciplines while emphasizing the contemporary aspects. Topics include ecology, population, environmental problems, atomic energy, space travel, space and time relationships, probability, computers, biological control systems, disease, drugs, aging, chemical and biological warfare, and genetic engineering. Group projects and independent study are encouraged. Includes laboratory. Prerequisite: Level I Placement in Mathematics (1 year of high school algebra).

112 **Natural Science Part II.**  
4 hrs.  
Continuation of NS 111. Includes a laboratory. Prerequisite: NS 111 or permission of instructor.

113 **Natural Science Part III.**  
4 hrs.  
Continuation of NS 112. Includes a laboratory. Prerequisite: NS 112 or permission of the instructor.

**Physics (PH)**

**Undergraduate Programs**

The basic courses for a B.S. degree with a major in physics include: PH 109, 110, 201, 241, 310, 311, 312, 321, 331, 351. PH 109-110 may be omitted by permission of the physics faculty. Three approved AOC's are listed. Others may be approved after consultation with the student's faculty advisor.

**Curriculum I**

For **Working Professionally at the B.S. Level or preparation for Graduate School.**

<table>
<thead>
<tr>
<th>General Education Requirements (humanities and social sciences)</th>
<th>Semester Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics--PH 109-110, 201, 241, 310, 311, 312, 321, 331, 337, 351, 401, 431, one senior lab at 400 level, 551-552</td>
<td>43</td>
</tr>
<tr>
<td>Mathematics--MA 153, 154, 233, 244, 251, 352, 491, 521</td>
<td>24</td>
</tr>
</tbody>
</table>

179
Chemistry--CH 121-122, 105, 126  
Electives  

**Curriculum II**

**Natural Science AOC with Emphasis on Physics.**

General Education Requirements (humanities and social sciences)  
Physics--PH 104, 105, 109-110, 201, 241, 310, 311, 331, 351  
Chemistry--CH 121-122, 105, 126, 331-332-333, 335  
Mathematics--MA 153, 154, 233, 244, 251, 352  
Biology--BY 113-114, 319, 317 or 354  
Electives  

**Curriculum III**

**AOC with Physics Major for Class B Secondary Professional Teaching Certificate.**  

<table>
<thead>
<tr>
<th>Semester Hrs.</th>
</tr>
</thead>
</table>
| **General Education Requirements (humanities and social sciences)** | 30-36  
| Physics--PH 104, 109-110, 201, 241, 310, 311, 312, 331, 351, 321 | 29  
| Mathematics--MA 153, 154, 233, 244, 251 | 15  
| Chemistry--CH 121-122, 105, 126 | 7  
| **With Chemistry Cluster** |  
| Chemistry--CH 223, 331-332-333, 341, 342 or 335-336 | 15  
| Education core | 27  
| Electives | 3-9  
| **With Mathematics Cluster** |  
| Mathematics--MA 333, 442, 385 or 585 | 9  
| Education core | 27  

180
Electives 9-15

With Biology Cluster

Biology--BY 113-114, 319, 221, 317 or 371 or 372, 432 or 431
Education core 27
Electives 0-2

Graduate Programs

The physics faculty offers programs of study leading to the Master of Science Degree under Plan I or Plan II and to the Doctor of Philosophy degree.

General information about the Graduate Programs at UAH and the general requirements for advanced degrees are given in the section on Graduate Programs and Research. Besides meeting the general admission requirements for graduate work, an entering student must take a placement examination during the first week of his first term of graduate study. The purpose of this examination is to help the student and his advisor decide on the best program of study. After taking the placement examination, the student must complete a Program Approval Form in consultation with his advisor.

Master of Science

Each student is required to take PH 792 (Physics Seminar) for two terms. For the Master of Science degree under Plan II, the following courses are required: PH 601, 622, 631, 632, 651 and 652. Each candidate for the Master of Science degree must also pass a Comprehensive Examination. This examination will normally be administered during the spring term.

Doctor of Philosophy

A statement of Procedures for Admission to the Ph.D. Program in Physics can be obtained from the Physics Department office.

Admission to the Ph.D. program in physics is dependent upon the performance on the Master of Science Comprehensive Examination. Students entering UAH with an M.S. degree or previous graduate training in Physics are required to take the M.S. Comprehensive Examination at their earliest opportunity.

A minimum of 48 hours of graduate course credit is required for the Ph.D. degree in Physics. Physics 601, 622, 631, 632, 651, 652 and a minimum of twelve credit hours in courses numbered 700 or above must be taken. Courses in addition to those enumerated above will be selected in
consultation with the student's advisory committee. Transfer of credit from other institutions requires the approval of the graduate faculty in physics. Although a minor subject is not required, the student is encouraged to develop an interdisciplinary program of study.

In order to be admitted to candidacy for the Ph.D. degree a student must pass the Qualifying Examination. A student must have earned 48 hours of graduate credit to be eligible to take the Qualifying Examination. After two or more years of full-time graduate work or the equivalent in part-time work, the student may be required to take the Qualifying Examination. This examination may be taken no more than twice. This examination is designed to test the student's fitness for pursuing a research project in his chosen area and to test his general knowledge of physics.

A significant portion of the dissertation must be submitted for publication in an approved journal with international circulation.

**Physics (PH)**

101 General Physics. 4 hrs.
An introductory course intended for science and engineering students. Intended to be phenomenological in nature with emphasis on understanding of basic ideas of physics and ability to apply these ideas to specific problems. Subjects covered include Newtonian mechanics, conservation laws, electromagnetic phenomena, relativity, waves, quantum nature of matter. Includes laboratory. PH 101-102 satisfy laboratory science requirement. Prerequisite: High school algebra. Fall, Spring.

102 General Physics. 4 hrs.
Continuation of PH 101. Includes laboratory. Prerequisite: PH 101. Winter, Summer.

104 Astronomy of the Solar System. 3 hrs.
Includes laboratory. Prerequisite: High school algebra and trigonometry. Fall.

105 Stellar Astronomy. 3 hrs.
Continuation of Ph 104. Includes laboratory. Prerequisite: PH 104. Winter.

109 General Physics. 4 hrs.
Lecture same as 101. Laboratory replaced by one-hour seminar each week. This will be generally in the area of history of science. PH 109-110 may not be used to satisfy laboratory science requirement; strongly recommended for science majors who will satisfy laboratory science with another set of courses. Fall.

110 General Physics. 4 hrs.
Continuation of PH 109. Lecture same as PH 102. Laboratory replaced by one-hour seminar each week. This will be generally in the area of contemporary thoughts in science and social implications. Prerequisite: PH 109. Winter.

201 Mechanics. 3 hrs.
Galilean invariance; energy and momentum; non-relativistic particle
kinematics and dynamics; harmonic oscillator; Lorentz transformations; relativistic momentum, energy, and dynamics. Prerequisite: PH 101 or 109. Prerequisite or parallel: MA 233. Fall.

241 Waves and Oscillations. 3 hrs.
Introduction to periodic phenomena, free oscillators, forced oscillators, traveling waves, modulation and Fourier analysis. Prerequisite: PH 201. Prerequisite or parallel: MA 244. Winter.

253 Modern Physics. 3 hrs.
Emphasis on basic concepts of modern developments in physics. Introduction to special relativity, atomic structure, structure of periodic table, atomic spectra, nuclear structure. Fall

310 Intermediate Laboratory I. 1 hr.

311 Intermediate Laboratory II. 1 hr.
Electronic instrumentation, electric fields, motion of charged particles. Prerequisite or parallel: PH 331. Spring.

312 Intermediate Laboratory III. 1 hr.
Electric circuits, acoustics and fluids, optics. Prerequisite: PH 311. Fall.

321 Thermal and Statistical Physics. 3 hrs.
Microscopic systems, equilibrium, heat and temperature, irreversibility; probability and statistics; thermal interactions, approach to equilibrium, mean energy and pressure of ideal gas; microscopic theory, absolute temperature, entropy, canonical distribution, and equipartition of energy. Prerequisite: PH 331. Fall.

331 Electricity and Magnetism. 3 hrs.
Basic concepts of electrostatics, electric potential theory, electric fields and currents, fields of moving charge including relativistic treatment, magnetic fields, Maxwell’s equations. Prerequisite: PH 201. Prerequisite or parallel: MA 251. (Engineers see EG 307 for prerequisites of PH 331.) Spring.

337 Electronics. 4 hrs.
Introductory course for all science students. Basic AC and DC circuits, vacuum tube circuits, transistor circuits, power supplies, feedback, use of above in laboratory instruments. Laboratory included. Prerequisite: PH 331. Summer.

351 Quantum Physics. 3 hrs.
Quantum hypothesis, physical quantities, theory of measurement; uncertainty principle, energy levels; photons; particles, de Broglie waves; phenomenological wave mechanics, Schröedinger’s wave equation, hydrogen-like systems, interactions. Prerequisite: PH 241, 331. Spring.

401 Intermediate Mechanics. 3 hrs.
Motion of particle in two or three dimensions, central forces, gravitation, systems of particles; rigid body motion; moving coordinate systems; generalized coordinates, Lagrange’s equations, Hamilton’s equations. Prerequisite: PH 201. Prerequisite or parallel: MA 352. Winter, Summer.

412 Optics and Spectroscopy Laboratory. 1 hr.
Experiments in geometrical optics including image formation and aberrations, study of diffraction gratings, plane and concave grating spectrographs.
photoelectric and photographic spectroscopy, analysis of spectra. Upon Demand.

413 Nuclear Physics Laboratory. 1 hr.
Statistics in counting processes, beta-ray continuum, scintillation spectroscopy, coincidence spectroscopy, Mossbauer effect, selected experiments in modern techniques. Upon Demand.

414 Solid State Physics Laboratory. 1 hr.
Fundamental solid state experiments, including electron paramagnetic resonance, nuclear magnetic resonance, Hall effect, cyclotron resonance, Mossbauer spectroscopy. Upon Demand.

415 X-Ray Laboratory. 1 hr.
Powder and single crystal x-ray photography with theory as needed. Upon Demand.

416 Senior Laboratory. 1 hr.
Selected experiments from PH 412-415.

420 Senior Thesis. 3 hrs.
Semi-original work performed under the direction of a faculty member.

431 Intermediate Electricity and Magnetism. 3 hrs.
Development of Maxwell’s equations for time-varying fields, basic concepts of AC circuit theory, electric fields in matter, magnetic fields in matter, selected discussions on modern applications of electricity and magnetism. Prerequisite: PH 331, MA 352. Spring.

506 Introduction to Physics of the Solar System. 3 hrs.
Development and discussion of the fundamentals necessary for understanding of the solar system and the major modern trends. Prerequisite: PH 552. Upon Demand. Spring.

521 Thermal Physics. 3 hrs.
An introduction to thermal phenomena, both on a macroscopic and on a statistical basis, and to the principles and laws governing them. Prerequisite: PH 431.

536 Introduction to Space Physics. 3 hrs.
Charged particles in electric and magnetic fields, cosmic rays and trapped radiation; introduction to plasmas, including collisions and macroscopic effects. Prerequisite: PH 351, 431. Spring.

541 Optics I. 3 hrs.

551 Introductory Quantum Mechanics. 3 hrs.
Background of the quantum theory, wave-particle duality and uncertainty principle, basic postulates of quantum mechanics, angular momentum and spin, simple systems in one, two, and three dimensions, perturbation theory, scattering theory, applications. Prerequisite: PH 351, 401, 431. Fall.

552 Introductory Quantum Mechanics. 3 hrs.
Continuation of PH 551. Prerequisite: PH 551. Winter.

561 Introduction to Solid State Physics. 3 hrs.
Crystal structure, lattice vibrations and phonons, free electron theory, band
theory of solids, electric and magnetic and optical phenomena in solids. Prerequisite or parallel: PH 551. Fall.

565 Introduction to Nuclear Physics. 3 hrs.
Stable nuclei, isotopes, nuclear reactions, nuclidic masses, binding energy, scattering experiments, nuclear cross sections, spins, energy levels, nuclear models. Prerequisite or parallel: PH 552. Winter.

571 Introduction to Elementary Particles. 3 hrs.
Invariance principles and quantum numbers, symmetry schemes, scattering and reactions, resonances, strong-interaction dynamics, and weak interactions. Prerequisite: PH 552. Spring.

601 Classical Dynamics. 3 hrs.
Variational principles and Lagrangian mechanics, rigid body motion, Hamilton's equations, and the theory of small oscillations. Emphasis is on those aspects related to modern physics. Prerequisite: PH 401. Prerequisite or parallel: MA 521. Fall.

607 Mathematical Methods I. 3 hrs.
Review of vector calculus and coordinate systems, calculus of residues, partial differential equations, orthogonal functions, special functions. Prerequisite: MA 521. Fall.

609 Mathematical Methods II. 3 hrs.
Tensor analysis, matrices and group theory, integral transforms, integral equations, Hilbert space. Prerequisite: PH 607. Winter.

622 Kinetic Theory and Statistical Mechanics. 3 hrs.
Review of thermodynamics, kinetic theory, classical statistical mechanics, canonical and grand canonical ensembles, quantum statistical mechanics, Bose and Fermi statistics, the partition function. Prerequisite: PH 521, 552, MA 521. Fall, Spring.

631 Electromagnetic Theory I. 3 hrs.

632 Electromagnetic Theory II. 3 hrs.

651 Quantum Mechanics I. 3 hrs.
Review of basic principles, general formulation in Hilbert space, angular momentum, steady-state perturbation theory, scattering theory and applications. Prerequisite: PH 552, 601, 609, MA 523. Spring.

652 Quantum Mechanics II. 3 hrs.
Identical particles, symmetry principles, time-dependent perturbation theory, variational principles, formal scattering theory. Prerequisite: PH 651. Summer.

680-689 Selected Topics. 3 hrs.
Upon Demand.

702 Advanced Classical Dynamics. 3 hrs.
Review of Lagrangian and Hamiltonian dynamics, canonical transformation,
Hamilton-Jacobi theory, Lagrangian field theory, selected topics. Prerequisite: PH 601. Upon Demand.

705 Relativity. 3 hrs.
A study of the special and the general theory, with emphasis on a covariant formulation of electrodynamics. Prerequisite: PH 601, 631. Upon Demand.

723 Kinetic Theory and Statistical Mechanics. 3 hrs.
Advanced topics in kinetic theory and statistical mechanics. Prerequisite: PH 622. Upon Demand.

741 Optics II. 3 hrs.
Selected topics from advanced optics including Fresnel and Fraunhofer diffraction, theory of aberrations, theory of partial coherence, including laser applications. Prerequisite: PH 541. Spring, 1973 and alternate years.

753 Advanced Quantum Mechanics. 3 hrs.
Relativistic wave equations, second quantization, interacting fields, Feynman techniques. Prerequisite: PH 652. Fall, 1972.

761 Solid State Physics. 3 hrs.
Quantum formulation of lattice waves, electron states, static properties of solids, electron-electron interaction, dynamics of electrons, transport properties, optical properties, magnetism, superconductivity. Prerequisite: PH 561, 652. Winter, alternate years.

780-789 Selected Topics. 3 hrs.
Upon Demand.

792 Physics Seminar. No credit
Students report on journal articles or individual research. Prerequisite: PH 552. Two terms required for M.S. students. Fall, Spring.

799 Master's Thesis. 3 hrs.
A minimum of two terms required for M.S. students. A maximum of 9 hours of credit is awarded upon successful completion of the master's thesis.

899 Doctoral Dissertation. 3, 6, or 9 hrs.
The engineering program has as its primary objective the preparation of qualified students for careers in any one of many engineering practices, for research, and for advanced studies. It stresses a broad education in mathematics, physical sciences, liberal arts, social sciences, and the fundamentals of engineering.

The Division of Engineering achieves this goal by offering a unified program of undergraduate studies that will serve as an effective foundation for creative participation in most areas of engineering, especially those associated with newly evolving technologies. All engineering students follow a common curriculum with specialization in the junior and senior years in such areas as:

Electrical Engineering, with applications in electronics, electrical circuitry, networks, radar, instrumentation, and computer systems;

Industrial and Systems Engineering, with applications in operations research, industrial management, and man-machine systems;

Fluid and Thermal Engineering, with applications in aeronautics and astronautics; hydraulics and various heat exchange systems; chemical and related process systems; and air, water, noise, and thermal pollution control systems; programs of specialization in Environmental Engineering, Chemical Engineering, and Mechanical Engineering are readily devised from the undergraduate courses presently being offered.

Engineering Mechanics, with applications to orbits and trajectories of spacecraft and missiles, industrial machinery, materials, and such diverse engineering structural systems as bridges, aircraft, and satellites.

Degrees and Programs

The Division of Engineering offers programs leading to the degree of Bachelor of Science in Engineering, Master of Science in Engineering, Doctor of Philosophy, and Master of Science in Operations Research.

When desirable, as evidenced from continuous studies, the Division of Engineering may modify its curricula and specific courses of instruction, alter the requirements for admission or for graduation, and change the degrees to be awarded.

Course Numbers

The course numbering system of UAH is coded for engineering courses so
that the second digit indicates the engineering department as follows:

<table>
<thead>
<tr>
<th>Middle Digit</th>
<th>Electrical Engineering</th>
<th>Industrial and Systems Engineering</th>
<th>Fluid and Thermal Engineering</th>
<th>Engineering Mechanics</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1</td>
<td>2-3</td>
<td>4-5</td>
<td>6-7</td>
<td></td>
</tr>
</tbody>
</table>

The General Engineering courses are identified by the middle digits 8 or 9.

I. Undergraduate Program

A student may be awarded the degree of Bachelor of Science in Engineering upon successful completion of all requirements, including a minimum of 136 semester hours of course work. Each student in the Division of Engineering must assume the responsibility for registering for all required courses in their proper sequence and for fulfilling all requirements for admission and graduation. Failure to do so may extend the time required for graduation.

Requirements for an Engineering Cluster

Students in other divisions of the University who wish to prepare themselves for a full role in technological society may develop a cluster in engineering. A minimum of 21 semester hours of engineering courses should be chosen with the assistance of an engineering advisor.

Bachelor of Science in Engineering Degree Program

Freshman Year (36 Semester Hours)

<table>
<thead>
<tr>
<th>Course</th>
<th>Semester Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry (CH 105, 121, 122)</td>
<td>6</td>
</tr>
<tr>
<td>English Composition (EH 101, 102)</td>
<td>6</td>
</tr>
<tr>
<td>Calculus and Analytic Geometry (MA 153, 154, 233)</td>
<td>9</td>
</tr>
<tr>
<td>General Physics (PH 101, 102)</td>
<td>8</td>
</tr>
<tr>
<td>Engineering Graphics (EG 198)</td>
<td>2</td>
</tr>
<tr>
<td>Freshman Seminar (EG 195)</td>
<td>1</td>
</tr>
<tr>
<td>Statics (EG 171)</td>
<td>2</td>
</tr>
<tr>
<td>Fortran Programming (EG 196)</td>
<td>2</td>
</tr>
</tbody>
</table>

Sophomore--Junior--Senior Years (104 Semester Hours)

A. Core Program (66 Semester Hours)

English:

<table>
<thead>
<tr>
<th>Course</th>
<th>Semester Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Literature Survey (EH 205, 206, 240, or 241)</td>
<td>3</td>
</tr>
</tbody>
</table>
Economics:
Principles of Economics (EC 142) 3

Mathematics:
Calculus and Analytic Geometry (MA 251) 3
Introduction to Differential Equations (MA 352) 3

Physics:
Electricity and Magnetism (PH 331) 3

Engineering Core Program:
Electrical Circuits I (EG 201) 3
Introduction to Industrial Management (EG 220) 3
Fluid Mechanics I (EG 242) 2
Thermodynamics I (EG 252) 2
Particle Dynamics (EG 263) 2
Mechanics of Deformable Bodies (EG 273) 3
Applied Linear Algebra (EG 281) 2
Applied Vector Analysis (EG 282) 2
Nature and Properties of Materials (EG 294) 3
Electronics and Instrumentations Laboratory (EG 301) 1
Electronics and Instrumentations (EG 311) 3
Heat Transfer (EG 344) 2
Fluid-Thermal Systems (EG 350) 2
Operational Methods in Engineering (EG 381) 2
Fluid-Thermal Laboratory I (EG 357) 1
Probability and Engineering Statistics I (EG 390) 3
Numerical Methods and Computations (EG 396) 2
Analysis and Control of Dynamical Processes (EG 487) 2
Analysis of Engineering Systems (EG 488) 3
Introduction to Engineering Design (EG 493) 2
Engineering Design (EG 494) 2

B. Engineering Options

Students are required to take 17 semester hours within their elected option. Options in Structural Engineering and Mechanical Engineering are also available. Interested students should obtain details concerning the Structural Engineering option from the Chairman of the Engineering Mechanics Department, and concerning the Mechanical Engineering option from the Director of the Division of Engineering.

Computer Systems Option:
Computers and Programming (CS/MA 212) 3
Digital Computer Systems (EG 308) 3
Switching Theory (EG 309) 3
Introduction to Digital Computer Design (EG 415) 3
Machine and Assembly Language Programming (EG 511) 3
Compiler Construction (EG 512) 3

Electrical Engineering:
- Electrical Engineering Laboratory (EG 304) 1
- Electrical Circuits II (EG 313) 3
- Electronics I (EG 316) 2
- Electrical Networks Laboratory (EG 404) 1
- Electronics Laboratory (EG 406) 1
- Electromagnetic Waves (EG 407) 3
- Electrical Networks (EG 414) 3
- Electronics II (EG 416) 3

Environmental Engineering:
- Engineering Economy (EG 321) 3
- Fluid-Thermal Laboratory II (EG 359) 1
- Introduction to Transport Phenomena (EG 442) 3
- Environmental Control (EG 450) 3
- Systems Analysis (EG 422) 2
- Elective in Environmental Engineering (EG 441, 352, 394, 458) 5
(Course selection requires the assistance and approval of an engineering counselor)

Industrial and Systems Engineering:
- Engineering Economy (EG 321) 3
- Probability and Engineering Statistics II (EG 421) 3
- Systems Analysis (EG 422) 2
- Management Systems Analysis (EG 427) 3
- Introduction to Human Factors Engineering (EG 524) 3
- Operations Research I (EG 525) 3

Fluid and Thermal Engineering:
- Thermodynamics II (EG 352) 3
- Fluid-Thermal Laboratory II (EG 359) 1
- Fluid Mechanics II (EG 441) 3
- Introduction to Transport Phenomena (EG 442) 3
- Fluid-Thermal Laboratory III (EG 458) 1
- Elective in Fluid and Thermal Engineering (EG 443, 444, 445, 450, 452) 5

Engineering Mechanics:
- Rigid Body Dynamics (EG 264) 2
- Fluid Mechanics II (EG 441) 3
- Applied Dynamics (EG 463) 3
- Intermediate Mechanics of Solids and Structures (EG 470) 3
- Methods and Applications in Mechanics (EG 492) 3
- Vibrations of Elastic Systems (EG 561) 3
C. Approved Technical Electives

Selection of 6 semester hours of technical electives should be made with the assistance of an engineering counselor and should complement the area of professional specialization chosen. These electives should clearly support the student's aims and goals. Such elective courses must be numbered 300 or above and have the approval of the Director of the Division of Engineering.

D. Electives in Humanistic-Social Studies

Engineering students are required to take 6 semester hours of courses in the humanities: art, literature, history, music, or philosophy, and 6 semester hours of courses in the social sciences: sociology, psychology, political science, geography, or economics.

Courses should be elected to fulfill an objective appropriate to the engineering profession. Courses treating subjects such as accounting, industrial management, finance, personnel administration, introductory language and ROTC normally do not fulfill this objective regardless of their general value in the total engineering curriculum.

E. Free Electives

In general, for 3 semester hours of free elective credit, the student may choose any course offered by UAH in which the subject matter does not duplicate the same or a lower level of courses in his program.

II. Graduate Study

The Division of Engineering offers programs leading to the degree of Master of Science in Engineering, Master of Science in Operations Research, and Doctor of Philosophy. Specializations for the MSE and Ph.D. are in the following areas:
- Electromagnetic Fields
- Network Theory
- Communications and Information Theory
- Digital and Analog Computer Engineering
- Control Sciences
- Human Factors Engineering
- Management Control Sciences
- Operations Research
- Heat and Mass Transfer
- Thermodynamics
- Fluid Mechanics
- Aerodynamics
Environmental Engineering
Astro-Geophysical Fluid Mechanics
Solid Mechanics
Dynamics and Vibrations

Graduate work in the Division of Engineering is administered jointly by
the Division of Graduate Programs and Research and the Division of
Engineering. Applicants desiring to pursue graduate work in engineering
should apply for admission to the UAH Graduate Office.

For admission to graduate study in the Division of Engineering, a student
is required (1) to have earned a "B" average (2.0 out of a possible 3.0) in
all undergraduate work attempted as well as in all engineering courses
attempted, (2) to have scored at least 1000 on the aptitude portion of the
GRE, and (3) to have received a baccalaureate degree in a curriculum
which was accredited by the Engineers' Council for Professional
Development at the time the degree was conferred.

Probationary admission may be granted to other students who have
baccalaureate degrees and who are considered, after an individual
examination of quantity and quality of their work, to be properly
prepared and capable of successfully pursuing graduate work toward an
acceptable graduate objective. Students admitted probationary are
required to maintain a "B" average on their first twelve semester hours of
graduate course work (and to remove any other conditions imposed at the
time of initial enrollment) in order to be allowed to continue graduate
study.

Applicants for admission to graduate study in engineering are required to
take the Advanced Engineering portion of the GRE, the results of which
will be considered in determining the qualification of the student to
pursue successfully a program of graduate study.

Students who are admitted to the University as Irregular Post Graduates
but who have been denied admission to the Graduate School because of a
deficiency in quality point average (OPA) and/or GRE score may be
reconsidered for graduate admission provided they are otherwise eligible
to pursue a particular engineering discipline. In order to be reconsidered
they must successfully complete 12 hours of courses numbered 500 or
above in engineering, mathematics, physics, chemistry or biology with a
OPA exceeding 2.0 on the work undertaken.

Upon admission to graduate study by the Dean of Graduate Programs and
Research, the student will be referred to the appropriate department
chairman. A supervisory committee, which usually is, but does not have
to be, the same as the final examining committee should be appointed
after the student has completed 12 semester hours.
General Requirements for the Master’s Degree

In addition to the requirements for all Masters degrees specified by the Division of Graduate Programs and Research, the following general requirements for the Master’s degree are specified by the Division of Engineering.

1. Average grade on the courses numbered 600 or above cannot be less than “B”.

2. Engineering courses numbered between 500 and 599 may be taken for graduate credit with prior approval of such courses on the student’s plan of study. Graduate students will be required to do extra work of appropriate nature in 500 level courses. A minimum grade of “B” must be attained in each engineering course designated by a number less than 600.

3. Graduate Seminars are required; EG 695 during the first 12 semester hours of the program of study and EG 795 during the active work on the thesis (Plan One) or the required paper (Plan Two).

4. All courses are selected by the student with the counsel of the adviser and are subject to approval by the appropriate department chairman, the Division Director, and the Graduate School. Additional course work may be required to correct deficiencies in undergraduate subjects.

Special Requirements for the MSE Degree

Basic Program of Study

The Basic Program of Study, common to both Plan One and Plan Two, contains a minimum of 24 semester hours of graduate level course work, which must include:

(a) 6 hours of courses (600 or above) in the primary engineering discipline.

(b) 6 hours of courses in a second approved engineering area of specialization, physics, chemistry, or biology.

(c) 6 hours of approved electives, chosen in support of the primary area of specialization.

(d) 6 hours of courses in mathematics beyond Differential Equations.

With prior approval, up to 12 hours of courses numbered 500-599 may be taken in fulfillment of these requirements.

Plan One

Students selecting the master’s degree program Plan One must:
(a) Successfully complete an approved Basic Program of Study.
(b) Complete an acceptable thesis.
(c) Pass a comprehensive final examination.

Plan Two

Students planning to complete the master's degree requirements under Plan Two must:
(a) Be admitted to the Plan Two program.
(b) Successfully complete an approved Basic Program of Study.
(c) Successfully complete an approved extended program of study consisting of a minimum of 9 semester hours of courses numbered 600 or above, and submit an acceptable paper on the student's independent work.
(d) Pass a comprehensive final examination.

Detailed instruction governing Plan One and Plan Two should be obtained from the Chairman of the primary engineering department before entering the Basic Program of Study.

Special Requirements for the MSOR Degree

The Master of Science in Operations Research (MSOR) is a degree program designed primarily for graduate students with non-engineering undergraduate degrees. Operations Research is characterized by the solution of real-world problems through the application of diverse methods, techniques, tools, and algorithms. The MSOR program is concerned with optimization, stochastic systems analysis, and operations research applications. Areas of application include large scale systems analysis, the analysis of urban and socio-economic systems, and the management sciences.

Admission to the Program

The requirements for admission to this program shall conform to the policies of the Graduate Division of the University. In addition the following prerequisites will be required:
1. A minimum score of 500 on the quantitative portion of the general Graduate Record Examination.
2. Mathematics through the calculus (MA 251).
3. Six hours of either applied or mathematical statistics.

Program of Study

The Program of Study contains a minimum of 24 semester hours of graduate level course work, which must include:
(a) 12 semester hours of graduate credit courses in operations research, including EG 525, 625, and 629.
(b) 6 hours of courses in an approved minor area.
(c) 6 hours in mathematics.
(d) an acceptable thesis.

Detailed information governing the MSOR Program should be obtained from the Chairman of the Industrial and Systems Engineering Department.

Requirements for the Ph.D. Degree

The degree of Doctor of Philosophy offered in the Division of Engineering is granted on the basis of general scholarly proficiency, distinctive achievement in a special field, and demonstrated ability to do independent, original investigation. These attributes are tested in comprehensive examinations 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 the essential considerations in awarding the Ph.D. degree.

In addition to the minimum requirements of the Graduate School for the granting of all graduate degrees, some special minimum requirements must be met by doctoral students in engineering. These are set forth below:

Admission to the Ph.D. Degree Program

Admission to the Ph.D. program is separate from admission to the Graduate School, even though a candidate must be admitted to Graduate School before being admitted to the program. Admission is limited to those whose backgrounds show distinct promise of success in the program.

Examinations

A student must pass three examinations before being awarded the degree. They are:

1. The Preliminary Examination (or entrance examination) is a written test of the student’s capability to successfully pursue the Ph.D. and aids in developing a program of study appropriate for the student. The examination may be taken at any time after the accumulation of at least 24 semester hours of graduate work and will be administered by the student’s temporary advisory committee. If the student fails this examination, upon the recommendation of the temporary advisory committee and the approval of the Graduate School, the student may repeat the examination after a time lapse of at least three months. The examination may not be taken more than twice.

2. The Qualifying Examination (or comprehensive examination) is a
written and/or oral test of the student's knowledge in the major and minor fields of study and will be administered by the applying student's advisory committee. An applicant must pass this examination in order to be admitted to candidacy for the Ph.D. degree. The following conditions must be satisfied prior to taking the examination: (1) foreign language requirements, (2) basic program of study, (3) at least 18 hours of course work in residence at UAH subsequent to passing the Preliminary Examination, and (4) considered by the advisory committee to be adequately prepared in his major and minor fields.

3. The Final Examination (or dissertation examination) will primarily concern the research work that is embodied in the candidate's dissertation and will be taken after the dissertation has been approved by the advisory committee.

Major and Minor Subjects

A defined major subject or field of specialization is required of all candidates for the Ph.D. degree. The candidate must also have at least two minor subjects that will be chosen with the approval of the candidate's advisory committee. One of the minors must be in mathematics.

All students must complete at least 60 semester hours of graduate course work. A minimum of 18 semester hours of course work must be within a defined major and a total of at least 33 semester hours of work within related departments including credits for the major. A minimum of 15 semester hours of work is required for the first minor, and a minimum of 12 semester hours for the second.

Program of Study

The student should prepare as early as possible after the successful completion of the Preliminary Examination an outline of the program of study. The general requirements for the Master's degree as stated under 1) and 2) must be satisfied. This outline must be approved by the student's advisory committee and the Dean of Graduate Programs and Research.

Transfer of Credits

Credits from other recognized institutions may be applied to the student's program of study if so approved by the student's advisory committee and by the Graduate School. These credits will generally not be evaluated until the student has been in residence study at UAH for at least one term and has passed the Preliminary Examination.

Advisory Committees

A temporary advisory committee appointed by the Dean of the Graduate
School shall direct the student's work until the Preliminary Examination is successfully completed. Thereafter the student shall immediately choose an advisory committee, subject to the acceptance of the faculty members so chosen, and the approval of the Division of Engineering and the Graduate School. This committee shall consist of at least five members of the Graduate Faculty--three representing the major field of study and one from each of the minor fields. The committee chairman must be a permanent faculty member.

Admission to Candidacy for the Degree

A student should apply for admission to candidacy for the Ph.D. degree after passing the Qualifying Examination and obtaining approval of the dissertation subject from his advisory committee. The student must be admitted to candidacy at least six months before the degree is awarded.

Residence Requirements

The minimum period in which the doctoral degree can be earned is three full academic years in graduate study or their equivalent. The student must complete a minimum of 24 semester hours of graduate work in three consecutive terms during the second and/or third year of graduate study in the Graduate School at UAH. Half-time graduate assistants are required to complete a minimum of 18 hours of graduate work in three consecutive terms.

Language Requirements

The student must satisfy the language requirement prior to applying for permission to take the Qualifying Examination in one of the ways specified by the Graduate School language requirements or by demonstrating, during graduate study, a knowledge of only one language by obtaining a "B" average in a four-course sequence of college-level courses in that language.

Dissertation Registration

Students must register for a minimum of 18 semester hours of dissertation during the time period they are actively conducting research and consulting their dissertation advisor.

Engineering (EG)

090 General Engineering Review. No credit.
A refresher course designed to re-acquaint students with the technical portion of the first two to three years of the basic engineering curriculum. Covers mathematics through calculus, physics, chemistry, electricity, thermodynamics, statics, kinetics, strength of materials, fluid mechanics, and
engineering economics. Prepares students for EIT and GRE tests.

097 Engineering Drawing. No credit.
Instruction and practice in the graphical representation of objects, using both mechanical and freehand techniques, with emphasis on the principles involved and their use in design. Topics include: isometric and oblique pictorial views; multiview projection on principal and auxiliary planes; dimensioning; fits and tolerances; detail and assembly working drawings. Prerequisite or parallel: MA 153 or evidence of previous instruction in mechanical drawing.

171 Statics. 2 hrs.
A study of forces and couples and the resultants of force systems, free-body-diagrams, equilibrium, problems involving friction centroids and moments of inertia. Prerequisite or parallel: MA 154.

190 COBOL Programming. 2 hrs.
A course for business oriented computer languages with emphasis on COBOL. Applications to business problems. Prerequisite: MA 105.

195 Freshmen Seminar. 1 hr.
Required of all Freshmen. Not open to upperclassmen.

196 FORTRAN Programming. 2 hrs.
An introduction to FORTRAN programming for solving scientific problems. The course includes the basic concepts of digital computation, algorithms, flow charting. Practice in solving problems on the University computer is included. No credit to students who have completed MA/CS 113. Prerequisite: MA 133.

197 Industrial Illustration. 2 hrs.
Deals with technical illustrations, problems, and techniques for engineering communication and pictorial representation. Problems involving lettering, layouts, shading, pictorial views, exploded views, cut away sections, freehand sketching, auxiliaries, rendering and advertising layout, and perspective. (Credit not applicable toward engineering degree.)

198 Engineering Graphics. 2 hrs.
The graphical solution of problems involving the location and relationship of points, lines, planes, and surfaces of revolution by the Mongean and direct methods. Prerequisite: EG 097 or placement test.

201 Electrical Circuits I. 3 hrs.
Electric and magnetic circuit concepts; transient and steady-state solution of simple circuits. Phasor analysis of ac circuits, and network theorems. Prerequisite: EG 196, 281, PH 102.

220 Introduction to Industrial Management. 3 hrs.
A comprehensive introduction to the industrial organization, its structure, environment, functions and systems as well as to industrial engineering, its role and methods. Includes time and motion laboratory work. (Not open to Seniors.)

242 Fluid Mechanics I. 2 hrs.
Properties of fluids and fundamental principles governing fluid motion, including fluid statics, conservation of mass, momentum and energy with applications to pipe and channel flows of incompressible fluids. Prerequisites: EG 263, MA 251.

252 Thermodynamics I. 2 hrs.
Properties of matter, state-variables, fluid processes, first and second laws with
applications to closed systems. Prerequisite: MA 251.

263 Particle Dynamics. 2 hrs.
Kinematics of a particle, Newton’s laws, linear and angular momentum, work and energy, conservation laws, relative motion. Laboratory experiments and demonstrations are required. Prerequisite: EG 171 or parallel, MA 233.

264 Rigid Body Dynamics. 2 hrs.
Kinematics and kinetics of rigid body motions in the plane and in space. Euler’s equations, applications to gyroscopic motion. Laboratory experiments included with lectures. Prerequisite: EG 263 or parallel, MA 251.

273 Mechanics of Deformable Bodies. 3 hrs.
A study of the kinematics and dynamics of continuous media, and mechanical behavior of solids with applications to fundamental problems of extension, torsion, flexure and buckling of bars. Laboratory experiments and demonstrations involving basic problems in structural behavior and mechanical materials properties are included with the lectures. Prerequisite: EG 171, MA 251.

281 Applied Linear Algebra. 2 hrs.
Introduction to the algebra of matrices and n-dimensional linear spaces, forms, mappings, transformations and invariants, and applications. Prerequisite: MA 251.

282 Applied Vector Analysis. 2 hrs.
Introduction to vector field theory, line and surface integrals, theorems of Green, Gauss and Stokes. Complex analytic functions, conformal mappings, and residues. Prerequisite: EG 281.

An introductory course covering the structure of matter; basic concepts of phase transformations; mechanical electrical, magnetic, and thermal properties; and corrosion. Approximately 1 semester hour of course work is devoted to laboratory experiments and 2 hours to lecture. Prerequisite: CH 122, PH 102.

301 Electronics and Instrumentations Laboratory. 1 hr.
Experiments related to the basic types of electronic instrumentation and experiments on analog computers. Prerequisite or parallel: EG 311.

302 Elements of Computers and Programming. 3 hrs.
Components of Digital Computer; Number and character representation codes; error detection. Machine dependent FORTRAN coding. Absolute and assembly language programming, pseudo operations, macros and buffering; communication between operating system and user program. Prerequisites: EG 190 or EG 196 and junior standing.

304 Electrical Engineering Laboratory. 1 hr.
Experiments and reports related to electrical and electronic circuits and to apply and verify the principles presented in EG 313 and 316. Prerequisite: EG 301 and parallel with EG 313, 316.

307 Electricity and Magnetism (See PH 331). 3 hrs.
Basic concepts of electrostatics, electric potential theory, electric fields and currents, fields of moving charge including relativistic treatment, magnetic fields, Maxwell's Equations. Prerequisite: EG 263, 282, PH 102.

308 Digital Computer Systems. 3 hrs.
Two pass assembler, relocatable leader; computer arithmetic. Components of
central processing units and program execution; types of computer memories. Interfacing of input-output equipment, sequential access devices, direct access devices. Examination of the architecture of some specific computers. Prerequisite: CS/MA 212 (CS/MA 214 is a desirable prerequisite for non-engineering students. Same as CS/EG 308).

309 Switching Theory. 3 hrs.
Techniques for the analysis and design of combinational and sequential switching networks; Boolean algebra, elements of code theory; minimum complexity combinational networks; threshold logic; functional decomposition; minimum complexity sequential networks; asynchronous sequential networks. Prerequisite: EG 308. (Same as CS/EG 309).

311 Electronics and Instrumentations. 3 hrs.
A study of electronic devices such as solid state and vacuum diodes, triodes and transistors, amplifiers, rectifiers, voltmeters, ammeters, display devices, simple instrumentation systems, and introduction to analog computers. Prerequisite: EG 201.

313 Electrical Circuits II. 3 hrs.
Basic concepts of network topology and analysis; steady-state response to sinusoidal driving functions, resonance, transfer functions, ideal transformers, network theories. Prerequisite: EG 381.

316 Electronics I. 2 hrs.
Graphical and small signal analysis of electronic devices; piecewise linear models; rectifiers and power supplies. Prerequisite: EG 311.

319 Introduction to Digital Computer Systems. 3 hrs.
Two pass assembler, relocatable loader; computer arithmetic. Components of central processing units and program execution; types of computer memories. Interfacing of input-output equipment, sequential access devices, direct access-devices. Examination of the architecture of some specific computers. Prerequisite: EG 302.

321 Engineering Economy. 3 hrs.
Deals with economic evaluation of engineering alternatives. Topics include interest, depreciation, time-value of investments, learning curves, and replacement analysis. Prerequisite: EC 142, MA 233.

344 Heat Transfer. 2 hrs.
Basic principles of heat transfer and applications to problems of conduction and radiation; introduction to convective heat transfer. Prerequisites: EG 252, MA 251.

350 Fluid-Thermal Systems. 2 hrs.
Analyses of fluid and thermal systems utilizing the basic principles of thermodynamics and fluid mechanics along with the control volume concept. Applications from environmental control, power and refrigeration cycles, and compressible flow through nozzles and turbo-machinery. Prerequisites: EG 242, EG 252.

352 Thermodynamics II. 3 hrs.
Irreversibility, availability, chemical reactions, phase and chemical equilibrium. Basic relationships among properties. Prerequisite: EG 350.

357 Fluid-Thermal Laboratory. 1 hr.
Use of techniques and instrumentation for experimental verification of fundamental principles of thermodynamics, fluid mechanics and heat
transfer. Prerequisites: EG 242, EG 252. Parallel: EG 344.

359 Fluid-Thermal Laboratory II. 1 hr.
Continuation of EG 357 with in-depth experimentation and analysis. Experiments include determination of thermodynamic and transport properties, verification of gas laws, and the demonstration of conservation principles and similitude. Prerequisite: EG 357.

381 Operational Methods in Engineering. 2 hrs.
A study of Fourier Series, Fourier and Laplace transforms with emphasis on their physical interpretation. Prerequisite: EG 201, 282.

An introduction to probability theory, estimation, sampling, and hypothesis testing. Prerequisite or parallel: MA 251.

394 Meteorology. 3 hrs.
Factors that govern weather conditions; physical properties and dynamics of the atmosphere; weather forecasting, meteorological factors affecting the design and operation of aircraft; weather research. Prerequisite: Approval of instructor.
396 Numerical Methods and Computations. 2 hrs.
Introduction to numerical techniques frequently associated with complex problems. In particular, emphasis is placed on evaluation of functions, finding roots of equations, solution of simultaneous algebraic equations and differential equations. Use of the University computer is included. Prerequisite: EG 196 and parallel to MA 352.

404 Electrical Networks Laboratory. 1 hr.
Experiments, problems, and reports to apply and verify the principles presented in EG 381 and 414. Prerequisite or parallel: EG 414.

406 Electronics Laboratory. 1 hr.
Experiments and reports on the theory of operation pertaining to various electronic circuits, such as amplifiers, oscillators, modulation, demodulation and switching circuits. Prerequisite or parallel: EG 416.

407 Electromagnetic Waves. 3 hrs.
Maxwell's equations, theory of transmission lines, matching; Smith chart, waveguides, microwave cavities, and wave propagation. Prerequisite: EG 307 (PH 331).

411 Electrical Machinery I. 3 hrs.
Energy storage and transfer in linear coupled systems; introduction to elementary transducers and rotating machines. Prerequisite: EG 313.

414 Electrical Networks. 3 hrs.
Driving point and transfer functions, frequency response of networks; Bode plots; introduction to filter theory. Prerequisite: EG 304, 313.

415 Introduction to Digital Computer Design. 2 hrs.
Logic and electronic design of functional digital units, design of computer subsystems, flow of information and logical flow diagrams in timing and control; design of memory, arithmetic, and I/O units; binary and decimal machine arithmetic; design of a digital computer. Prerequisite or parallel: EG 309. (Same as CS/EG 415).

416 Electronics II. 3 hrs.
Multistage active circuits; impulse and step function response; frequency response; tuned-coupled stages, feedback and oscillators. Prerequisite: EG 304, 313, 316.

418 Transistor Circuits. 3 hrs.
Characteristics and equivalent circuit representations of semiconductor devices. Applications of equivalent circuits in the analysis of various transistor applications. Prerequisite: EG 316.

421 Probability and Engineering Statistics II. 3 hrs.
A continuation of EG 390 with emphasis on analysis of variance, regression analysis, correlation, and non-parametric statistics. Includes computer solution of large scale problems. Prerequisite: EG 390.

422 Systems Analysis. 2 hrs.
An introduction to the philosophy and methods of organization, industrial and urban systems analysis. A systems approach to such complex problems as pollution, transportation, and urban decay is discussed. Methods of formulating such problems, identifying relevant factors, methods of simplification and provision of control and information feedback are presented and illustrated. A group design project is required. Prerequisite: MA 251 and senior standing.
427 Management Systems Analysis. 3 hrs.
A systems approach to the study of formal organizations. Presents analytical techniques for making decisions about organizational design. Prerequisite: EG 220, 390.

441 Fluid Mechanics II. 3 hrs.
Study of the physical laws of mass, momentum and energy conservation as applied to incompressible fluid flows. Topics include streamfunctions, vorticity, potential flow, viscous flow, and flow in open channel. Prerequisite: EG 282, 341.

442 Introduction to Transport Phenomena. 3 hrs.
The study of fluid flows and processes in which molecular transport effects due to the viscosity, thermal conductivity, and mass diffusivity are important. Topics include convective heat transfer, boiling and condensation, heat exchangers, and diffusion. Prerequisite: EG 344, EG 350.

443 Applied Heat Transfer. 3 hrs.
The fundamental principles of thermodynamics and heat transfer are applied to the design of processes involving the transfer of energy by conduction, convection, and radiation. Typical applications include: heat exchangers, thermal and humidity control of spacecraft, and thermal protection systems for reentry vehicles. Prerequisite: EG 344, 441.

444 Applied Mass Transfer. 3 hrs.
Introduction to the design and analysis of processes and equipment in which mass transfer between phases is the primary objective. Typical operations include: gas absorption, fractional distillation, and liquid-liquid extraction. Typical applications include: chemical and related processes, spacecraft environmental control, and electrochemical processes. Prerequisite: EG 442.

445 Applied Aerodynamics and Propulsion. 3 hrs.
Applications of concepts and principles from fluid mechanics, thermodynamics, statics, and dynamics to the determination of the forces acting on engines and aircraft within the atmosphere, and to the resulting performance under non-oscillatory conditions. Prerequisite: EG 441.

450 Environmental Control. 3 hrs.
Engineering design and synthesis of environmental control systems: heating and air conditioning, control of multi-phase, such as air pollution, water pollution, and desalination. Prerequisite: EG 442.

452 Energy Conversion and Power Generation. 3 hrs.
Applications of theory in energy conversion and power generation to: fossil fuel steam plants, nuclear steam plants, electric generators, hydroelectric plants, MHD generators, fuel cells, Thermionic converters, internal combustion engines. Consideration of engineering design and synthesis of typical systems including power requirements and economics. Prerequisite: EG 352.

458 Fluid-Thermal Laboratory III. 1 hr.
Continuation of EG 358, dealing with more sophisticated techniques and instrumentation, applied to more complex phenomena. Completion of student conceived experiments or project is an essential part of this course. Prerequisite: EG 369. Parallel: EG 441.

463 Applied Dynamics. 3 hrs.
Applications of the principles of dynamics to various fields of engineering. Prerequisite: EG 264.
470 Intermediate Mechanics of Solids and Structures. 3 hrs.
Fundamentals of solid mechanics with applications to structures. Including inelastic behavior, theory of bars and plates, and stability. Laboratory work involving demonstrations of structural behavior through model analysis is included. Prerequisite: EG 492.

487 Analysis and Control of Dynamical Processes. 2 hrs.
A course designed to introduce the scientifically-oriented student to the "systems approach" for the study of a variety of dynamical processes found in engineering, economics, biology, sociology, psychology, etc. Problems studied include the analysis of existing systems and the problems of synthesizing closed-loop feedback controllers to achieve improved performance, stability, etc. Prerequisite: MA 251 and senior standing.

488 Analysis of Engineering Systems. 3 hrs.
Mathematical modeling of physical systems and determining their dynamic response. Mechanical, electrical, electromechanical, heat transfer, fluid-mechanical and other engineering problems are treated. Prerequisite: EG 381 and senior standing.

492 Methods and Applications in Mechanics. 3 hrs.
Application of vector analysis, tensor calculus, integral transforms, and other mathematical methods. Prerequisite: EG 264, 273, 282.

493 Introduction to Engineering Design. 2 hrs. Lab.
Study of fabricating processes; specifications and assumptions underlying engineering design. Prerequisite: Senior Standing.

494 Engineering Design. 2 hrs. Lab.
Continuation of EG 493 leading to the design of an engineering system. Prerequisite: EG 493.

496 Selected Topics in Engineering. Credit to be arranged.

502 Theory and Design of Logic Circuits. 3 hrs.
Boolean algebra; binary, reflected binary, star and Karnaugh arrays; Boolean function representation and reduction; one-to-one transformations with symmetric switching functions; subtractors, and binary order detectors; error detecting codes. Prerequisite: EG 416 or graduate standing.

503 Analog Computation. 3 hrs.
Design of an operational integrator. Analog computer solution of engineering problems represented by linear and nonlinear differential equations encountered in vibration analysis, flow problems, automatic controls, electrical network theory and concept of transfer function simulation. Laboratory Sessions. Two credit hours for lecture and one credit hour for laboratory. Prerequisites: EG 311 and 381, or Senior Standing.

504 Instrumentation. 3 hrs.
A study of measurement techniques and conventional and electronic instruments. The construction, theory of operation, and proper use of bridge circuits, oscilloscopes, transducers, etc. Prerequisite: EG 311.

505 Automatic Control Theory. 3 hrs.
An introduction to the theory common to all feedback control systems. Topics include transfer functions, stability criteria, and frequency response. Prerequisite: EG 381.

506 Communication Theory. 3 hrs.
The transmission of information, including the effects of networks,
507 Antennas. 3 hrs.

508 Ultra High Frequency Engineering. 3 hrs.
A study of high frequency transmission line charts, negative-grid triode oscillators and amplifiers at high frequencies, klystron oscillators, magnetron oscillators, rectangular wave-guides and radiating elements. Prerequisite: EG 407, 416.

511 Machine & Assembly Language Programming. 3 hrs.
Machine and assembly language programming in fixed and variable wordlength computers; techniques in addressing and machine control; data structures and data processing; use of subroutine linkages; coroutines, pushdown lists, list processing, loops and input-output subroutines; use of a macro-assembly language; sorting, merging, arrays, and data fields in data processing. Prerequisite: EG 308 or senior standing. (Same as CS/EG 511.)

512 Compiler Construction. 3 hrs.
Review of program language structures, translation, loading, execution, and storage allocation. Compilation of simple expressions and statements. Organization of a compiler including compile-time and run-time symbol tables, lexical scan, syntax scan, object code generation, error diagnostics. Use of compiler writing languages. Prerequisite: EG 511. (Same as CS/EG 512.)

516 Advanced Electronics. 3 hrs.
Non-sinusoidal generating and wave-shaping circuits, timing circuits, limiters, comparators, clamps, logic gates, multivibrators and voltage-controlled oscillators. Prerequisite: EG 406, 416.

517 Physical Electronics. 3 hrs.
Bulk properties, surfact effects, and energy band theory of solids. Theory of metal-semiconductor and p-n junctions, characteristics of junction devices such as diodes, transistors, field effect transistors, properties of metal-oxide-semiconductor (MOS). Prerequisite: EG 416.

523 Statistical Quality Control. 3 hrs.
A study of statistical theory and techniques used to control the quality of manufactured products. Prerequisite: EG 390 or AS 608.

524 Introduction to Human Factors Engineering. 3 hrs.
An introduction to the philosophy, methodology, and techniques of human engineering as related to the optimum design and analysis of man-machine systems. Includes laboratory and computer problem solution. Prerequisite: PY 100, EG 421.

525 Operations Research I. 3 hrs.
An introduction to the philosophy and methodology of operations research. Specific techniques introduced are: Linear programming, inventory control, simulation, and replacement analysis. Prerequisite: EG 390, or EG 621, or AS 608, or MA 585.

526 Design and Analysis of Experiments. 3 hrs.
Covers advanced topics in statistical experiments with emphasis on the design aspect. Topics include confounding, fractional replication, factorial and
nested designs. Prerequisite: EG 421 or 621 or AS 608.

527 Digital Simulation. 3 hrs.
Methods and procedures for digital computer simulation of complex systems. Both discrete increment and continuous time models are considered. Prerequisite: EG 196, 525.

531 Engineering Reliability. 3 hrs.
The methodology of reliability prediction including application of discrete and continuous distribution models; reliability estimation; reliability logic diagrams; life testing; and reliability demonstration. Prerequisite: EG 421.

540 Physical Properties of Fluids. 3 hrs.
Development and study of theoretical, experimental, and correlation methods for determining and predicting the thermodynamic and transport properties of various fluids. Topics include: critical properties, equations of state; vapor pressure and latent heat; heat capacity; viscosity, thermal conductivity, diffusion coefficients; phase equilibrium; heat and free energy of formation. Prerequisite: EG 342.

541 Advanced Fluid Mechanics. 3 hrs.
Development and use of the integral and differential forms of the equations of continuity, momentum, and energy to ideal fluids, viscous fluids, and compressible fluids through tensor analysis. The derivations of thermodynamics equations. Applications to one-, two-, and three-dimensional problems. General tensors and curvilinear coordinates. Prerequisite: EG 441.

542 Transport Phenomena in Environmental Engineering. 3 hrs.
Fundamental principles of fluid mechanics, thermodynamics and heat transfer are applied to the design of processes such as the control of air, water, and thermal pollutions, heat exchangers, and air conditioners. Theoretical emphasis is placed on two-phase flows. Prerequisite: EG 442.

543 Wave Phenomena in Environmental Engineering. 3 hrs.
Using principles of mass, momentum and energy conservation, propagation phenomena of acoustic waves are analyzed and methods of noise control are studied. Prerequisite: EG 442.

545 Gasdynamics. 3 hrs.
Review of the equations of mass, momentum and energy conservation, and the equations of state for ideal and real gases. Topics include normal and oblique shock waves, Prandtl-Meyer fans, acoustic waves, isentropic, isothermal, and general diabatic flows, Fanno and Rayleigh lines, Laval nozzles, exact solutions for flow over wedges and cones, and approximate methods. Prerequisite: EG 441 or 541.

559 Selected Topics in Fluid and Thermal Engineering. Credit to be arranged.

560 Intermediate Dynamics. 3 hrs.
Newtonian and Lagrangian methods applied to particles, rigid bodies, and other mechanical systems. Prerequisite: EG 264.

561 Vibrations of Elastic Systems. 3 hrs.
Dynamic response of mechanical systems: transient, oscillatory, and wave motions, flutter, and stability. Prerequisite: EG 488.

568 Dynamics of Flight. 3 hrs.
Introduction to the dynamics of flight vehicles. Equations for static and dynamic equilibrium are analyzed and the criteria for stability, controllability, and maneuverability are discussed. Fundamentals of stress and
Mathematical models using linear differential equations are emphasized. Prerequisite: EG 264, 381.

570 Mechanical Behavior of Engineering Materials. 3 hrs.
A study of the structure, properties and behavior of materials. Particular topics are structural defects and their influence on mechanical properties, point defects, dislocations and lattice imperfections in crystals, plastic deformation of single crystal and polycrystalline alloys, strengthening mechanisms and fracture. Strain rate, time to failure and cyclic life are treated from a microscopic viewpoint. Prerequisite: EG 273, 294.

571 Applied Mechanics of Solids. 3 hrs.
Analysis of stresses and strains at a point, the theories of failures, stress concentration factors, thick-walled cylinders, torsion of non-circular members, curved beams, unsymmetrical bending, and shear center. Prerequisite: EG 273.

572 Matrix Methods in Structural Mechanics. 3 hrs.
Applications of matrices to the formulation and solution of linear problems in structural mechanics. Analyses of stresses, vibrations and stability of engineering structures. Prerequisite: EG 470.

601 Transients in Linear Systems. 3 hrs.
Formulation and solution by transform methods of the differential equations of linear electrical and mechanical systems. Prerequisite: EG 414.

602 Digital Computer Design. 3 hrs.
Combination of static logic and sequential logic circuits; digital arithmetic; adders, multipliers, dividers, switching matrices, shift registers, counters, comparators. Design of a simple digital computer, a digital differential analyzer and a digital filter. Prerequisite: EG 502.

605 Control System Design. 3 hrs.
Advanced study of control system synthesis by means of feedback, feedforward, minor loop and cascade techniques. Study of system designs by analog simulation. Laboratory sessions. Two credit hours for lecture and one credit hour for laboratory. Prerequisite: EG 505.
606 Statistical Communication Theory. 3 hrs.
Introduction to generalized harmonic analysis. Includes correlation, convolution, power density spectra, etc. Probability and statistics. Correlation detection. Optimum linear filtering and prediction. Prerequisite: EG 506.

607 Information Theory. 3 hrs.
Introduction to self-information, entropy, mutual information, and channel capacity. Noiseless encoding and error detecting and correcting codes. Sampling theorem. Continuous channels. Prerequisite: EG 606.

608 Electromagnetic Field Theory I. 3 hrs.

609 Electromagnetic Field Theory II. 3 hrs.
A continuation of EG 608. Prerequisite: EG 608.

610 Selected Topics in Electrical Engineering. Credit to be arranged.

611 Antenna Theory I. 3 hrs.
The study of antennas and antenna arrays. Radiation patterns and impedance characteristics. Analysis of spheres, cylinders, horns, slots, microwave lenses, traveling-wave, and frequency independent antennas. Prerequisite: EG 608.

612 Antenna Theory II. 3 hrs.
A continuation of EG 611. Prerequisite: EG 611.

614 Network Analysis. 3 hrs.
The analysis of networks using matrix algebra, network topology, and transform methods. Network theorems, filters, and introduction to flow graphs. Prerequisite: EG 414.

615 Network Synthesis. 3 hrs.
Methods of Bott-Duffin, Brune, Cauer, Darlington, Foster, etc. studied. Filter synthesis with Butterworth and Tschebycheff functions. Realizability of networks. Prerequisite: EG 614.

617 Solid State Electronics. 3 hrs.
Introduction to solid state theory as pertaining to solid state devices, their design and application in electronic circuits. Prerequisite: EG 517.

618 Microwave Techniques. 3 hrs.

619 Advanced Linear Control Theory. 3 hrs.
Modern techniques for the analysis and design of linear control systems. Matrix formulation, multivariable control systems, state variable concepts. Linear transformations, controllability, observability, discrete-time systems. Prerequisite: EG 605.

620 Concepts of Industrial Management I. 3 hrs.
A study of the principles of the executive process in industrial organizations. Emphasis upon the basic management functions, scientific management, planning, directing, controlling, and decision making, as they relate to the management of industrial organizations. Prerequisite: Graduate standing.
621 Statistical Methods for Engineers. 3 hrs.
Designed to introduce graduate students to the applications of probability and statistics useful in research work. Includes descriptive statistics, theoretical distribution functions, point and interval estimation, tests of hypotheses, linear regression, and analysis of variance. Not open to students who have taken EG 390 or 421. Prerequisite: MA 251 and graduate standing.

622 Research and Development Management. 3 hrs.
Deals with those problems which are unique to the management of organizations engaged in R&D activities. Topics discussed include management control systems for R&D projects, motivation of technical personnel, problems of managing the creative person, means of increasing creativity, and the management of change. Prerequisite: EG 620.

623 Advanced Engineering Economy. 3 hrs.
Mathematical models for expenditure analysis under uncertainty. Relationship between investment decision criteria and microeconomic theory. Capital planning and budgeting. Decision involving expansion, acquisitions, replacement, and disinvestment. Prerequisite: EG 321, EG 421, EG 525.

624 Advanced Human Factors Engineering. 3 hrs.
Design, analyses and evaluation of man-machine systems. Included are considerations of work space, environment, anthropometrics and simulation as related to optimization of man-system performance. Prerequisite: EG 524.

625 Operations Research II. 3 hrs.
A continuation of EG 525 with emphasis on an introduction to: queueing theory, theory of games; Markov processes, sequencing and coordination problems, and special topics in mathematical programming. A team project is also required. Prerequisite: EG 421, 525.
627 Introduction to Systems Engineering. 3 hrs.
The analysis and design of special purpose operational, procedural and hardware systems. General theories for the analysis of complex systems from both the Macro and Micro-viewpoints will be considered. Prerequisite: EG 505 or 506 or 525.

628 Concepts of Industrial Management II. 3 hrs.
Deals with the organizational and human relations aspects of industrial management. Formal and informal organizations, job satisfaction, motivation of employees, manager-employee relations, social behavior in the work situation and executive management functions as they influence the design and implementation of management systems. Prerequisite: EG 620.

629 Optimization Methods in Operations Research. 3 hrs.
A presentation of specialized techniques and recent advances in optimal seeking methods in operations research with special emphasis on search and quasi-enumerative methodology. Topics include search techniques, quasi-enumerative techniques, heuristic programming, and geometric programming. Prerequisite: EG 525.

631 Management Information Systems. 3 hrs.
Introduction to the design of integrated information systems necessary for effective management. Includes the methods of systems design, the basic concepts of computer processing systems, the design of management information procedures and reports, and their application to mechanized and electronic data processing equipment. Prerequisite: EG 190 or 196.

632 Stochastic Systems. 3 hrs.
Analysis of processes whose outputs are governed by probabilistic laws. Included are Gaussian processes, processes with correlated and uncorrelated variables, Markov processes, and others. Prerequisite: EG 421, 525.

633 Industrial Forecasting and Analysis. 3 hrs.
A study of industrial forecasting and smoothing. Topics covered include multivariate analysis, regression, correlation, spectrum and time series analysis, and their applications to industrial problems. Prerequisite: EG 526 or 621 or AS 608.

634 Value and Decision Theory. 3 hrs.
A mathematical development of the decision making process. Statistical decision theory and game theory applied to decision making under risk and uncertainty. Consideration of utility, benefit functions, opportunity loss and the value of additional information. Prerequisite: EG 525.

635 Linear Programming. 3 hrs.
The application of linear programming to complex allocation problems. Methods for determining the maximum or minimum or objective functions whose variables are subject to constraints. Topics include simplex method, degeneracy, modified simplex, transportation problems, network flows, and sensitivity analysis. Prerequisite: EG 525.

637 Dynamic Programming. 3 hrs.
A unified treatment of optimization problems arising in the study of multistage processes. Topics covered include the development of dynamic programming principles, (deterministic and stochastic), discrete maximum principle and some well known search techniques to reduce dimensionality and computational requirements. Prerequisites: EG 196, 525.

639 Selected Topics in Industrial & Systems Engineering. Credit to be arranged.
640 Compressible Fluid Flow. 3 hrs.
A unified treatment of subsonic, transonic and supersonic flows. Included are compressible potential flows; elliptic, parabolic, and hyperbolic equations; characteristics, perturbation theory, similarity rules and hodograph methods. Prerequisite: EG 545.

641 Fundamentals of Thermodynamics I. 3 hrs.
Properties of thermodynamic systems: reduced equations of state; degenerate gases, equilibrium, third law. Magnetic and electric phenomena. Prerequisite: EG 342.

642 Fundamentals of Thermodynamics II. 3 hrs.
A continuation of EG 641. Prerequisite: EG 641.

643 Convection Heat Transfer. 3 hrs.
Analysis of convection problems; boundary layer theory; laminar and turbulent flow. Boiling, condensation. Prerequisite: EG 343, 541.

644 Pollution and Perturbation of Environmental Systems. 3 hrs.
Applied use of renewable material resources. Emphasis will be on biotic problems of land, air, and water management; pollution, pollution types, population increase, multiple-use concept, land ethics, and monitoring. Prerequisite: EG 544.

645 Propulsion. 3 hrs.
Aerothermodynamics of rocket propulsion systems; rocket propellants and combustion; heat transfer and cooling problems. Application to ramjets and hybrid systems. Prerequisite: EG 545.

646 Hydrodynamics. 3 hrs.
Study of potential flow in two and three dimensions, Eulerian and Lagrangian formulations, potential and stream functions, vorticity; Laplace's equation, singularities and distributions of singularities, complex potential, conformal mapping. Prerequisite: EG 541 and a course in vector calculus.

647 Radiation Heat Transfer. 3 hrs.
648 Heat Conduction in Solids. 3 hrs.

649 Transport Phenomena. 3 hrs.
Mass, energy, and momentum transport in steady and transient motions in real and rheological substances. Prerequisite: EG 343 or 441 or approval of instructor.

650 Cryogenics. 3 hrs.
Study of the thermodynamics of low pressure and low temperature systems: measuring devices, materials, and techniques of handling low temperature, low pressure systems. Prerequisite: EG 342.

651 Direct Conversion of Energy. 3 hrs.
The analysis and study of systems for the direct conversion of heat to electricity including thermionic, magneto-hydrodynamic, fuel cells, and semiconductor devices. Prerequisite: EG 641.

652 Introduction to Air Pollution Control. 3 hrs.
An introduction to the technology of air pollution dealing with air pollutants, effects, sources, combustion processes, and abatement and control technology. Engineering contributions to both the problems and its solution. Nature of the air pollution problem and fundamental technological approaches to its solution. Prerequisite: graduate standing.

658 Dimensional Analysis. 3 hrs.
Nature and use of dimensions; principles of dimensional analysis; systematic calculation of dimensionless products; algebraic theory of dimensional analysis, similarity and model testing; applications to problems of stress and strain, dynamics, fluid mechanics, theory of heat, and electrical phenomena; differential equations and similarity. Prerequisite: MA 353.

695 Selected Topics in Fluid and Thermal Engineering. Credit to be arranged.

660 Theory of Vibrations. 3 hrs.

661 Advanced Dynamics. 3 hrs.
Special theory of relativity, Hamilton's equations, canonical transformations, Hamilton-Jacobi theory. Lagrangian and Hamiltonian formulation for continuous systems. Prerequisite: EG 560, 692.

663 Astrodynamics. 3 hrs.
Introduction to astronomical coordinates and time systems; the many-body problems and disturbing functions. Study of general perturbation theories, special perturbation methods and application of classical mechanics and Hamilton-Jacobi method to orbital mechanics. Prerequisite: EG 560.

664 Space Trajectories and Guidance. 3 hrs.
Study of trajectories and missions for space flight, optimal orbit transfer by velocity impulses and powered-flight guidance. Fundamental theories of celestial navigation and interplanetary guidance. Prerequisite: EG 560.

665 Aeroelasticity. 3 hrs.
Deformation of aircraft structures under static and dynamic loads. The effects of the air loads developed by incompressible flow on static aeroelastic
phenomena and flutter are analyzed. Prerequisite: EG 541, 560.

671 Mechanics of Deformable Solids. 3 hrs.
The fundamentals of solid mechanics with applications to important structural problems. Topics include: the concepts and analysis of strain and stress, the constitutive equations of elastic, plastic, and viscoelastic materials, energy and stability concepts and applications to beams and plane problems. Prerequisite: EG 273, 692.

672 Theory of Elasticity. 3 hrs.

673 Mechanics of Continuous Media. 3 hrs.
A study of the mechanics of continuous media. Kinematics, dynamics and thermodynamics are developed in generality. Constitutive equations of solids and fluids are formulated and applied to specific problems. Prerequisite: EG 541 or 671.

674 Energy Principles and Variational Methods. 3 hrs.
Concept of virtual displacements, principle of minimum potential energy, Castigliano's theorem, Hamilton's principle, and Lagrange's equations. Applications in stress analysis, elastic stability, and dynamics. Prerequisite: EG 671.

675 Photoelasticity. 3 hrs.

676 Inelastic Behavior of Materials and Structures. 3 hrs.
An introduction to the theory of constitutive equations with applications in classical viscoelasticity, thermoelasticity, and plasticity. Linear viscoelasticity, creep and relaxation phenomena; linear coupled thermoelasticity; classical theories of plasticity, kinematic hardening law, concept of stress space, limit analysis. Applications to selected boundary-value and initial-value problems. Prerequisite: EG 671.

677 Experimental Stress Analysis. 3 hrs.
Experimental methods (not including photoelasticity) used to determine stress distribution in machine and structural elements subjected to static and dynamic loadings. Theory and laboratory application of mechanical and electrical resistance strain gauges, brittle coatings, and analogies. Prerequisite: EG 571.

678 Mechanics of Flexible Bodies. 3 hrs.
A study of the approximate theories and problems of thin bodies. Theories and solutions for plates and curved rods; effects of transverse shear, large deflections and buckling. Prerequisite: EG 671.

679 Linear Analysis of Shells. 3 hrs.
Elastic membrane and bending theory of shells. Solutions for cylindrical, spherical, conical, and other types of shells by analytical and numerical methods. Prerequisite: EG 671.

680 Selected Topics in Engineering Mechanics. Credit to be arranged.

692 Graduate Engineering Analysis I. 3 hrs.
Linear algebra, linear transformations and matrices, vector analysis and
introduction to tensors; selected applications. Prerequisite: MA 244 or EG 282.

693 Graduate Engineering Analysis II. 3 hrs.
Partial differential equations, integral equations, applications and approximation. Prerequisite: EG 692.

695 Graduate Seminar I.
Preparation and presentation of papers on current topics of research and general interest in engineering. To be taken no later than the term preceding registration for the 13th hour of the student's program and no earlier than the term in which the student is registered for the 7th hour of his graduate program.

697 Systems Programming and the Theory of Formal Languages I. 3 hrs.
The technique of constructing systems programs: supervisory programs (monitors), input-output systems, interpreters and compilers for procedure-oriented languages. Syntactic analysis and semantic interpretation of formal languages. Prerequisite: EG 692.

698 Systems Programming and the Theory of Formal Languages II. 3 hrs.
A continuation of EG 697. Prerequisite: EG 697.

700 Sampled Data Control Systems. 3 hrs.
Classical and modern methods for analysis and design of sampled data control systems: Z-transforms, transport lags, z and w plane analysis, state variables and the transition matrix. Prerequisite: EG 619.

702 Theory of Automata. 3 hrs.
Periodic automata and coding analyzed with Z-transforms and cyclotomic polynomials. Autonomous automata. Prerequisite: EG 602.

704 Nonlinear Control Systems. 3 hrs.
Classical and modern methods for the analysis and design of nonlinear automatic control systems. State variables, phase plane, limit cycles, stability, describing functions, relay control, stabilization theory. Prerequisite: EG 619.

705 Theory of Optimal Control. 3 hrs.
The general theory of optimal control of dynamic processes. Calculus of variations, Hamilton-Jacobi theory. Pontryagin's maximum principle, dynamic programming. Prerequisite: EG 619 or approval of instructor.

706 Communication Systems. 3 hrs.

710 Selected Topics in Electrical Engineering. Credit to be arranged.

715 Microwave Filter Theory. 3 hrs.

716 Plasma Dynamics I. 3 hrs.
Motion of ions and electrons, Kinetic theory, collisions, ionizations and recombination. BBGKY hierarchy. Interaction of plasma with static and slowly varying fields, gas discharges, instabilities sheath and oscillations. Prerequisite: EG 608 or approval of instructor.
717 Plasma Dynamics II. 3 hrs.

718 Advanced Topics in Servomechanisms. 3 hrs.
Advanced topics in linear, nonlinear sampled data, optimal, etc. control. Prerequisite: Approval of instructor.

719 Advanced Electromagnetic Field Theory. 3 hrs.
A study in depth of the classical theory of electricity and magnetism. Potential theory, time-varying fields, boundary-value problems, stresses, theory of relativity. Prerequisite: EG 609.

721 Advanced Statistical Applications. 3 hrs.
An extension of the application of parametric and non-parametric methods to the techniques of Discriminant Analysis, Factor Analysis, and Pattern Recognition for the discovery of system structure and function. Prerequisites: EG 526 or EG 621.

729 Nonlinear Programming. 3 hrs.
A presentation of optimal seeking algorithms in nonlinear mathematics including the algorithms of Theil and Van de Panne, Beale, Wolfe, Rosen, Houthakker, and Zoutendijk's method of feasible directions. Prerequisite: EG 629, EG 196.

735 Discrete Optimization. 3 hrs.
A study of optimal seeking methods in discrete solution space. Topics include integer and zero-one programming, cutting-plane techniques, implicit enumeration, surrogate and aggregated constraints, and deployment methods. Prerequisite: EG 635, EG 196.

739 Selected Topics in Industrial and Systems Engineering. Credit to be arranged.

741 Statistical Thermodynamics. 3 hrs.

744 Hypersonic Flow Theory. 3 hrs.
Nonlinear treatment of compressible flow; linearized theory, methods for blunt bodies, best wave theory, numerical methods and hypersonic wind tunnels. Prerequisite: EG 640.

752 Mechanics of Rarefied Gases. 3 hrs.

753 Magneto-Gas Dynamics. 3 hrs.
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. Prerequisite: EG 640 or approval of appropriate discipline chairman.

Navier-Stokes equations including several exact solutions and several approximate solutions for both small and large Reynolds numbers.
Application to laminar and turbulent flows. Introduction to approximate boundary layer methods. Prerequisite: EG 541.

756 Theory of Flow of Viscous Fluids II. 3 hrs.
Theory of convective aerodynamic heating in high speed flow, laminar, and turbulent flows: ablation, transpiration cooling, and mass transfer cooling. Includes aerodynamic heating in hypersonic flow, real gas effects, effect of pressure interactions, vorticity interactions, and heat transfer in rarefied gas flows. Prerequisite: EG 755.

757 Turbulence. 3 hrs.
Study of turbulence in gases and liquids; compressive phenomena such as interaction of shocks and boundary layers, and fluid-dynamic heating. Prerequisite: EG 756.

759 Selected Topics in Fluid and Thermal Engineering. Credit to be arranged.

760 Analytical Methods in Nonlinear Dynamics. 3 hrs.
Development of theory and applications of nonlinear vibration phenomena, transient and steady state response of nonlinear systems. Prerequisite: EG 660, 661.

762 Wave Motion of Continuous Elastic Bodies. 3 hrs.
A study of the dynamics of continuous elastic bodies. The properties of wave motion are considered while studying the motion of an elastic string. Propagation of elastic waves in infinite and semi-infinite bodies, cylinders, rods, and beams. Prerequisite: EG 660.

768 Dynamics of Aerospace Vehicles. 3 hrs.
Advanced problems in aerospace vehicle rigid body dynamics and control are studied. Statistical characteristics of vehicle responses to turbulence, trajectory computations, Euler's equations of motion for spinning vehicles, and other special problems related to satellite stabilization and control are presented. Prerequisite: EG 660.

770 Discrete Models for Nonlinear Continua. 3 hrs.
Methods for approximating continuous systems by finite systems. Particular attention is given to the finite-element approximation of continuous media. Prerequisite: EG 572, 671.

772 Theory of Structural Stability. 3 hrs.

773 Theory of Shells. 3 hrs.
The first-approximation theory of thin shells, higher approximations and transverse-shear deformations. This course emphasizes the role of geometrical nonlinearities and current problems of shell instability. Theories are illustrated by selected problems. Prerequisite: EG 678 or 679.

779 Selected Topics in Engineering Mechanics. Credit to be arranged.

795 Graduate Seminar II. 1 hr.
Preparation and presentation of papers on topics of research interest related to thesis study. Parallel to EG 799.
799 Master's Thesis. 3 hrs.
Required each term a student is working and receiving direction on his master's thesis. A minimum of two terms required for M.S. students. A maximum of 9 hours of credit is awarded upon successful completion of the master's thesis.

899 Doctoral Dissertation. 3 hrs.
Division of Nursing

The graduate of The University of Alabama in Huntsville Division of Nursing should be prepared to assume responsible citizenship and satisfying personal relationships, as well as professional nursing leadership and practice in a setting of his choice. Through a planned system of advisement, the student will develop a secondary area of concentration which will enable him to begin practice in a functional specialty. An advisor will be assigned to each student to help guide him throughout the program.

The acceleration of social and technological change in society at large is reflected in changing patterns of nursing practice. Thus a theoretically oriented curriculum has been designed to meet the individual’s goals, to prepare him to practice nursing now and in the future, and to progress to advanced study in either professional or academic graduate programs. It is believed that the student who learns to select scientific facts and theories from relevant disciplines for application to nursing practice will be able to adapt readily to changing modalities of medical and nursing practice.

A flexible program of studies encourages and provides for the student preparing to enter his first career; and, also for the mature person seeking career change or upward mobility. The student transferring into the program in nursing has the same options of testing for credit or advanced standing as any other university student (see Information on Admissions). Only currently registered nurses will be permitted to challenge the required nursing courses: N-381; N-382; N-383; N-481; N-482; N-443; N-490. Credit for at least one-half of the major nursing courses must be taken at UAH to complete requirements for the Bachelor of Science in Nursing degree.

Program of Studies

Lower Division

<table>
<thead>
<tr>
<th>Natural Science and Mathematics</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Science (Biology, Chemistry, Physics)</td>
<td>12</td>
</tr>
<tr>
<td>Human Ecology (Physiology, Microbiology, Epidemiology, Immunology)</td>
<td>8</td>
</tr>
<tr>
<td>Statistical Concepts (A statistics course offered in any division will meet this requirement.)</td>
<td>3</td>
</tr>
</tbody>
</table>

Social and Behavioral Sciences

| Sociology and Psychology (Two courses in one of the fields and one course in the other field.) | 9 |

218
Electives

Humanities
- English Composition: 6
- Literature or History: 6
- Electives: 6

Upper Division

Nursing
- Bases of Nursing Practice: 24
- Episodic Nursing: 8
- Distributive Nursing: 8
- Nursing Functions in Delivery of Health Services: 4
- Independent Study: 4

A total of 128 semester hours of credit is required for the B.S.N. degree. Forty-eight semester hours of nursing in the upper division as specified in the Program of Studies constitutes the major area of concentration. Each student is guided by his assigned nursing faculty advisor to select a secondary area of concentration which is consistent with the student's goals and abilities. The secondary area requires 18 semester hours, of which 6 hours must be in the upper division. The secondary area of concentration may be in a single department or consist of a sequentially developed cluster of related courses. A minimum of 60 hours must be completed in the lower division before progressing into major courses in the upper division.

Nursing

381  Bases of Nursing Practice, I.  

Builds upon natural and behavioral sciences to explore theories of man's adaptive responses to threats to his health. The hospital setting provides experiences for beginning analysis and practice of communicative and motor-manipulative skills.

382  Bases of Nursing Practice, II.  

Focuses upon critical employment of the nursing process in individualized, personalized care of patients in a variety of settings which includes family health.

383  Bases of Nursing Practice, III.  

Physio-psycho-socio-pathological-assaults to man's integrity considered using
patients as exemplars. Primary, secondary, and tertiary health care analyzed and utilized as nursing intervention.

390 Independent Study.  2-4 hrs.
Individualized independent study of a specific nursing problem under the sponsorship of a nursing faculty member with special preparation in the field. Elective only.

481 Episodic Nursing.  8 hrs.
Nursing patients with complex medical, surgical and psychiatric conditions requiring episodes of hospitalization.

482 Distributive Nursing.  8 hrs.
Family focused nursing care in homes, ambulatory centers and health agencies with emphasis on maternal, child, and mental health situations.

443 Nursing Functions in Delivery of Health Services.  4 hrs.
Nursing roles and functions in systems of delivery of health services. A study of existing and emerging systems; emphasis on creating new approaches on basis of systems and organizational theories. Preceptorship included.

490 Independent Study.  4 hrs.
Student initiated, faculty guided experience or research to support selected functional role. N-443 is prerequisite or may be concurrent.
A Master’s Degree Program in Developmental Learning (DL)

A Master of Arts degree in Developmental Learning is expected to be fully implemented by September, 1973. This interdisciplinary program will prepare persons to deal with children and adults who have learning problems and to do research in human learning.

It is general enough to provide the student with opportunities to study the total developmental process and see how that process is affected by the physiological and emotional factors impinging on the human organism. When fully implemented, this program will provide for Alabama State Certification in the field of Learning Disabilities and/or Early Child Development. It can provide training for persons who wish to become remedial specialists, diagnostic and resource teachers associated with the public schools, or specialists who work with pediatricians, psychologists, ophthamologists or optometrists and who wish to direct clinical programs.

The program requires 9 credit hours in a core curriculum and 15 credit hours in a professional specialization. The candidate for this degree must also submit a thesis or take an additional 6 credit hours. Professional specializations will be offered in learning disabilities, learning theory, diagnostic procedures, and child development.

To be admitted to the graduate program in developmental learning, a student must meet the general requirements to Graduate School as indicated on page of this catalog.

Developmental Learning (DL)

The courses listed here include the cluster required for the professional specialization in learning disabilities, which will be offered during the 1972-73 school year.

601 Early Childhood Development. 3 hrs.
Provides an in-depth study of physical, psychological, and social growth, development, and maturation in early childhood. Will give particular attention to the perceptual, cognitive, and psychomotor processes that more directly affect learning and behavior. A look at normal development will precede and provide a basis for an analysis of the atypical.

602 Psychopathology of Children with Learning Problems. 3 hrs.
A comprehensive study of symptoms and learning theory as related to children with learning problems.
603 Sensory-Motor Readiness in Children. 3 hrs.
Provides an understanding of the necessary early learning processes in children from birth to six years of age. The student is presented with techniques and sequential approaches to sensory-motor training on a developmental basis.

604 Adaptive Academics. 3 hrs.
Provides students with a sequential and veridical approach to making sensory-motor adaptations in academic areas so that programs can be developed to serve individuals who can best learn through adaptive and concrete procedures of a sensory-motor nature.

625 Diagnostic Procedures I. 3 hrs.
Deals with psychometric theory and psychological tests. In first phase of the course, psychometric issues such as standardization, validity, reliability and theory of testing will be covered. In second phase, the mathematical techniques used in psychometrics such as factor analysis and trend analysis will be examined. The third phase will survey standardized tests in the areas of intelligence, psychomotor assessment, personality, etc.

626 Diagnostic Procedures II. 3 hrs.
A practicum in administration, interpretation and use of selected tests for preschool age children. A minimal level of competency will be defined which all students will be required to master.

627 Diagnostic Procedures III. 3 hrs.
An advanced practicum in administration, interpretation and use of selected tests for elementary school children. A minimal level of competency will be defined which all students will be required to master.

628 Human Learning Theory. 3 hrs.
Human Learning Theory will critically examine various approaches to the field of human learning. Description of behavioral changes commonly called "learning", as well as closely related behavioral phenomena such as transfer, retention, and stimulus generalization will be emphasized. Interrelationships between these behavioral changes and areas such as motivation, perception, personality and neurophysiology will also be considered. Examples of the applications of learning principles to the learning problems of children and adults will be studied.

629 Behavior Modification. 3 hrs.
Presents the basic psychological principles concerning the control of human behavior and reviews current theoretical and experimental research in the field of behavior modification.

630 Statistics and Methodology. 3 hrs.
Research Methodology will include an overview of experimentation, simple data presentation, normal probability vs. non-normal distributions, correlation, and reliability and validity. Will examine both the concept and actual work type situations.

640 The Family in a Changing Society. 3 hrs.
The study of the family as the primary unit of society; its major influence on the growth and development of the individual; problems and difficulties experienced in the family in a society in transition; the relationships of the family and other educational institutions of society.

644 Advanced Studies in Socialization. 3 hrs.
In-depth survey and critical analysis of comparative theories of socialization. Particular emphasis is placed on how theoretical constructs may be transformed into effective child training practices.
Computer Science

Courses in Computer Science are offered to satisfy the requirements of a cluster or specialization only. All course offerings, and sequencing of courses, is administered by the Subcommittee on Computer Programs and Courses, in lieu of a Department.

The following list of approved clusters are typical of clusters chosen by students. CS/MA 113, 212, 214, CS/EG 308 and one of the following options:

a. CS/EG 290, 300, 309 or 511
b. CS/EG 309, 511, 415 or 512.

Computer Science (CS)

CS/MA 113 Introduction to Computing. 3 hrs.
Algorithms, programs, and computers; basic programming and programming structure; programming and computer systems; debugging and verification of programs; data representation; organization and characteristics of computers; survey of computers, languages, systems, and applications; computer solution of several numerical and non-numerical problems using one or more programming languages including ANSI Fortran IV. Includes laboratory. Prerequisite: MA 105 or Level II placement in mathematics.

CS/MA 212 Computers and Programming. 3 hrs.
Computer structure, machine language, instruction execution, addressing techniques, and digital representation of data; computer systems organization, logic design, microprogramming, and interpreters; symbolic coding and assembly systems, macro definition and generation, and program segmentation and linkage; systems and utility programs, programming techniques, and recent developments in computing. Includes laboratory. Prerequisite: CS/MA 113, or EG 196 and sophomore standing.

CS/MA 214 Introduction in Discrete Structures. 3 hrs.
Review of set algebra including mappings and relations; algebraic structures including semigroups and groups; elements of the theory of directed and undirected graphs; Boolean algebra and propositional logic; applications of these structures to various areas of computer science. Prerequisite: CS/MA 113.

CS/EG 290 COBOL Programming. 3 hrs.
A course in business oriented computer languages with emphasis on COBOL; applications to business problems. Prerequisite: CS/MA 212.

CS/EG 300 Computer Applications. 3 hrs.
Third generation concepts in COBOL, Index Sequencing, Direct Access, linkage with other languages and design of applications systems. On-line commercial applications. Prerequisite: CS/EG 290.

CS/EG 308 Digital Computer Systems. 3 hrs.
Two pass assembler; relocatable loader; computer arithmetic. Components of central processing units and program execution; types of computer memories. Interfacing of input-output equipment, sequential access devices, direct access devices. Examination of the
architecture of some specific computers. Prerequisite: CS/MA 212
(CS/MA 214 is a desirable prerequisite for non-engineering students).

CS/EG 309 Switching Theory. 3 hrs.
Techniques for the analysis and design of combinational and sequential switching networks; Boolean algebra, elements of code theory; minimum complexity combinational networks; threshold logic; functional decomposition; minimum complexity sequential networks; asynchronous sequential networks. Prerequisite: CS/EG 308.

CS/EG 415 Introduction to Digital Computer Design. 3 hrs.
Logic and electronic design of functional digital units, design of computer subsystems, flow of information and logical flow diagrams in timing and control; design of memory, arithmetic, and I/O units; binary and decimal machine arithmetic; design of a digital computer. Prerequisite or parallel: CS/EG 309.

CS/EG 511 Machine and Assembly Language Programming. 3 hrs.
Machine and assembly language programming in fixed and variable wordlength computers; techniques in addressing and machine control; data structures and data processing; use of subroutine linkages; co-routines, pushdown lists, list processing, loops and input-output subroutines; use of a macro-assembly language; sorting, merging, arrays, and data fields in data processing. Prerequisite: CS/EG 308 or senior standing.

CS/EG 512 Compiler Construction. 3 hrs.
Review of program language structures, translation, loading, execution, and storage allocation. Compilation of simple expressions and statements. Organization of a compiler including compile-time and run-time symbol tables, lexical scan, syntax scan, object code generation, error diagnostics. Use of compiler writing languages. Prerequisite: CS/EG 511.

Bibliography

Courses in bibliography are offered as elective only, neither forming nor contributing to a cluster; nor do they contribute to the certification requirements for teacher-librarians. No credit toward the General Education Requirements is obtained.

Bibliography (BIB)

100 Introduction to Libraries and Bibliography. 2hrs.
Systems of library retrieval and their use; construction of bibliographies and footnotes; major reference materials and library resources of the area in various subjects.

310 Bibliography of English Philology. 1 hr.
Origin and terminology of the subject; its production and utilization of information; its reference and research materials.

345 Bibliography of the Health Sciences. 1 hr.
Origin and terminology of the subject; its production and utilization of information; its reference and research materials.
380 Bibliography of Music. 
1 hr.
Origin and terminology of the subject; its production and utilization of information; its reference and research materials.

400 Theory of Bibliographical Order. 
2 hrs.
General structures of systems of bibliographical order: hierarchical trees, "alphabetical" files, juxtaposition and syndesis, facet analysis, thesauri.
Prerequisite: BIB 100 or admission to an MLS program.

Criminal Justice

UAH has developed an undergraduate degree program that is designed to help meet the criminal justice system's critical need for well-educated professionals to fill a variety of important positions. The program is sufficiently flexible to benefit persons throughout the system. However, an emphasis has been placed on needs in police functions.

Although the program has a substantial number of professional law enforcement courses, the primary objective is to provide a general education. Today's policeman must constantly deal with problems resulting from population growth, increasing urbanization, developing technology, and civil rights revolution, and breakdown of traditional values. He must be aware of these factors and must understand the psychological and sociological implications for his community. He must deal with all of its citizens--rich and poor, young and old, of whatever cultural and ethnic backgrounds--in a manner which will maintain their confidence and support. The UAH program is designed to provide this intellectual armament.

The program, leading to a Bachelor of Arts degree, involves an Area of Concentration (AOC) with a major in the social and behavioral sciences and a cluster in law enforcement. The curriculum includes PSC 101, SOC 100, and PY 103 as foundation courses which also satisfy a portion of the General Education Requirements. An additional 33 semester hours in courses, approved by the student's advisor, are selected from disciplines in the social and behavioral sciences to complete an interdisciplinary major in Criminal Justice. This major must include at least 15 semester hours in courses numbered 300 and above. Requirements for the cluster must be met with 21 semester hours in law enforcement (LE) courses, including 6 semester hours in courses numbered 300 and above. Additional courses in the General Education Requirements and approximately 21 semester hours in electives complete the curriculum.
The graduate programs of The University of Alabama in Huntsville provide a learning experience in which the student further matures his intellectual capabilities through advanced studies. These studies are characterized by a greater degree of independence on the part of the student and at the same time a close association with one or more members of the Graduate Faculty. Only those students showing distinct promise of completing the requirements for a graduate degree are admitted to the Graduate School.

The graduate degree is based on a program of studies designed to accomplish a specific intellectual or professional goal. This program of studies should be completed by the student at the earliest appropriate time (see specific degree programs) with the counsel of his faculty advisor. The program includes advanced studies in subject matter areas, and in most cases a research phase in which the student demonstrates his capabilities for independent scholarly work.

The University of Alabama in Huntsville offers the following graduate degrees:

- Master of Administrative Science (MAS)
- Master of Arts (MA): Mathematics
- Master of Science (MS): Chemistry, Mathematics, Physics
- Master of Science in Engineering (MSE)
- Master of Science in Operations Research (MSOR)
- Doctor of Philosophy (PhD): Engineering, Physics

A Master of Arts degree in developmental learning is expected to be fully implemented during the 1972-73 school year; a limited schedule of graduate courses in education is offered also.

A person who desires to obtain graduate credits without pursuing one of the degree programs may be admitted as an unclassified student providing he meets the qualifications outlined below for regular admission.

A person previously admitted to The University of Alabama in Huntsville Graduate School to pursue a degree program offered in one division must meet current admission criteria if he wishes to change his course of study to a degree program offered in another division. (See application procedure.)

Members of the University faculty with rank above that of instructor may not pursue work toward an advanced degree at The University of Alabama in Huntsville.
Requirements for Admission

Applicants for admission to the Graduate School must hold a bachelor’s degree from The University of Alabama in Huntsville or from another approved institution. The following minimum requirements are acceptable to the Graduate Council; academic units may require higher averages. (See admission requirements listed under the academic division concerned.)

Admission

An applicant must:
1. Have a minimum quality point average of at least 2.0 (A=3.0) overall, or at least 2.0 for the last 60 hours of work, and
2. Score at least 1,000 on the aptitude portion of the Graduate Record Examination (GRE). The advanced test of the GRE in the applicant’s proposed graduate field is also required. Information concerning the GRE may be obtained from Educational Testing Service (ETS), Princeton, New Jersey. Applications may be obtained at the UAH Graduate Office.

Students applying for admission to Graduate School after the current application deadline date for the Graduate Record Examination may be admitted on a temporary probationary basis, based on a minimum score of 50 on the Miller Analogies Test. (Administered and graded locally.) The student so admitted must take the GRE when it is next offered, and meet normal entrance requirements to continue graduate study.

Probationary Admission

An applicant whose scholastic record does not fully meet the requirements for admission may, upon recommendation of the appropriate division director and with the approval of the Dean of the Graduate School, be admitted on a probationary basis provided:
1. His quality point average is at least 1.5 (A=3.0) overall or
2. His score on the aptitude portion of the GRE is at least 1,000 or
3. His quality point average on the last 60 hours is at least 2.0.

Irregular Post Graduate Status

Persons whose applications to the Graduate School have been denied on the basis of a quality point average and/or GRE score may apply to UAH for admission with irregular post graduate status. (See Admission as an IPG in the undergraduate section of this catalog.) A student admitted in this category may register in courses at UAH providing all prerequisites for the courses have been satisfactorily completed.

Upon completion of 12 or more semester hours of advanced level courses with a grade of B or better in each course, a student may reapply for
admission to the Graduate School. Evaluation of this application will include the demonstrated performance in the advanced level courses. In this case, an applicant may be admitted provisionally if acceptance is recommended by the appropriate academic division.

UAH Seniors

A UAH senior may, with permission of the Graduate Dean, pursue graduate work while completing undergraduate degree requirements if:
1. Fewer than 13 semester hours remain to be taken.
2. His overall undergraduate average or his average on the last 60 hours is at least 2.0 (B).
3. His total course load is less than 12 semester hours.

Application Procedure

Applicant must submit:
1. Completed graduate application form in duplicate.

In addition he must request that:
1. Two copies of previous academic records be sent from each institution attended to UAH Graduate Office.
2. Scores of the Graduate Record Examination (GRE) be sent to UAH Graduate Office from Educational Testing Service (ETS).
3. Three former professors (or other individuals qualified to judge competence for graduate study) submit to UAH Graduate Office completed "Evaluation of Fitness for Graduate Study Forms."

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For Further Information

Address the following offices at:
P.O. Box 1247
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Division of Graduate
Programs and Research
Division of Continuous
Education
Division of Graduate
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Division of Student Affairs
Technology; Director, Division of Continuous Education, 1961, 1970.


WITRIOL, NORMAN M., Ph.D. (Brandeis University). Lecturer in Physics, 1970.


SHAMS AVORI, ALI, B.A. (National University of Iran), Ph.D. work in Economics (Vanderbilt University). Lecturer in Economics, 1972.


SODEK, BERNARD A., Jr., B.S. (Loyola University of the South), M.S., Ph.D. (Oklahoma State University). Lecturer in Physics, 1967.

STEVERDING, BERNARD, Ph.D. (Institute of Technology Aachen). Lecturer in Physics, 1963.


SU, MING YANG, B.S.M.E. (National Taiwan University), M.S. (Virginia Polytechnic Institute), Ph.D. (University of Minnesota). Lecturer in Remote Sensing, 1971.


TEUBER, DIETER L., Diplom-Ingenieur, Dr.-Ing. (Technical University, Darmstadt, Germany). Lecturer in Engineering, 1967.


VON SPAKOVSKY, ANATOL, Ph.D. (University of Lyublyana, Yugoslavia). Lecturer in Russian, 1971.

WALKER, BILLY J., B.S., M.S., Ph.D. (University of Oklahoma). Lecturer in Engineering, 1969.


WALKER, JOHN, B.S., M.B.A. (University of Alabama, Tuscaloosa and Syracuse University). Lecturer in Accounting, 1971.


WATSON, RAYMOND C., Jr., B.S. (Jacksonville State College), M.S.E. (University of Alabama, Tuscaloosa), M.S. (University of Florida). Lecturer in Modern


PETERS, PALMER N., Ph.D. (University of Tennessee). Lecturer in Physics, 1969.


RAO, YEDLA K., B.S., M.S. (Banaras Hindu University, India), Ph.D. (University of Maryland). Lecturer in Economics, 1968.


SCALES, JEAN, B.A. (Millsaps College), Lecturer in Business Law, 1972.


HOLL, HERBERT B., Ph.D. (University of Jena, Germany). Lecturer in Physics, 1965.


HUNG, FRANK T., B.S. (Taiwan College of Engineering), M.S., Ph.D. (Kansas State University). Lecturer in Engineering, 1968.

JONES, G. MERRILL, B.S. Ch.E., M.S.Ch.E., Ph.D. (University of Alabama, Tuscaloosa). Lecturer in Engineering, 1968.


KENNER, HELMUT, Masters, Ph.D. (University of Vienna, Italy). Lecturer in Engineering, 1968.

KHEIR, FERIAL, B.A. (Ain-Shams University), Ph.D. (Budapest University). Lecturer in French, 1970.


MARSHALL, GEORGE L., Jr., B.S. (University of Tennessee), Graduate Study (Indiana University and The University of Alabama in Huntsville). Lecturer in Physics, 1968.


EGGERT, JOHN D., B.S. (St. John's University), M.S. (Rensselaer Polytechnic Institute). Lecturer in Physics, 1967.

FAN, CHIEN, B.S. (National Taiwan University), M.S., Ph.D. (University of Illinois). Lecturer in Mechanical Engineering, 1967.

FOREMAN, JESSE W., Jr., Ph.D. (Purdue University). Lecturer in Physics, 1970.

FOSTER, HOWARD J., B.A., M.A. (Fisk University), Ph.D. (Catholic University of America). Professor of Physics, Alabama A & M University. Lecturer in Physics, 1969.

FU, TSUN-SEN, B.S., M.S. (Chang Kung University), Ph.D. (University of Minnesota). Lecturer in Engineering, 1969.

GARBER, VITALIJ, Ph.D. (University of Alabama, Tuscaloosa). Lecturer in Physics, 1963.


GUINN, GERALD R., B.M.E. (Auburn University), M.S.M.E. (Purdue University), Ph.D. (University of Alabama, Tuscaloosa). Lecturer in Engineering, 1967.

HALE, DANIEL P., Ph.D. (University of Tennessee). Lecturer in Physics, 1967.


HART, EDWIN M., B.A. (Goddard College), M.A. (University of Oklahoma). Lecturer in Configuration Management, 1972.


Lecturers

(First date refers to original appointment to the University. Second date, if any, refers to date of appointment to title listed.)

ADAMS, DAVID M., B.S., M.S. (Texas A & M University), Ph.D. (Oklahoma State University). Lecturer in Engineering, 1965.


ANDERSON, ROBERT A., B.A. (David Lipscomb College), M.A. (Mississippi State University), Graduate Study (University of Tennessee). Lecturer in History, 1965.


ATHA, LARRY C., B.S.M.E., M.S.M.E. (Missouri University, Rolla), Ph.D. (Missouri University, Columbia). Lecturer in Engineering, 1968.


BUYCK, ROBERT, First & Second Bacc. (University of Nancy, France), Ph.D. (University of Colorado). Lecturer in French, 1970.

DAILEY, GRACE E., A.B. (Colby College), M.Ed. (Harvard University). Lecturer in English, 1967.

DANIEL, ALFRED C., B.S., M.S. (Georgia Institute of Technology), Ph.D. (University of Alabama, Tuscaloosa). Lecturer in Physics, 1964.


DAVIS, ROBERT TAYLOR, B.S. (Middle Tennessee State University), M.S. (University of Tennessee). Lecturer in Chemistry, 1966.


WATTS, WILLIAM P., B.S. (U.S. Naval Academy), M.B.A. (New York University), Graduate Study (University of Alabama, Tuscaloosa). Assistant Professor of Economics and Business Administration, 1971.


WHARRY, RHODA E., B.S.E. (University of Arkansas), M.S. (Memphis State University), Ph.D. (Purdue University). Associate Professor of Education, 1967.


WILSON, HAROLD J., B.S. (Alabama A & M University), M.S. (Iowa State University), Ph.D. (University of Arizona). Associate Professor of Biology, 1972.

WILSON, JAMES L., B.A., M.A., Ph.D. (Indiana University). Professor of Linguistics; Vice President for Academic Affairs, 1972.

WOLFE, WALTER N., B.S. (Auburn University), M.S. (DePaul University), Graduate Study (Auburn University). Instructor in Mathematics, 1968.


WU, SHI TSAN, B.S. (National Taiwan University), M.S. (Illinois Institute of Technology), Ph.D. (University of Colorado). Associate Professor of Engineering, 1967, 1969.


SHIH, CORNELIUS C., B.S. (National Taiwan University), M.S., Ph.D. (Michigan State University). Professor of Engineering Mechanics; Chairman, Department of Fluid and Thermal Engineering, 1965, 1970.

SMALLEY, LARRY L., B.S., M.S., Ph.D. (University of Nebraska). Assistant Professor of Physics, 1967.

SMITH, DONALD H., B.A., M.A. (California State College at Long Beach). Assistant Professor of Sociology, 1972.


SMITHBURG, DONALD W., A.B. (University of Washington), Ph.D. (Harvard University). Professor of Political Science; Director, Division of Social and Behavioral Sciences; Chairman, Department of Political Science, 1967, 1969, 1970.

STEPHENS, WILLIAM D., B.S. (Western Kentucky State College), Ph.D. (Vanderbilt University). Adjunct Associate Professor of Chemistry, 1970.

STETTLER, JOHN D., B.S. (Notre Dame), Ph.D. (Massachusetts Institute of Technology). Adjunct Associate Professor of Physics, 1965, 1970.

STROMECKY, OSTAP, A.B. (Realgymnasium, Ulm, Germany), M.A., Ph.D. (Ukrainian Free University). Assistant Professor of Slavic Languages, 1967, 1970.

SULLINS, WALTER R., B.A. (Stetson University), B.D. (Southern Baptist Seminary), M.A., Ph.D. (Emory University). Assistant Professor of Psychology; Chairman, Department of Psychology, 1966, 1971.

TAKACS, GERALD A., B.S. (University of Alberta), Ph.D. (University of Wisconsin). Teaching Intern/Research Associate, Chemistry Department, 1972.

TARTER, DONALD E., B.S. (Middle Tennessee State College), Ph.D. (University of Tennessee). Associate Professor of Sociology; Chairman, Department of Sociology, 1966, 1969, 1971.

THOMPSON, KENNETH O., B.S., B.A.E., B.B.A., M.S. (University of Minnesota), Ph.D. (University of Alabama, Tuscaloosa). Associate Research Professor of Engineering; Assistant Director, Research Institute, 1969.


RILEY, CLYDE, B.S. (University of Rochester), Ph.D. (Florida State University). Associate Professor of Chemistry; Chairman, Department of Chemistry, 1967, 1972.

RITCHIE, GERALDINE J., B.S. (Texas Christian University), M.S. (University of Florida). Assistant Professor of Nursing, 1971.


ROGERS, JON G., JR., A.B. (Kansas State Teachers College), M.A. (University of Arkansas), Ph.D. (University of New Mexico). Associate Professor of Psychology, 1968, 1969.

ROGGING, LORRAINE PAULINE, B.S., M.S. (University of Rhode Island), Ph.D. (Southern Illinois University). Assistant Professor of Biology, 1967.

ROWLAND, M. ELOISE, B.S. (Mississippi State College for Women), M.S. (Iowa State College), Ph.D. (University of Tennessee at Memphis). Associate Professor of Biology, 1967.

ROY, UPENDRA, B.S. (B.I.T., Sindri, India), M.S. (Sheffield University, England), Dr. rer. nat. (Technical University of Stuttgart, Stuttgart, Germany). Assistant Professor of Engineering, 1968.


RUSH, JOHN EDWIN, JR., B.S. (Birmingham-Southern College), Ph.D. (Vanderbilt University). Associate Professor of Physics; Chairman, Department of Physics, 1967, 1969.


SHACKELFORD, JEAN A., B.A. (Kansas State University), M.A., Graduate Study (University of Kentucky). Instructor in Economics, 1971.

SHANNON, ROBERT E., B.S. (Oklahoma State University), M.S. (University of Alabama, Tuscaloosa), Ph.D. (Oklahoma State University). Associate Professor of Industrial Engineering, 1965, 1968.

MIRAKHOR, ABBAS, B.A., M.A., Ph.D. (Kansas State University). Associate Professor of Economics; Chairman, Department of Economics, 1968, 1970.

MITCHELL, FERDINAND H., JR., B.S. (University of Florida), M.S. (University of California), Ph.D. (University of Alabama, Tuscaloosa). Adjunct Associate Professor of Administrative Science, 1972.


MOEBES, JAMES D., A.B. (Samford University), B.D. (Southern Baptist Theological Seminary), M.A., Ph.D. (University of Alabama, Tuscaloosa). Assistant Professor of Education; Director of Student Affairs, 1972.


O'NEAL, ROBERT DAWSON, A.B. (Florida State University), M.A. (University of New Mexico), Ph.D. (Florida State University). Associate Professor of Spanish, 1967, 1971.


PAO, S. PAUL, B.S.C.E., (National Taiwan University), M.S., Ph.D. (University of Florida). Assistant Research Professor of Fluid and Thermal Engineering, 1972.


PENOT, DOMINIQUE M., B.A. (University of Aix-France), License (University of Montpellier), Ph.D. (University of Yale). Professor of Romance Languages; Chairman, Department of Modern Foreign Languages, 1970.

PERREAULT, JEAN M., B.S. (Rockhurst College), M.A. (Marguette University), M.L.S. (University of Wisconsin). Assistant Professor of Bibliography; Director of the Library, 1969.


PORTER, JOHN F., JR., B.S., M.S. (University of Alabama, Tuscaloosa), Ph.D. (Johns Hopkins University). Professor of Physics; Dean of Graduate Programs and Research, 1966, 1970.

RAINEY, ROBERT LEE, B.A. (College of Wooster). Assistant Professor of Political Science, 1972.

RHEINFURTH, MARIO H., B.S., M.S. (University of Darmstadt, Germany). Adjunct Associate Professor of Aerospace Engineering, 1959, 1970.


JAMES, ROBERT E., B.S. (Carnegie Institute of Technology), M.A. (Hollins College), Ph.D. (University of Tennessee). Assistant Professor of Psychology, 1971.


KHEIR, NAII M. A., B.S.E.E. (Ain-Shams University, Cairo, Egypt), Ph.D. (Hungarian Academy of Sciences). Assistant Professor of Electrical Engineering, 1969.


LEONARD, RICHARD C., B.S., M.A. (East Carolina College), M.A.T., Ph.D. (University of North Carolina). Assistant Professor of Biology; Chairman, Department of Biology, 1966, 1972.


MAURER, ALICE C., B.S. (University of Alabama, Tuscaloosa), M.S. (Florida State University). Instructor in Natural Sciences, 1972.

MC CALISTER, DONALD V., A.B. (Fresno State College) Ph.D. (University of Tennessee), Visiting Professor of Sociology; Director of the Center for Research in Health Care Delivery, 1972.

MC DANIEL, JOHN L., B.S. (Berry College), Ph.D. (Auburn University). Adjunct Professor of Administrative Sciences, 1971.


GRAVES, BENJAMIN B., B.A. (University of Mississippi), M.B.A. (Harvard University), Ph.D. (Louisiana State University). Professor of Management; President, The University of Alabama in Huntsville, 1970.

GROHSE, EDWARD W., B.Ch.E., Ch.E. (Cooper Union Institute of Technology), Ph.D. (University of Delaware). Professor of Chemical Engineering, 1960.

GUENTHER, GODEHARD A., B.S. (University of Goettingen, Germany), M.S., Ph.D. (University of Heidelberg, Germany). Assistant Professor of Physics, 1969, 1970.


HAMMILL, MILDRED A., B.A. (Union University), M.A. (Baylor University), M.L.S. (George Peabody College). Assistant Professor of Bibliography; Librarian for American and British Philology, 1969.


HAUPT, FREDERIC CURT, B.S. (University of Florida), Ph.D. (Harvard University). Assistant Professor of Chemistry, 1969.


HELLER, HERTHA D., Perm. Teachers Certificate (Teachers College for Women, Hanover, Germany), Graduate Study (Vanderbilt University). Assistant Professor of German, 1965, 1969.


HERMANN, RUDOLF, Ph.D. (Leipzig University), Dr. Phil habil. (Aachen Institute of Technology, Germany). Professor of Aerospace Science and Engineering, 1962, 1970.


HOLT, CECELIA ANN, B.A. (Florence State College), M.S. (University of Kentucky). Instructor in Mathematics, 1968.

HOOMANI, JAFAR, B.S., M.S., Ph.D. (North Carolina State University). Associate Professor of Mathematics; Chairman, Department of Mathematics, 1968, 1972.


HUDSON, RALPH M., B.A., B.Sc., M.A. (Ohio State University), Ed.D. (University of Alabama, Tuscaloosa). Professor of Art History; Chairman, Department of Art, 1969.

HULL, HENRY LANE, A.B., M.A., Ph.D. (Georgetown University). Assistant Professor of History, 1971.
Ed.D. (University of Florida). Professor of Nursing; Director, Division of Nursing, 1971.

CULLINANE, THOMAS P., B.S. (Boston University), M.S.I.E. (Northeastern University), Ph.D. (Virginia Polytechnic Institute). Assistant Professor of Industrial and Systems Engineering, 1972.

DAVIS, JACK H., B.S., M.S., Ph.D. (Clemson University). Associate Professor of Physics, 1966, 1969.

DEMPSEY, JOHN P., B.S. (University of Louisville), Graduate Study in Venice, Italy; Indiana University. Assistant Professor of Art, 1965.

DOANE, GEORGE B., III, B.S.E.E. (Swarthmore College), M.S.E.E. (Yale University), Ph.D. (Auburn University). Adjunct Associate Professor of Electrical Engineering, 1956, 1970.

DODSON, CHARLES L., B.S. (Emory and Henry College), M.S., Ph.D. (University of Tennessee). Associate Professor of Chemistry, 1966, 1968.

DOSS, DEVA CHITHA, B.S. (University of Madras, India), B.Sc., M.Sc., Ph.D. (University of Poona, India). Associate Professor of Mathematics, 1969.


DOYLE, F.L., B.S., (University of Texas), M.S., Ph.D. (University of Illinois). Adjunct Professor of Hydrogeology, 1972.


ESSENWANGER, OSKAR M., B.S. (Technical University, Danzig), Diploma in Meteorology (equiv. to M.A.) (University of Vienna), D.Sc. (Dr. rer nat) (University of Warzburg). Adjunct Professor of Earth Science, 1971.

FORTE, ALDO, D.Sc. (University of Havana, Cuba). Associate Professor of Mathematics, 1966.


GOULD, GRACE THERESA, R.N. (Mt. Vernon Hospital School of Nursing), B.S.N. (Texas Woman's University), M.S.N. (Catholic University of America). Associate Professor and Assistant Director of Nursing, 1972.

GRAHAM, JOY M., B.S. (Florence State College), M.L.S. (George Peabody College). Assistant Professor of Bibliography; Librarian for Behavioral and
BRINKMAN, RONALD J., B.A. (Knox College), M.A., Ph.D. (University of Denver). Assistant Professor of Political Science, 1971.

BROWN, ROBERT A., B.S. (U.S. Naval Academy), M.S., Ph.D. (Ohio State University). Associate Professor of Industrial Engineering; Chairman, Department of Industrial and Systems Engineering, 1967, 1972.


BURNS, ROBERT W., A.B. (Syracuse University), Graduate Study (The Sorbonne, France). Instructor in Philosophy, 1970.


CASTLE, JOHN GRANVILLE, JR., B.A. (University of Buffalo), Ph.D. (Yale University). Professor of Physics, 1969.

CHAN, CHIA HWA, B.S., Ph.D., (Imperial College, London University). Associate Professor of Physics, 1970.


CHUNG, T. J., Engineering Diploma (Seoul National University), M.S., Ph.D. (Oklahoma State University). Visiting Associate Research Professor of Engineering, 1970.

CLOUD, GISELA, A.B., M.A., Graduate Study (University of Georgia). Instructor in German, 1966.


COBLE, HAROLD DWAIN, B.S., (Kearney State College), M.S., Ph.D. (University of Nebraska). Assistant Professor of Chemistry, 1966.

COFFIELD, KENNETH E., A.B. (University of Kansas), M.A. (DePaul University), M.A., Ph.D. (University of Missouri). Associate Professor of Psychology, 1966, 1969.


COOK, FREDERICK LEE, B.S., M.S., Ph.D. (Georgia Institute of Technology). Assistant Professor of Mathematics, 1967, 1969.

COSGROVE, MARK, B.A. (Saint Benedict College), M.A. (University of Detroit), Ph.D. (University of Florida). Assistant Professor of English, 1970.


CROSSLAND, KATHRYN M., B.S., M.S. (University of Alabama, Tuscaloosa),
Faculty

(First date refers to original appointment to the University. Second date, if any, refers to date of appointment to title listed.)

ADAMS, CURTIS H., B.S. (Mississippi State University), M.S.Ed. (Henderson State Teachers College), Ph.D. (Mississippi State University). Associate Professor of Biology, 1965, 1968.


ARENDALE, WILLIAM F., B.S. (Middle Tennessee State University), M.S., Ph.D. (University of Tennessee). Professor of Chemistry, 1964, 1966.

AUDEH, NADEEM F., B.S. (South Dakota State College), M.S., Ph.D. (Iowa State University). Associate Professor of Electrical Engineering, 1964, 1970.


BAILEY, J. ALBERT, A.B. (University of Notre Dame), M.A. (Fordham University), Ph.D. (Georgetown University). Assistant Professor of History, 1972.

BAILEY, MARY P., R.N. (Maryview Hospital School of Nursing), B.S.N. (Georgetown University). Instructor in Nursing, 1972.


BLANTON, ROY W., JR., B.M.E., M.S., Ph.D. (Georgia Institute of Technology). Associate Professor of Mechanical Engineering, 1965, 1967.


BOYER, D. ROYCE, B.M. (Butler University), M.A. (Catholic University of America), D.M.A. (University of Texas at Austin). Associate Professor of Music, 1966, 1970.

BRADEN, ARTHUR WAYNE, A.B. (Transylvania College), B.D. (Lexington Theological Seminary), Ph.D. (University of Southern California). Professor of Philosophy; Director, Division of the Humanities, 1966, 1969.

BRAINERD, JEROME J., B.S., M.S. (University of Notre Dame), Ph.D. (Cornell University). Associate Professor of Aerospace Engineering, 1965.

Earl C. Jacoby, A.B.
Director of Fiscal Affairs

Nan G. Hall, B.S.
Registrar
Coordinator of Records and Admissions

Kenneth E. Johnson, B.S., Ph.D.
Associate Director, Center for Environmental Studies

Dennis J. Killips, B.S., M.A.
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Benjamin B. Graves, B.A., M.B.A., Ph.D.
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Andrew J. Rudnick, A.B., M.B.A.
University Affairs

Stephens Tapia
External Affairs

Jane E. Nelson, B.A.
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James L. Wilson, A.B., M.A., Ph.D.
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Joseph C. Dowdle, B.E.E., M.E.E., Ph.D.
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John F. Porter, Jr., B.S., M.S., Ph.D.
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James D. Moebes, A.B., B.D., M.A., Ph.D.
Assistant Dean for Academic Affairs
Director, Division of Student Affairs

A.W. Braden, B.A., B.D., Ph.D.
Director, Division of Academic Services

Jon G. Rogers, Jr., A.B., M.A., Ph.D.
Dean, School of Humanities and Behavioral Sciences

Jafar Hoomani, B.S., M.S., Ph.D.
Dean, School of Sciences and Engineering

Kathryn M. Crossland, R.N., B.S., M.S., Ed.D.
Dean, School of Nursing

Raymond C. Watson, Jr., B.S., M.S.E., M.S.
Director, Division of Continuous Education

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519 Digital Electronics Technology. 3 hrs.
Intensive survey of the analysis and design of digital logical circuits using discrete and integrated elements. Prerequisite: knowledge of basic electronic circuits.

520 Heat Transfer Technology. 3 hrs.
Intensive survey of heat transfer theory, applications, and devices, particularly as related to missiles and spacecraft. Prerequisite: knowledge of basic thermodynamics.

521 Flight Structures Technology. 3 hrs.
Intensive survey of the analysis and design of structures for missiles and spacecraft, with an emphasis on matrix methods. Prerequisite: knowledge of basic structures and materials.

522 Remote Sensing Technology. (Formerly MT 553) 3 hrs.
Intensive survey of principles and techniques of sensing characteristics of the earth and its environment by remote means.

523 Image Processing Technology. 3 hrs.
Intensive survey of the theory, hardware, and application of optical and digital image processing, coding, and transmission. Prerequisite: basic knowledge of data processing.
584 Production Management. 3 hrs.
Study of the theory and application of demand forecasting, production and inventory planning and control, and product quality control.

Modern Technology (MT)

The following courses all require a knowledge of basic calculus and assume a background in engineering, physics, or a similar field. Additional prerequisites are as noted.

501 Foundations of Modern Technology I. 3 hrs.
General examination of the mathematical and physical foundations of modern technology. Elements of calculus, differential equations, chemistry, physics, and applied mechanics. This course is primarily intended to assist persons in updating previous training.

502 Foundations of Modern Technology II. 3 hrs.
A continuation of MT 501. Elements of electrical circuits, electronics, mechanics of materials, thermodynamics, engineering economics, and other selected topics. Prerequisite: knowledge of topics given in MT 501.

511 Radar Technology. 3 hrs.
Intensive survey of radar theory, techniques, systems, and components. Appropriate for both specialists and non-specialists. Prerequisite: knowledge of basic electronic systems.

512 Infrared Technology. 3 hrs.
Intensive survey of the generation, transmission, and detection of infrared radiation, with emphasis on military and remote sensing applications.

513 Guidance Technology. 3 hrs.
Intensive survey of trajectory theory, stability and control theory, guidance and optimization theory, and modern guidance techniques and systems.

514 Rocket Propulsion Technology. 3 hrs.
Intensive survey of rocket propulsion theory, techniques, systems, and components. Appropriate for both specialists and non-specialists. Prerequisite: knowledge of basic thermodynamics.

515 Instrumentation Technology. 3 hrs.
Intensive survey of the theory and application of modern electronic instruments and instrumentation systems. Appropriate for engineers and scientists in all fields.

516 Laser Technology. 3 hrs.
Intensive survey of laser principles and systems with an emphasis on practical aspects, particularly in space and military applications.

517 Nuclear Technology. 3 hrs.
Intensive survey of the principles of nuclear energy, nuclear power systems, nuclear weapons, radiation effects, and radiation shielding.

518 Simulation and Modeling Technology. 3 hrs.
Intensive survey of simulation methodology with applications to systems analysis and synthesis. Prerequisite: basic knowledge of computer programming.
contracts, and management of contract performance. Primarily for R&D technical and managerial personnel.

523 **Configuration Management.** (Formerly MT 563) 3 hrs.
Study of the needs, concepts, and applications of configuration identification, control, and status accounting as related to hardware and documentation.

524 **Cost Modeling and Estimating.** (Formerly MT 564) 3 hrs.
Introduction to the theory and application of costing techniques in management and engineering; elements of decision and value theory; cost-effectiveness; proposal pricing.

525 **Planning and Control Techniques.** 3 hrs.
Study of the methodology of network-based planning and control; detailed analysis of CPM, PERT, and GERT; computer procedures for complex networks.

541 **Fundamentals of Contract Administration.** 3 hrs.
Intensive survey of the principles and practices involved in the administration of contracts by and from federal agencies.

542 **Legal Aspects of Contracts.** 3 hrs.
Study of governmental procurement laws and regulations, contract construction and interpretation, patents and copyright, and the Uniform Commercial Code.

543 **Financial Aspects of Contracts.** 3 hrs.
Study of contract pricing techniques; financing of government contracts; allowable, disallowable, and allocable costs; indirect rate determinations; accounting methods; contract closings.

544 **Contract Writing.** 3 hrs.
Study of writing techniques for RFP's proposals, negotiation memoranda, contracts, subcontracts, contract changes, progress reports, and other contract-related documents.

545 **Contract Changes and Terminations.** 3 hrs.
Detailed study of contract negotiation by and with governmental agencies, with an emphasis on interfaces among the technical program, administrative, and financial operations. Prerequisite: 522 or 541 or equivalent.

561 **Fundamentals of Public Administration.** 3 hrs.
Intensive survey of the principles and practices involved in the administration of governmental organizations.

581 **Fundamentals of Industrial Administration.** 3 hrs.
Intensive survey of the principles and practices involved in the administration of industrial organizations.

582 **Industrial Personnel Administration.** 3 hrs.
Study of personnel administration in an industrial organization: selection, training, and placement of personnel; merit training and promotion; salary and wage administration.

583 **Labor Relations.** 3 hrs.
Detailed study of labor laws, management-labor problems, organization and structure of labor unions, collective bargaining procedures and techniques, and union-management contracts.
courtroom. Theory and practice of investigation; collection and preservation of evidence; interviewing witnesses and suspects; methods of surveillance; rules of evidence; legal and ethical problems. Prerequisite: LE 101 or permission of instructor.

202 Elementary Criminal Law and Procedure. 3 hrs.
An introduction to elementary criminal law and the mechanics of the courts. Foundations of criminal law; elements of criminal liability; capacity impairments and legal defenses; offenses; arrest, search, and seizure; confessions and right to counsel; trial proceedings.

203 Introduction to Criminalistics. 3 hrs.
Introductory survey of the scientific approach to criminal investigation. Definition and scope of criminalistics; physical evidence and probability; equipment for investigation; collecting physical evidence; nature of physical evidence; laboratory operations and techniques; the expert witness. Prerequisite: LE 101; introductory science desirable.

301 Crime and Delinquency. 3 hrs.
A detailed study of crime and delinquency in the United States: quantity, measurement, trends, economic impact, and victimization. Examination of the nature and impact of organized crime. Prerequisite: LE 101 or permission of instructor.

302 Administration of Criminal Justice. 3 hrs.
A detailed study of the modern criminal justice system—enforcement, courts, corrections, and social concern agencies—on the local, state, and federal levels. Prerequisite: LE 101 and LE 202 or permission of instructor.

401 Critical Issues in Law Enforcement. 3 hrs.
An examination of current issues that are of critical importance to law enforcement in a free society. Reading and discussion of articles and commission reports.

Modern Administration (MN)

The following courses are primarily intended for personnel working in administrative or technical management positions. Prerequisite for all of these courses is an educational background equivalent to at least two years of college-level work.

501 Decision Mathematics. (Formerly MT 565) 3 hrs.
Introduction to mathematical concepts used in management science: matrix algebra, linear systems, linear programming, game theory, basic calculus, set theory, probability. Prerequisite: college-level algebra.

502 Statistical Techniques. (Formerly MT 566) 3 hrs.
Introduction to the theory and application of statistical techniques in management and engineering: descriptive methods, probability and sampling theory, statistical inference. Prerequisite: college-level algebra.

521 Fundamentals of Program Management. (Formerly MT 561) 3 hrs.
Intensive survey of the principles and techniques involved in the management of technical programs.

522 Contract Management. (Formerly MT 562) 3 hrs.
Study of governmental procurement processes, nature of various types of
202 Language Development. 3 hrs.
Study of the development of speech and language in the young child; basis for
language growth; language arts in preschool and elementary school programs;
introduction to written expression; identification of speech impediments.
Prerequisite: CD 101 or permission of instructor.

203 Teaching the Young Child. 3 hrs.
Study of the total pattern of child development, curriculum, learning,
methods, and guidance of the child from two to nine years of age; analysis of
curricula for various types of preschool programs; introduction to basic
testing and evaluating the young child. Prerequisite: CD 101 or permission of
instructor.

204 Family Relationships. 3 hrs.
Course designed to help the student gain an understanding of the dynamics of
family interaction and their effects upon the child. The family as a social
system; communications within the family; effects on family members of the
working mother; problems of low-income families; family crises.

Interior Decoration (ID)

101 Fundamentals of Home Furnishings. 3 hrs.
Introductory survey of furnishings for the home. Principles of design,
furniture arrangement, basic color schemes, floor and wall coverings, lighting,
decorative fabrics, window treatments, and selection of furniture and
accessories.

102 Introduction to Interior Decoration. 3 hrs.
A course designed to guide the student to an intelligent understanding of what
is beautiful and useful in the design, furnishing, decoration, and equipment for
all types of rooms; an introduction to the principles and practices of interior
decoration. Prerequisite: AA 101 or permission of instructor.

201 Introductory Architectural Planning. 3 hrs.
Survey of architectural planning and drawing, primarily as these topics relate
to interior decoration. Basic practices of construction; types of construction
materials; reading blueprints; preparation of layout sketches and drawings.

202 Interior Decoration Problems. 3 hrs.
Detailed study of problems in interior decoration; practical applications in
combining furnishings, materials, and finishes; practice in decorating
complete rooms. Prerequisite: AA 102.

Law Enforcement (LE)

101 Introduction to Criminal Justice. 3 hrs.
An introductory survey of the panorama of the criminal justice system.
Philosophical and historical background; constitutional limitations; criminal
justice agencies; pre-trial, trial, and post-trial processes; evaluation of criminal
justice today.

102 Law Enforcement Operations. 3 hrs.
Basic principles of organization, management, and line activities of law
enforcement agencies; fundamentals of personnel administration;
coordination and relationships between local, state, and federal operations.

201 Investigation and Evidence. 3 hrs.
Introduction to criminal investigation, from the crime scene to the
Graduate School after completion of 12 semester hours in advanced courses with a grade of B or better. Courses in the post-graduate certificate program are an excellent means of pursuing this credit. Students intending to use the credit for this purpose are advised to consult with the department responsible for the desired graduate program as to the acceptability of specific courses.

Courses

The following courses are offered by the Division of Continuous Education, primarily for programs described in the previous sections. The number shown is for credit registration. All of the courses are also available as non-credit.

Child Development (CD)

101 Introduction to Child Development. 3 hrs. Introduction to the physical, social, emotional, and mental development of the young child; survey of the work functions, employment opportunities, and responsibilities of personnel trained in child development.

102 Child Nutrition and Health Care. 3 hrs. Basic information on human nutrition, the nutritional value of food, and the relationship of food and food habits to nutrition of the young child; fundamental descriptions of diseases and disorders of children, preventive medicine, emergency treatment, and care of handicapped children.

201 Creative Activities. 3 hrs. Introduction to art and simple science media for use with young children; principles relating to the choice, use, and value of creative media in enrichment opportunities for children. Prerequisite: CD 101 or permission of instructor.
be applicable, credit must not be more than six years old at the time of certificate completion, and at least six semester hours credit must be earned after registering for the program with the Division of Continuous Education.

**Curricula**

Curricula may now be developed in Program Management and Modern Technology. Post-graduate certificates in other areas will be available in the near future. Each curriculum will include one or more core courses to establish the area of specialization. The remaining courses will be selected in accordance with each student's requirements. The curriculum for each student must be approved by an advisor.

Courses may be drawn from the special 500-level offerings of the Division of Continuous Education and from the regular offerings of other divisions. Offerings from the Continuous Education Division will be presented in both short-term and standard periods. Major courses will be given in both formats during each year.

Post-graduate credits earned in the University of Alabama System prior to entering the program may possibly be used in a curriculum. Up to six semester hours credit might be transferred from institutions not in the system. However, all such credit is subject to the six-year limitation and must fit into an approved curriculum.

**Relationship to Standard Graduate Programs**

The primary distinction between this program and standard graduate programs is embodied in their respective objectives. The post-graduate certificate program has as its major objective the presentation of theories, concepts, and techniques to keep professional personnel proficient in their fields. The most important objective of standard graduate programs is to develop students' abilities in reasoning processes, with applications to indepth examinations of discipline areas.

Obviously, there is an overlapping of courses appropriate for both types of programs, and it may be possible for students to apply credit earned in the post-graduate certificate program to requirements for a master's or doctoral degree. For this, the student must be fully admitted to Graduate School prior to pursuing the course. Further, the student's graduate advisory committee must approve each specific course and will control the admission of credit earned while pursuing the post-graduate certificate.

The admission requirements of the UAH Graduate School are very specific, directed toward the academically talented student. However, it is recognized that some very capable persons did not demonstrate this talent in prior studies. Such persons may be considered for admission to
Law Enforcement Operations (LE 102)*  3
Investigation and Evidence (LE 201)*  3
Elementary Criminal Law and Procedure (LE 202)  3
Introduction to Criminalistics (LE 203)*  3

General Electives  8
Total Semester Hours  64

Post-Graduate Certificate Program

The problems associated with obsolescence in professional personnel are reaching a critical level and must receive immediate attention if the United States is to maintain its economic and technological leadership. As a remedy to professional obsolescence, UAH now offers a new type of continuing education activity: the Post-Graduate Certificate Program. Departing from tradition, this program combines some of the best features of informal continuing education courses and graduate study to provide fully credited, organized curricula to keep professional personnel proficient in their fields.

Admission

All participants in the program must hold at least a bachelor's degree from an approved institution. However, quality point averages will not be a factor in determining acceptance, and the graduate record examination will not be required. The field of specialization in the program will be determined by the student's needs and will not be limited to that of his prior academic area of concentration, but prerequisites for specific courses must be met.

Normally persons in the program will be admitted to UAH in the irregular post-graduate category. Persons with the necessary academic qualifications may desire to be admitted with the status of graduate student or graduate student on probation. Students who cannot meet deadlines for admission application may start in the program by registering as a non-matriculated student or a special student.

In addition to being admitted to UAH, each participant in the program must register with the Division of Continuous Education.

Requirements

Requirements for earning the post-graduate certificate are 15 semester hours credit in an approved curriculum of 500- and 600-level courses, with a quality point average of at least 1.0 on all courses attempted. To

*With approval of advisor, other courses may be substituted.
The U.S. Department of Justice has identified the requirement for law enforcement personnel with higher education as being one of the greatest needs in the criminal justice system. To assist in meeting this need, UAH has developed a curriculum leading to a Two-Year Certificate in Law Enforcement. Although designed for persons in police and related activities, the curriculum might also be of interest to supporting personnel in the areas of courts and corrections. A degree program using law enforcement courses as a cluster is described under the Division of Social and Behavioral Sciences.

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Education</td>
<td></td>
</tr>
<tr>
<td>Freshman Composition (EH 101, 102)</td>
<td>6</td>
</tr>
<tr>
<td>History of Western Civilizations (HY 101, 102)</td>
<td>6</td>
</tr>
<tr>
<td>Introductory Science</td>
<td>8</td>
</tr>
<tr>
<td>Introductory Mathematics</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total General Education Hrs.</strong></td>
<td><strong>23</strong></td>
</tr>
<tr>
<td>Social &amp; Behavioral Sciences</td>
<td></td>
</tr>
<tr>
<td>American Government (PSC 101)</td>
<td>3</td>
</tr>
<tr>
<td>Introduction to Sociology (SOC 100)</td>
<td>3</td>
</tr>
<tr>
<td>General Psychology (PY 103)</td>
<td>3</td>
</tr>
<tr>
<td>Criminal Behavior (SOC 211) *</td>
<td>3</td>
</tr>
<tr>
<td>State and Local Government (PSC 212) *</td>
<td>3</td>
</tr>
<tr>
<td>Principles of Public Administration (PSC 271) *</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total Social &amp; Behavioral Sciences Hrs.</strong></td>
<td><strong>18</strong></td>
</tr>
<tr>
<td>Law Enforcement</td>
<td></td>
</tr>
<tr>
<td>Introduction to Criminal Justice (LE 101)</td>
<td>3</td>
</tr>
</tbody>
</table>

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The following sections describe two of the programs. For additional information on these and other programs under development, contact the Division of Continuous Education.

**Child Development Program**

At the present time, the State of Alabama does not certify persons for employment in pre-school activities, such as kindergartens and day-care centers. However, the U.S. Office of Child Development has recommended that these persons have two years of higher education, including specialty courses, qualifying them to serve as child development associates. The following curriculum, leading to a Two-Year Certificate in Child Development, is available for training these persons. This curriculum would also be appropriate for paraprofessionals in the lower grades of elementary schools.

<table>
<thead>
<tr>
<th>General Education</th>
<th>Semester Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshman Composition (EH 101, 102)</td>
<td>6</td>
</tr>
<tr>
<td>History of Western Civilizations (HY 101, 102)</td>
<td>6</td>
</tr>
<tr>
<td>Introduction to Sociology (SOC 100)</td>
<td>3</td>
</tr>
<tr>
<td>General Psychology (PY 103)</td>
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<td>Introductory Science</td>
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<td>26</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Teacher Education</th>
<th>Semester Hrs.</th>
</tr>
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<td>Art for the Elementary Teacher (ART 215)</td>
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<td>Music for the Elementary Teacher (MU 215)</td>
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<td>Phy. Ed. for the Elementary Teacher (ED 215)</td>
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<td>Human Development (ED 230)</td>
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<td>Educational Psychology (ED 263)</td>
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Applications for non-credit courses may be completed during registration. In general, these courses are open to all mature adults, but prerequisites are necessary for certain advanced courses. UAH now grants continuing education units (c.e.u.) in recognition of satisfactory completion of non-credit courses. The c.e.u. is the standard adopted by colleges and universities for offerings that do not have academic credit. Permanent c.e.u. records for students are now maintained by the Continuous Education Division.

Offerings Available

Some courses are given on a periodic basis, but many of the offerings are designed to meet some current need or interest. Consequently, the offerings available vary considerably with time. Brochures describing the offerings during various periods are available. Persons interested in receiving these brochures should contact the Continuous Education Division. Inquiries concerning the development of special courses are invited.

Two-Year Certificate Programs

Many individuals have a need for an organized program of study at the university level, but do not feel that the baccalaureate is a practical goal. This is particularly true for mature adults who are beginning their studies on a part-time basis. For these persons, UAH has developed two-year programs in selected areas.

The two-year certificate programs involve approximately one-half of the credit required for a bachelor's degree. Thus, it should be clear that these programs do not provide the same level of career preparation as the standard degree programs. However, credit earned in the two-year programs may also be used, where applicable, toward fulfilling requirements for a degree, and students completing the certificate are encouraged to continue work toward the baccalaureate.

General Requirements

Students in the two-year certificate programs must be admitted to UAH and are subject to all of the standard academic regulations of this institution. Certificates are awarded upon the completion of a specific curriculum involving 64 semester hours credit, with an overall quality point average of at least 1.0. Transfer students must earn at least 18 semester hours credit at UAH, including 6 or more hours in the specialty area. In addition to the required overall quality point average, transfer students must have a quality point average of no less than 1.0 on all courses attempted at UAH.
Division of Continuous Education

The formal educational process has traditionally been composed of a series of experiences extending from age five or six through some terminal point just prior to entering full-time employment. However, education is actually a continuous endeavor, and to be most effective, the formal process should be smoothed into a continuum extending from early childhood to retirement and beyond.

The Division of Continuous Education has as its mission the application of university-level capabilities to educational needs at all age levels. Although the major efforts of the Division are in higher education programs for adults, other programs under development include a special program for high school students and a cooperative work-study plan for regular UAH students.

General Studies

The Division of Continuous Education offers credit and non-credit courses, conferences, seminars, and institutes in a variety of subjects to provide for individual enrichment and professional advancement. Primarily intended for adults, these offerings are given so as to be convenient for the greatest number of intended attendees. Many classes are scheduled in the evenings and on a short-term basis. Preliminary efforts are now being made in the use of educational television and independent study. Many special technical and management courses are given in facilities of industrial and governmental organizations. Working in association with the other divisions of UAH, courses drawn from the standard academic programs are given in extension.

Admission and Credit

Persons desiring to have credit earned through the Continuous Education Division applied in standard academic programs should be admitted to UAH and register as regular students. However, credit may also be pursued by registering as a non-matriculated student. Credit earned in the non-matriculated category remains on file with the Continuous Education Division. If the student becomes admitted to UAH, the credit may be requested to be accepted into the regular records, subject to the standard regulations governing transfer credit.

The application to enroll as a non-matriculated student may be completed at the time of registration. No transcripts or other credentials are required. A non-matriculated student must certify that he or she is (1) a high school graduate or has a satisfactory score on the GED, (2) has the stated prerequisites for the course desired, and (3) is not under current
Graduate Deans, or their representatives, and the department or division in which the student wishes to take the work. The amount of course work that may be taken by a student under such an arrangement will be determined by his Advisory Committee with appropriate approvals at the other University.

A student earning a master's degree or a six-year degree at either institution must complete at least one-half of the required course work at the institution granting the degree.

In order for a course to be applicable for credit above the six hours presently transferable toward a master's degree or beyond the master's toward a six-year degree, the course must be approved in advance by the student's major department or division and his Graduate Dean.

The Deans of the Graduate Schools or their representatives will serve as liaison officers in arranging programs for which the additional hours may be transferred and other details.
comply with the regulations set out in the leaflet, *Instruction for the Preparation of Theses and Dissertations* at the University of Alabama, which is available at the UAH Graduate Office. Approval by the Graduate Dean or his designated representative is necessary before graduation.

**Final Examination**

The final examination is an oral defense of the thesis before the student’s committee and is open to the members of the University community in the form of a seminar.

**Special Requirements:**

Special requirements of the academic divisions are indicated in the separate division sections.

Students must assume full responsibility for acquainting themselves with all requirements related to a desired program and for carrying them out.

**Ph.D. Programs**

Ph.D. programs in engineering and physics were approved during the Spring of 1971, effective September, 1971. Information concerning the engineering program may be obtained from the Division of Engineering. Information concerning the physics program may be obtained from the Division of Natural Sciences and Mathematics or from the Department of Physics.

Close cooperation on Ph.D. programs exists between UAH and Tuscaloosa departments authorized for carrying on doctoral work. Applicants to programs in mathematics and chemistry who desire to make maximum utilization of services in Huntsville may submit application materials to the UAH Graduate School. Upon being admitted, the student will be advised of the procedures for program planning.

The minimum residence requirements on the Tuscaloosa Campus include:

1. Two consecutive semesters (or, if specifically approved by the faculty concerned, one full summer of two terms, preceded by or followed by one regular semester); and
2. 18 semester hours of credits (including research, seminars, dissertation, special problems, or other assignments for which a credit equivalency may be established).

**Cooperative Graduate Programs Between Auburn University and The University of Alabama in Tuscaloosa**

In some designated programs, a student enrolled in either Auburn University or any campus of the University of Alabama may register as a transient student at the other institution with the approval of both
each other), proficiency in which is to be demonstrated to the satisfaction of the department of the major.

Residence Requirements

The student shall have successfully completed at least three academic years of residence beyond the bachelor's degree; at least one of the three academic years shall have been spent in continuous full-time residence. All research effort presented for residence credit toward the Ph.D. degree must have been performed under the direction of a full member of the UAH graduate faculty.

Qualifying Examination

The Qualifying Examination is administered by the graduate faculty, the chairman usually being the chairman of the advisory committee, with representatives from the major and minor departments and related fields appointed by the Graduate Dean. The examination is a demonstration of proficiency in the subject matter phase of the program of study and shall be part written and part oral. The written portion shall become a part of the student's permanent record. The examination may be taken twice if necessary. Attempts beyond two will require the permission of the Graduate Council.

Admission to Candidacy

Upon successful completion of the Qualifying Examination and the requirements for ancillary skills the student may be admitted to candidacy for the degree. Admission to candidacy is based on the recommendations of the student's advisory committee and the appropriate division, and is approved by the Graduate Dean. It is the responsibility of the student to secure the appropriate forms from the Graduate Registrar and initiate the procedure for admission to candidacy at least one year prior to the award of the degree.

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 a cogent, well-written exposition.

A completed copy of the dissertation must be submitted to the major division at least four weeks before the date on which the candidate expects to receive the degree. At least ten days before graduation three copies of the dissertation, approved by the student's committee and the director of the major division, and a receipt for the binding fee ($13.00) must be deposited in the UAH Graduate Office. Dissertations must
programming, statistics) as appropriate, and culminating in an independent research project, the results of which are presented in the form of a dissertation.

The following specific degree requirements are applicable to all Ph.D. degree programs within the University. Additional requirements may be imposed by individual departments or divisions but in no case may they waive the university-wide requirements.

Specific Requirements

See application procedure.

Course Requirements

The Graduate School imposes no specific course or credit-hour requirements for the Ph.D. Course requirements are defined by the program of study and are determined by the appropriate department or division. Usually the student will take a majority of his courses in a given field and the remainder in a cognate field, however this is not a requirement.

The approval of the program of study should be accomplished as early as possible, usually no later than the end of the first year of study. The program of study is approved by the student’s advisory committee.

Competence in Ancillary Skills

The reading knowledge of foreign languages has historically been considered a requisite for the Ph.D. degree. It has become increasingly evident in the recent past that this is not true in all areas of scholarly study, in particular the knowledge of computer languages and statistics may be more meaningful than that of foreign languages. The requirement for competence in ancillary skills may be satisfied by one of four methods; the particular method being determined by the department of the major:

1. Reading proficiency in two languages as determined by performance on the standardized Graduate School Foreign Language Tests provided by the Educational Testing Service and administered at the UAH. The required level of performance is to be established by the major department;

2. Reading proficiency in one language as above and demonstrated competence in an ancillary skill not related to the major in the sense of a minor;

3. An in-depth knowledge of one language as demonstrated by performance on the E.T.S. Graduate School Foreign Language Test at a level appropriately higher than that for "1." above; or

4. Competency in two independent ancillary areas (independent of
Admission to Candidacy

Admission to the Graduate School and admission to candidacy for a degree are two separate acts. Application for admission to candidacy for the master's degree should be filed after completing 12 semester hours but before completing 18 semester hours of graduate credit at The University of Alabama in Huntsville. It must be approved at least two months before the degree is conferred. Approval will depend on (a) the quality of the applicant's graduate work prior to the time the application is made (see Scholastic Requirements); (b) the removal of any special conditions; and (c) the certification of the major division that the student is well qualified to continue work toward the degree. Application forms will be supplied by the UAH Graduate Office.

Examinations

In addition to the regular course examinations, a final comprehensive examination is required of all candidates for the master's degree. This examination may be written, oral, or both. If a thesis is submitted and a written examination is given, there will be an oral examination which may be limited to the thesis. The candidate will be examined on his major subject or subjects and his thesis if he pursues Plan One, and on his field or fields of concentration if he pursues Plan Two. The oral examination is conducted by a committee of at least 3 members, appointed by the Graduate Dean. A written notice of the time and place of the examination is sent by the Graduate Dean to the candidate and to each member of the committee. The examination must be given at least two weeks before the date of graduation, and the results must be reported promptly to the Graduate Dean on furnished forms. A student may take the final oral or written examination only twice.

Application for Degree

Each candidate for a master's degree must apply for the degree through the UAH Graduate Office during the terms in which all remaining requirements for the degree are to be met but at least two months before it is to be conferred.

The Doctor of Philosophy

The doctor of philosophy is a research-oriented degree awarded upon the demonstration of scholarly competence, not on the mastery of a highly specialized field of learning in a narrow area. The degree program at the UAH is based on the successful completion of a program of study, arrived at by the student and his faculty committee in concert, including course work requirements, mastery of certain tool skills (languages,
necessary before graduation.

In exceptional cases, theses may be written in absentia. To obtain such permission, the student, before leaving the University, must select his thesis subject and submit to the director of his major division a satisfactory outline of his thesis, plus satisfactory evidence that adequate facilities are available where he plans to do his work.

Plan Two

Degree requirements for the master's degree under this plan include the completion of 33 or more semester hours of course work. If the program contains three or more terms of full-time work, the degree requirements may be met with 30 or more semester hours of course work. A thesis is not required.

A candidate working under Plan Two may be required to participate successfully in seminar or problem courses that will give him an acquaintance with the methods of research and an appreciation of the place and function of original investigation in the field.

Students majoring in mathematics and physics may follow Plan One or Plan Two; students majoring in administrative science must follow Plan Two; students majoring in chemistry must follow Plan One.

Transferred Credit

A maximum of six semester hours of acceptable graduate credit, earned in any approved graduate institution, may be transferred and counted toward the master's degree. Such credit may not be more than six years old at the time of graduation and is transferable only if the student was enrolled in a graduate school at the time it was taken and if the overall average at the institution was B or better. Evaluation of credit for transfer will be made on request after the student has completed 12 semester hours of graduate credit at the University of Alabama. Students who have graduate credits from other units of the University of Alabama must complete a minimum of 12 semester hours at UAH to receive a master's degree from UAH.

Time Limit

All requirements for the master's degree should be completed in not more than six years. Credit for individual courses completed at the University of Alabama more than six years but less than ten years before the completion of all requirements for the degree may be validated by special examination given by the division concerned. Such an examination will be equivalent to a final examination in the course.
2. Grade of B or better must be received on at least 75% of all credit hours undertaken.
3. Credits toward a graduate degree are earned only with grades of C or better.
4. At least 50% of the hours required for a graduate degree must be completed in courses numbered 600 or above.

Probationary Status:
1. Students admitted on a probational basis who have an overall grade average of B or better for all work attempted up to and including the term in which 12 semester hours are completed assume the status of an unconditionally admitted student. At any time the overall grade average of a student drops below a B average the student will be placed on probation.
2. A student on probation cannot apply for admission to candidacy for a degree.
3. Probationary status is removed by raising the overall grade average to B or better on all work attempted in all terms up to and including the term in which 12 semester hours are completed following the term in which the student was placed on probation.
4. Failure to remove probation in the manner identified in No. 3 results in dismissal from the Graduate School.

The Master's Degree

All course work is done with the approval of the faculty in which a student proposes to major.

Plan One

Degree requirements under this plan include completion of 24 or more semester hours of course work and the writing of an acceptable thesis.

The thesis should show evidence of the student's capacity for research, independent thought, and his ability to interpret materials used and to write correct English. The subject must be in the major field and must be approved by a faculty committee of the major field, by the director of the appropriate division, and by the Graduate Dean.

A completed copy of the thesis must be submitted to the major division at least four weeks before the date on which the candidate expects to receive the degree. At least ten days before graduation three copies of the thesis, approved by the thesis committee and the director of the major division, and a receipt for the binding fee ($13.00) must be deposited in the UAH Graduate Office. Theses must comply with the regulations set out in the leaflet Instruction for the Preparation of Theses and Dissertations at the University of Alabama which is available at the UAH Graduate Office. Approval by the Graduate Dean or his designated representative is
Applicants to a Ph.D. program who have been previously admitted to the Graduate School of The University of Alabama in Huntsville must submit a completed re-evaluation form to the UAH Graduate Office.

Applicants to a graduate degree program other than that to which he was previously admitted must submit a completed re-evaluation form to the UAH Graduate Office. Such students must meet current admission criteria if he wishes to change his course of study to a degree program offered in another division.

All application materials must be in the UAH Graduate Office no later than dates specified in the UAH Calendar.

Applicants are urged to initiate actions for admission at least six weeks in advance of the registration date for the term to which admission is sought.

Registration

A student must be admitted to the Graduate School and must register on graduate forms in order to receive graduate credit for courses taken. Graduate students can schedule courses for other than graduate credit by so indicating on regular graduate registration forms; these courses will remain as originally designated.

The maximum course load of a graduate student is 10 semester hours per term. Students employed full time (40 or more clock hours per week) can schedule no more than 3 semester hours of graduate work per term without permission of their faculty advisors. If a student does not have an advisor, he must obtain approval from the departmental chairman. (A full-time teacher working toward certification is limited to one course per term and a maximum of three 3-semester hour courses per academic year (9 months).)

Identified undergraduate prerequisites or deficiencies must be scheduled early in the graduate program.

The same requirements and procedures of attendance, conduct, withdrawals, examinations, and assigned tasks that apply to undergraduate students must be met by graduate students.

Students working on a thesis must register for thesis.

Scholastic Requirements

The following scholastic requirements are those of the Graduate School; individual academic units may identify additional requirements.

Degree Requirements:
1. Overall grade average must be B or better on all graduate credit