1971

1971-1972 Catalog, vol. 5, no. 1

University of Alabama in Huntsville

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President Benjamin B. Graves
THE UNIVERSITY OF ALABAMA IN HUNTSVILLE
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 for 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.
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1972

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**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
1971-72

FALL TERM, 1971
Early Registration ................. July 21-August 3
Freshman Orientation ............. August 10-11
Fall Placement Tests .............. August 13, Friday
Application Deadline ............. August 18, Wednesday
Registration ..................... September 1-2, Wed. & Thurs.
Classes Begin 8:00 a.m. .......... September 7, Tuesday
Late Registration ................. September 7-8, Tues. & Wed.
Deferred Examinations ............ September 11, Saturday
Mid-Term ........................ October 11, Monday
Reading Day ..................... November 16, Tuesday
Examinations .................... November 17-20

WINTER TERM, 1971-72
Early Registration ................. October 25-November 5
Winter Placement Tests .......... November 12, Friday
Application Deadline ............. November 17, Wednesday
Student Thanksgiving Holidays ... November 25-26, Thurs. & Fri.
Registration ..................... November 29, Monday
Classes Begin 8:00 a.m. .......... December 1, Wednesday
Late Registration ................. December 1-2, Wed. & Thurs.
Deferred Examinations ............ December 4, Saturday
Student Christmas Holidays ...... December 22-January 2
Classes Resume 8:00 a.m. ......... January 3, Monday
Mid-Term ........................ January 14, Friday
Examinations .................... February 22-25

SPRING TERM, 1972
Early Registration ................. February 3-16
Spring Placement Tests .......... February 18, Friday
Application Deadline ............. February 23, Wednesday
Registration ..................... March 2, Thursday
Classes Begin 8:00 a.m. .......... March 6, Monday
Deferred Examinations ............ March 4, Saturday
Late Registration ................. March 6-7, Mon. & Tues.
Student Spring Holidays ......... March 31 & April 3, Fri. & Mon.
Classes Resume 8:00 a.m. ......... April 4, Tuesday
Mid-Term ........................ April 14, Friday
Reading Day ..................... May 17, Wednesday
Examinations .................... May 18-23
Commencement ................... May 27 or May 28
SUMMER TERM, 1972
Early Registration ............... April 28-May 11
Summer Placement Tests .......... May 12, Friday
Application Deadline ............. May 29, Monday
Registration ...................... June 1, Thursday
Deferred Examinations ............ June 3, Saturday
Classes Begin 8:00 a.m. .......... June 5, Monday
Late Registration ................ June 5-6, Mon. & Tues.
Student Holidays .................. July 3-4, Mon. & Tues.
Mid-Term .......................... July 12, Wednesday
Reading Day ....................... August 16, Wednesday
Examinations ...................... August 17-22

CLASS PERIODS

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<tr>
<th>Period</th>
<th>Time</th>
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<td>8:00 a.m.-9:15 a.m.</td>
<td>M 8:00 a.m.-10:00 a.m.</td>
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<tr>
<td>B</td>
<td>9:25 a.m.-10:40 a.m.</td>
<td>P 10:10 a.m.-12:10 p.m.</td>
</tr>
<tr>
<td>C</td>
<td>10:50 a.m.-12:05 p.m.</td>
<td>Q 1:40 p.m.-3:40 p.m.</td>
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<td>D</td>
<td>12:15 p.m.-1:30 p.m.</td>
<td>R 3:50 p.m.-5:50 p.m.</td>
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<td>F</td>
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<td>S 6:00 p.m.-8:00 p.m.</td>
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<td>T 8:10 p.m.-10:10 p.m.</td>
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<td>S</td>
<td>6:00 p.m.-8:00 p.m.</td>
<td>(MW only)</td>
</tr>
<tr>
<td>T</td>
<td>8:10 p.m.-10:10 p.m.</td>
<td>(MW only)</td>
</tr>
</tbody>
</table>

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.
## CONTENTS

- General Information ............................................. 11
- Facilities ............................................................. 15
- Admissions Information .......................................... 19
- Financial Information .............................................. 25
- Student Life ......................................................... 35
- Student Academic Information .................................. 43
- Undergraduate Academic Programs .............................. 53
- Division of the Humanities ....................................... 61
- Division of Social and Behavioral Sciences .................... 99
- Division of Natural Sciences and Mathematics ................. 121
- Division of Engineering ........................................... 151
- Division of Graduate Programs and Research ................... 173
- Division of Continuous Education ............................... 181
- Board of Trustees ................................................ 183
- Administration ..................................................... 185
- Faculty ............................................................ 187
- Lecturers ........................................................... 195
- For Further Information ......................................... 201
- Index ...................................................................... 202
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. 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, cosmopolitan community.

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; and the Division of Engineering.

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 Social and Behavioral Sciences offers the Bachelor of Arts degree with majors in economics, psychology, and political science. Courses are also offered in 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 and mathematics and the Bachelor of Science degree with majors in biology, chemistry, mathematics, and physics. Courses are also offered in earth sciences. 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. Post master's level courses and research opportunities are also available.

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

The Division of Continuous Education offers both credit and non-credit courses to provide individual enrichment and professional advancement. This Division also sponsors conferences, seminars, and institutes in a variety of subjects.

The UAH Library is being developed to give maximum support to the academic and research programs. Its more than 65,000 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 UAH development.
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 some 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 admissions and student affairs offices and most of the classes and offices in the undergraduate programs of the Division of Social and Behavioral Sciences.

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, graduate classrooms, and faculty offices.

The Research Institute is an integral division of The University of Alabama in Huntsville. It was created with the strong support of the community, local and state governments, and federal agencies. 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.

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 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.

The two-story Student 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 is under construction to house programs in the humanities, principally music, art, English, and history. This facility contains several large lecture rooms for varied University programs. Completion of this new complex is expected during the Spring of 1971.
INFORMATION ON ADMISSIONS

The University of Alabama in Huntsville welcomes inquiries and applications from students who are attracted to the academic programs offered at UAH. 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 can be granted on the basis of ACT scores and high school records through the junior year. Work completed in the senior year and proof of graduation will be reviewed before a student will be finally accepted for admission.

Applicants may be requested to furnish information related to character, supplemental to that required on the application forms. UAH reserves the right to refuse admission to persons when there is evidence that their presence might be deemed detrimental to the best interest of the University Community.

How to Apply

ADMISSION TO THE FRESHMAN CLASS

Plan A

High school graduates may be admitted as freshmen at 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 the divisional 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 specifically required 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. Adults who did not graduate from high school and who wish to take the examination should contact the Office of Student Records for detailed information.

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 no later than 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 TOEFL 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.
Students Transferring Within The University System

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.

Students Transferring From Other Institutions

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. Full credit for the provisional credit will be based upon performance during the first 30 semester hours attempted at UAH. Students falling in this category should see the Registrar concerning his status.

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 20.

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 (TOEFL) 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 20.

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 section Division of Graduate Programs.
FINANCIAL INFORMATION
COST OF ATTENDING THE UNIVERSITY OF ALABAMA IN HUNTSVILLE

Expenses per Term

**Full-Time and Part-Time Students Taking 8 or More Semester Hours (Undergraduate)**

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<tr>
<td>Non-Resident</td>
<td>$350.00</td>
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**Full-Time and Part-Time Students Taking 5 or More Semester Hours (Graduate)**

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<tr>
<td>Non-Resident</td>
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</tbody>
</table>

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)**

<table>
<thead>
<tr>
<th>Category</th>
<th>Cost</th>
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<tbody>
<tr>
<td>Registration Fee</td>
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</tr>
<tr>
<td>Course, Buildings, and Student Union Fees per Semester Hour</td>
<td>$22.00*</td>
</tr>
<tr>
<td>For Non-Residents, an Additional Charge per Semester Hour</td>
<td>$22.00</td>
</tr>
<tr>
<td>Student Activity Fee</td>
<td>$4.00</td>
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**Part-Time Students Taking Graduate Education Courses**

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<thead>
<tr>
<th>Category</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registration Fee</td>
<td>$3.00</td>
</tr>
<tr>
<td>Registration Fee for Courses on Semester Basis</td>
<td>$4.50</td>
</tr>
<tr>
<td>Course, Buildings, and Student Union Fees per Semester Hour</td>
<td>$25.00*</td>
</tr>
<tr>
<td>Student Activity Fee</td>
<td>$4.00</td>
</tr>
</tbody>
</table>

**Part-Time Students Taking 4 or Less Semester Hours (Graduate)**

<table>
<thead>
<tr>
<th>Category</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registration Fee</td>
<td>$3.00</td>
</tr>
<tr>
<td>Course, Buildings, and Student Union Fees per Semester Hour</td>
<td>$50.00*</td>
</tr>
<tr>
<td>Student Activity Fee</td>
<td>$4.00</td>
</tr>
<tr>
<td>For Non-Residents, an Additional Charge per Semester Hour</td>
<td>$50.00</td>
</tr>
</tbody>
</table>

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.

*A Student Union Fee of $1.75 is included in the cost of the first hour only for each person enrolled each term.*
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

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addition of Course Fee</td>
<td>$ 5.00</td>
</tr>
<tr>
<td>Change of Course Fee</td>
<td>5.00</td>
</tr>
<tr>
<td>Examination Fee (Deferred or Special)</td>
<td>2.00</td>
</tr>
<tr>
<td>(A student missing more than two examinations in one term is charged a maximum fee of $5.00)</td>
<td></td>
</tr>
<tr>
<td>Installment or Deferred Payment Fee</td>
<td>2.00</td>
</tr>
<tr>
<td>Laboratory Fee (Biology, Chemistry, Physics, Psychology)</td>
<td>15.00</td>
</tr>
<tr>
<td>Applied Music</td>
<td></td>
</tr>
<tr>
<td>2/3 Hour Private Instruction</td>
<td>20.00</td>
</tr>
<tr>
<td>1 1/3 Hours Private Instruction</td>
<td>30.00</td>
</tr>
<tr>
<td>Late Payment Fee</td>
<td>10.00</td>
</tr>
<tr>
<td>Late Deferred Penalty</td>
<td>5.00</td>
</tr>
<tr>
<td>Late Registration Fee (In addition to regular registration fee)</td>
<td>10.00</td>
</tr>
<tr>
<td>Returned Check Handling Fee</td>
<td></td>
</tr>
<tr>
<td>1st Check</td>
<td>1.00</td>
</tr>
<tr>
<td>2nd Check</td>
<td>2.00</td>
</tr>
<tr>
<td>3rd Check</td>
<td>5.00</td>
</tr>
<tr>
<td>Replacement of I.D. Card</td>
<td>2.00</td>
</tr>
<tr>
<td>Transcript Fee—First transcript free—Each additional copy</td>
<td>1.00</td>
</tr>
<tr>
<td>No transcript will be issued for a person who has a financial obligation to the University.</td>
<td></td>
</tr>
<tr>
<td>Cap and Gown Rental—Handled through the Book Nook</td>
<td></td>
</tr>
<tr>
<td>Diploma Fees</td>
<td></td>
</tr>
<tr>
<td>Bachelor's and Master's Degrees</td>
<td>15.00</td>
</tr>
<tr>
<td>Diploma Fee (If qualifications for graduation are not met and if diploma has been ordered)</td>
<td>5.00</td>
</tr>
<tr>
<td>Duplicate Diploma</td>
<td>7.50</td>
</tr>
</tbody>
</table>
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. Basic fees (course, buildings fund, and lab fee) will be pro-rated according to the withdrawal schedule below:

<table>
<thead>
<tr>
<th>Charges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Withdrawal after registration is completed but before first class meeting of the course.............Registration fee</td>
</tr>
<tr>
<td>Withdrawal during first week of classes...........25% of basic fees</td>
</tr>
<tr>
<td>Withdrawal during second week of classes...........50% of basic fees</td>
</tr>
<tr>
<td>Withdrawal during third week of classes..........75% of basic fees</td>
</tr>
<tr>
<td>Withdrawal after third week of classes..........100% of basic fees</td>
</tr>
</tbody>
</table>

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

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 Parents' Confidential Statement form 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 $200 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.

SOCIETY OF AMERICAN VALUE ENGINEERS SCHOLARSHIPS

The Redstone Alabama Chapter of the Society of American Value Engineers awards annually a scholarship to two engineering students enrolled in a full-time undergraduate curriculum. A minimum "B" average on previous scholastic work, either in high school or college, is required. A recipient is selected for the fall term and another is selected for the spring term.

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.

Job Placement

In addition to assisting students in obtaining financial aid, UAH provides the following job placement services to all students and alumni:

1. Part-time employment opportunities either in the local community or within the University;
2. Full-time placement opportunities for graduating UAH seniors and for UAH alumni.

Contact is maintained with many employers in education, industry, and government. The Placement Office arranges student-employer interviews on the campus throughout the year. The office also maintains a career library of occupational information and company literature.

A complete and permanent personnel file, including a summary of college activities and confidential evaluations from faculty members, is established for each student who registers with the Placement Office. Information in this file is available to employers upon request.

Cooperative Plan

UAH has recently developed a Cooperative Plan which is available to a limited number of qualified students. The Plan operates on a program of alternating academic and work quarters over a period of five years. The students are divided into two sections, with the co-ops of one section exchanging places with those of the other section every three months for four years. At the beginning of the fifth year, both sections merge and remain at UAH until completion of the degree requirements.

Organizations which employ co-op students compensate them for services rendered. Thus, participation in the Plan can assist students in defraying part of their education expenses and in acquiring an understanding of thrift and financial planning. However, of perhaps greater importance, the Plan allows the undergraduate student to obtain education which never could be gleaned from textbooks. In addition to obtaining valuable experience in their chosen profession, the co-op students get practical insight into sociology, psychology,
economics, and ethics from daily association with their fellow employees.

Students in the Cooperative Plan are selected from applicants on the basis of high scholarship and aptitude for the work involved. Although students majoring in all of the disciplines at UAH may be considered as potential candidates, a major portion of the work positions are for students majoring in the physical sciences and mathematics or pursuing an engineering degree.

Students interested in making application for admission into the Cooperative Plan should contact the Division of 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.

UAH participates in the Law Enforcement Student Grant Program. This program makes available payments for tuition and fees not exceeding $200 per academic term for students enrolled full-time or part-time in an undergraduate or graduate program leading to a degree or certificate in an area related to law enforcement. Recipients must be full-time employees of a publicly funded law enforcement agency and must agree to remain in the service of the employing agency for a period of two years following completion of any course of study funded by a grant.

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 in turn is responsible for paying his fees directly to the University.

The Veterans Administration will make full payment only when the student’s schedule includes at least 9 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 Educational 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 Housing

The University of Alabama in Huntsville is primarily a commuter campus at this time, and student housing is not provided on campus. Residence halls on, or adjacent to, the campus are being considered for the near future.

Apartments are available in the Huntsville community. Information concerning lists of community housing available and rates may be secured by writing to the Office of Student Affairs, Student Housing, The University of Alabama in Huntsville, P. O. Box 1247, Huntsville, Alabama 35807.
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.

The SGA sponsors several activities in the Student Union program. It helps finance dances and other social activities, the UAH Rowing Club, the intramural sports program, the UAH Film Series, the school newspaper, the yearbook, and the UAH Cultural Series.

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, Film and Lecture Series*—SGA sponsors dances, usually held once a month, and films and lectures throughout the year, all of which are held in the Union.

*Book Nook*—The University’s paperback bookstore has both popular and text paperbacks, as well as records, posters, UAH stationery, jackets, and art 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* provides convenient eating facilities and is open from 7:30 a.m.-5:00 p.m., Monday-Friday. 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.

*“Unionaction”*—An information bulletin issued periodically for the convenience of the University community lists the coming events.

**Student Publications**

“exponent,” the official student newspaper, is published bi-weekly. 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 paper known as “Advocate.” This publication deals with what SGA is doing and some of the problems it is confronting.

**UAH Rowing Club**

The UAH Rowing Club provides an opportunity for students to develop physically and emotionally within a framework of cooperation and teamwork.

36
As charter members of the Southern Intercollegiate Rowing Association, the UAH Crew 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 1969-70 UAH varsity crew ranked high in the Southern Conference.

Competition is not limited to the Southern Conference. Non-conference races are held with crews from Boston University, Dartmouth College, Marietta College, The University of Wisconsin, Purdue University, Kansas State University, Morris Harvey College, and Washburn College.

The UAH Crew also participates in the following major regattas: Miami, Cypress Gardens, Mid-American, President’s Cup, and the Dad Vail. The 1969-70 varsity crew placed 11th nationally in small college rankings after a good showing at the Dad Vail.

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 experiences related to their particular needs. 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, crew, and tennis.

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.

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.

Circle K

The Circle K Club offers men students a chance to become involved in community and campus service projects. Past interests of the club include disadvantaged youth, ecology, minority concerns and drug education. Circle K, open to all men students, holds weekly meetings and occasional social events.

Gamma Xi

Gamma Xi, a chapter of the National Gamma Sigma Sigma Sorority, is a service organization for university women students dedicated to helping the university, community, and nation. Gamma Xi is open to all women students who are willing to work in service projects.

UAH Sigma Xi Club

The UAH Sigma Xi Club was formed to encourage and promote the activities of the Society of Sigma Xi. The Society of Sigma Xi is an honorary organization devoted to the encouragement of original investigation of pure and applied sciences. Membership in the UAH Club is restricted to members and associate members of the Society of Sigma Xi and to certain other persons not members of the Society but who in view of their published research and professional standing would be considered as qualified for Society membership.
World Perspective Club

Members of the World Perspective Club meet monthly to discuss topics related to current events and current social problems. The meetings are held in the homes of the history faculty giving students an opportunity to exchange ideas with their teachers in a social and informal setting.

The members also raise funds for various service projects.

Any interested student may join.

The Engineering Society

The Engineering Society provides an opportunity for engineering students to meet and discuss matters of interest relevant to the engineering profession and to the UAH community. The Society sponsors guest speakers, social functions, and explores the opportunities in the engineering profession.

Society of Physics Students

The UAH Chapter of the Society of Physics Students promotes educational activities for all students interested in physics, and awards recognition and distinction to students who have achieved high scholarship in physics by electing them to the status of Sigma Pi Sigma membership within the society.

The University Cultural Series

The University Cultural Series, jointly sponsored by the SGA and the UAH faculty and administration, presents lecturers and
performances to stimulate the cultural interests of the students. Full-time students may draw one free 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 in the Book Nook in the University Union.

**UAH Film Series**

The UAH Film Series, free to UAH students, shows art, foreign, and classic movies monthly. The intent behind the Series is to 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.

**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.

**Honor Societies**

The attainment of academic excellence is recognized through various honor societies. High scholarship in physics qualifies students in this discipline for membership in Sigma Pi Sigma, the national honor organization in physics. UAH is eligible to organize a chapter of Phi Eta Sigma, a national honor society; this honorary fraternity recognizes superior scholarship of freshmen men.

Other honor societies are being chartered as the University continues to develop its full academic program.
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 and mathematics. A student wishing to take 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 German or 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 had chemistry in high school must take an advanced chemistry examination in order to continue his study of chemistry 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, and French—$3.00 each. Students are charged only for the tests they take.

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. 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 of a particular course being 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. Changes made any other way are void.

**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. (Approval of the director of the division in which the course is taught is required on the Change of Course Form.)
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 (excepting "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</td>
</tr>
<tr>
<td></td>
<td>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>Student Classification</th>
<th>Semester Hrs. Earned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshman</td>
<td>0-29</td>
</tr>
<tr>
<td>Sophomore</td>
<td>30-59</td>
</tr>
<tr>
<td>Junior</td>
<td>60-91</td>
</tr>
<tr>
<td>Senior</td>
<td>92 up</td>
</tr>
</tbody>
</table>

**Academic Workload**

A full-time undergraduate student is one who is enrolled in courses totaling at least 9 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 1-8 semester hours.

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 (90-100) Superior</td>
<td>3</td>
</tr>
<tr>
<td>B (80-89) Above Average</td>
<td>2</td>
</tr>
<tr>
<td>C (70-79) Average</td>
<td>1</td>
</tr>
<tr>
<td>D (60-69) Passing</td>
<td>0</td>
</tr>
<tr>
<td>F (0-59) Failure</td>
<td>0</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 a 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 home address of 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 9 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 9 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 9 semester hours are completed, be designated as an Honor Scholar.

SCHOLAR

A student earning 9 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 9 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 9 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 2.40-2.79 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 and commencement programs.

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 9 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 the 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>Overall Quality Point Average</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>—</td>
<td>And 0</td>
<td>Probation Removed</td>
</tr>
<tr>
<td>Less than 1.0</td>
<td>1.0 or higher</td>
<td>or 7 or less</td>
<td>Probation Continued</td>
</tr>
<tr>
<td>Less than 1.0</td>
<td>Less than 1.0</td>
<td>Plus more than 7</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 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.)

Change of Program

Students who are pursuing one program of study at UAH and desire to change to another 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. A request for a change of program must be approved by the director of the division to which the change is proposed before the change is effective.

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

The maximum amount of correspondence or extension credit allowed from any accredited institution toward a bachelor’s degree at UAH is 25% of the total degree requirements.

Persons interested in taking correspondence study courses at the University of Alabama in Tuscaloosa may contact the Extension Division, University of Alabama, P.O. Box 2987, University, Alabama 35486.
UNDERGRADUATE ACADEMIC PROGRAMS

The undergraduate academic programs of The University of Alabama in Huntsville are administered by four divisions:

- Division of the Humanities
- Division of Social and Behavioral Sciences
- Division of Natural Sciences and Mathematics
- Division of Engineering

The University of Alabama in Huntsville endorses a philosophy of education which sees the need for both a solid core of liberal learning and study in areas of the student's choice. In the Division of the Humanities, the Division of Social and Behavioral Sciences, and the Division of Natural Sciences and Mathematics, this is made possible through a degree program with three phases: general education; area of concentration; and electives.

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.

The area of concentration (AOC) phase consists of two parts: a major area of study, and a cluster of supportive courses. The major area of study includes courses chosen by the students and approved within identified limitations from one of the approved major disciplines or a combination of related courses from two or more approved major disciplines. The cluster of courses may be chosen to relate to the major area of study or to provide a background in another area for a student's specific purpose. Each division has defined specific philosophies within the concept.

The elective phase allows a student to broaden and enhance his education plans. A student may count as an elective any course offered by UAH so long as the content does not duplicate the same or lower level of courses being applied to meet the degree requirements.

Academic programs offered at UAH allow a student flexibility in planning an academic career with guidance and counsel and with freedom to cross traditional boundaries of knowledge.

A student should declare his AOC no later than the term in which he completes 64 semester hours. In preparing his AOC form, the student should be extremely careful to fulfill all requirements listed under Undergraduate Degree requirements on page 57 to page 60.

Detailed information concerning each major area of concentration will be found in the divisional section in which the major is offered.
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
- Political Science

Courses are also offered in Sociology.

Division Of Natural Sciences And Mathematics

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

Courses also are offered in the Earth Sciences.

Division Of Engineering

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

Detailed information concerning the unified engineering curriculum will be found in the section, Division of Engineering.

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 those which follow for the School of Dentistry at the University of Alabama in Birmingham:

1. Biology
2. Inorganic chemistry (including qualitative analysis)
3. Organic chemistry
4. Quantitative analysis
5. Physics (including laboratory)
6. College algebra and trigonometry
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.
8. The completion of a minimum of 90 semester hours of collegiate work.
Students should elect courses in mathematics through calculus and should not elect biology courses that constitute a part of the dental school curriculum.

**Nursing**

Students interested in nursing as a career can initiate a degree program at UAH and plan to transfer to the School of Nursing at The University of Alabama in Birmingham to complete degree requirements. A curriculum for the first two years is now offered at UAH.

The University of Alabama in Huntsville has applied recently for federal and state funding to underwrite a complete four-year nursing program leading to the B.S. degree in nursing. Should funding be secured, the initial class in the UAH degree program would enter in the Fall of 1971. The entire academic program, including pre-clinical and clinical requirements, would be satisfied at The University of Alabama in Huntsville.

Further information regarding the baccalaureate degree in nursing may be secured by calling the office of the Director of the UAH Nursing Division.

**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 Hrs.</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.

**Commerce and Business Administration**

Students interested in obtaining a degree in one of the concentrations of commerce and business from the University of Alabama
in Tuscaloosa will find it possible to complete up to 75% of the undergraduate degree program at UAH. Proper course selection is the responsibility of the student. Professional courses are validated when a student successfully completes one additional course in the sequence after transfer.

Typical of the requirements for admission to the MBA program are those which follow for the School of Commerce and Business Administration at the University of Alabama in Tuscaloosa.

<table>
<thead>
<tr>
<th>Semester Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principles of Accounting</td>
</tr>
<tr>
<td>Business Law</td>
</tr>
<tr>
<td>Business Statistics</td>
</tr>
<tr>
<td>Principles of Economics</td>
</tr>
<tr>
<td>Corporate Financial Policy</td>
</tr>
<tr>
<td>Principles of Business Organization</td>
</tr>
<tr>
<td>Marketing</td>
</tr>
</tbody>
</table>

**Education—Teaching Certificates**

A student may complete professional requirements for a Class E: 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.

**Undergraduate Degree Requirements**

**Degrees Offered**

Programs for the undergraduate degrees of Bachelor of Arts, Bachelor of Science, and Bachelor of Science in Engineering 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, Physics

**Bachelor of Science in Engineering:**
- Unified Programs with Professional Specializations

57
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. 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; and (c.) UAH and overall in the major and in all other courses in the AOC.

General Education Requirements

for the

BACHELOR OF ARTS DEGREE

Humanities

<table>
<thead>
<tr>
<th>Course</th>
<th>Semester Hrs.</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 and Development of the Contemporary World</td>
<td>6</td>
</tr>
</tbody>
</table>

Social and Behavioral Sciences

Economics, Political Science, Psychology, or Sociology (or Philosophy from the Division of the Humanities) (one discipline) 6

If major is economics or psychology, basic social sciences requirement should be taken in one of the other areas.

Science—Mathematics

A student may select any of the following groups:

a. 6 hours mathematics
   8 hours laboratory science in one of biology, chemistry or physics
b. 8 hours in each of two laboratory sciences
c. 3 hours mathematics
8 hours in a physical science or biology
4 hours in the other area (physical science or biology)
d. 12 hours natural science (NS 111, 112, and 113)
3 hours mathematics

Foreign Language

One Language ........................................... 6-12

Students who have a competence in a language will be placed at the appropriate level by the foreign language faculty and may complete this requirement with 6 hours beyond the elementary level in that language. No credit is advanced for exemption from any portion of the language requirement. Additional specific requirements are listed by departments approved to offer a major.

To meet the requirements for the Bachelor of Arts degree, a student will take 44-52 semester hours listed in General Education Requirements. A student may take no more than 64 semester hours in his total AOC program (a major with a supportive cluster). All prerequisites will be included in this 64-hour maximum. He may take up to 52 semester hours in his major, including courses in his major listed in General Education Requirements. Courses in the General Education Requirements, which are also part of the major or cluster, are not used in computing the maximum number of hours (64) that can be taken in the AOC.

General Education Requirements for the

BACHELOR OF SCIENCE DEGREE

Humanities

<table>
<thead>
<tr>
<th>Course</th>
<th>Semester Hrs.</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 and Development of the Contemporary World</td>
<td>6</td>
</tr>
</tbody>
</table>

Social and Behavioral Sciences

Economics, Political Science, Psychology, or Sociology (or Philosophy from the Division of the Humanities) (one discipline) ........................................ 6
Natural Science

Biology, Chemistry, or Physics ......................... 16
(8 hours each in two)

Mathematics ................................................. 9

Foreign Language

One language ................................................. 6-12

Students who have a competence in a language will be placed at the appropriate level by the foreign language faculty and may complete this requirement with 6 hours beyond the elementary level in that language. No credit is advanced for exemption from any portion of the language requirement. Additional specific requirements are listed by departments approved to offer a major.

To meet the requirements for the Bachelor of Science degree, a student will take 55-61 semester hours listed in General Education Requirements. A student may take no more than 64 semester hours in his total AOC program (a major with a supportive cluster). All prerequisites will be included in this 64-hour maximum. He may take up to 52 semester hours in his major, including courses in his major listed in General Education Requirements. Courses in the General Education Requirements, which are also part of the major or cluster, are not used in computing the maximum number of hours (64) that can be taken in the AOC.

Requirements
for the

BACHELOR OF SCIENCE IN ENGINEERING DEGREE

The requirements for this degree are identified in the section, Division of Engineering.
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 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.

Plan I. Visual Art Program

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

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

   Upper Division (22 semester hours)

   Junior Year: 6 hours (3 courses) in a major studio area (painting, communication graphics, or sculpture) at the 300 level; 7 hours: consisting of 4 hours (2 courses—2 hours each in a different studio area at the 300 level), and 3 hours in art history.

   Senior Year: 6 hours (3 courses) in a 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:

   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 three lower division studio areas (design, drawing, sculpture).

**Upper Division** (22 or 23 semester hours):

a. 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).

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

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

III. **Major in Art with Certification**:

(For Class B Secondary Art Professional Teaching Certificate, Grades 7-12; the Class B Elementary-Secondary Art Teaching Certificate, grades 1-12; and the Art Major for the UAH program leading to Elementary Certification)

**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). Prerequisites for upper division courses should be kept in mind in selecting courses.

**Upper Division** (15 or 16 semester hours): 3 hours of art history at 300 level; 2 hours in painting (Art 370 or 371); 8 hours (4 courses in studio, including at least two areas, at least 4 hours of which will be at the 300 level); one additional course (2 to 3 hours) in art elected by the student.

Cluster Program. For an Elementary Teaching Certificate required professional courses in education constitute the Cluster. For a Secondary or Elementary-Secondary Certificate in Art the Cluster of 21 hours can include 18 hours in a teaching minor subject selected from the group approved by the State Department of Education on file in the Art Office. The other three hours can be of a supportive nature.

Basic requirements for teacher certification (secondary and elementary) are identified elsewhere in the section, *Division of the Humanities*. Teacher certification requirements (other than listed in basic core) will include Art Methods (ED 388 or ARS 215) and Practice Teaching in Art (ED 497).

**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

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. 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 9 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 (ART)

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.

122. THREE-DIMENSIONAL FORM IN DESIGN. 2 hrs.
Studio analysis and development of forms by the use of basic principles of three-dimensional expression and manipulation.

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 more traditional means of line, value, texture, etc.

161. DRAWING WITH FLUID MEDIA. 2 hrs.
Introduction to the use of inks, washes, oils, gouache, etc., in art-image making.

162. DRAWING LIGHT-ON-DARK MEDIA. 2 hrs.
Introduction to the additive use of light reflectivity in drawing, especially useful in preparation for oil painting.

163. DRAWING WITH COLLAGE. 2 hrs.
Introduction to the drawing systems that involve assembling preformed 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. Recommended for all 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.

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.

330. COMMUNICATION GRAPHICS—FUNDAMENTALS. 2 hrs.
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 fusion and additive characteristics of oil paints.  Prerequisite: Art 100 or 101; one of Art 120, 121, 122; and one of Art 160, 161, 162, 163, or approval of instructor.

371. TEMPERA PAINTING.  2 hrs.
Advanced studio experience in the quick-curing tempera media so widely used in contemporary expression.  Prerequisite: Art 100 or 101; one of Art 120, 121, 122; 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, 122; and one of Art 160, 161, 162, 163 or approval of instructor.

400. ART HISTORY SEMINAR: RENAISSANCE AND BAROQUE.  3 hrs.
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. 3 hrs.
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.

430. ADVANCED STUDIO PROBLEMS IN COMMUNICATION GRAPHICS. 2 hrs.
Individual content by consultation. Prerequisite: Senior standing.

431. ADVANCED STUDIO PROBLEMS IN COMMUNICATION GRAPHICS. 2 hrs.
Individual content by consultation. Prerequisite: Senior standing.

432. ADVANCED STUDIO PROBLEMS IN COMMUNICATION GRAPHICS. 2 hrs.
Individual content by consultation. Prerequisite: Senior standing.

440. ADVANCED STUDIO PROBLEMS IN SCULPTURE. 2 hrs.
Individual content by consultation. Prerequisite: Senior standing.

441. ADVANCED STUDIO PROBLEMS IN SCULPTURE. 2 hrs.
Individual content by consultation. Prerequisite: Senior standing.

442. ADVANCED STUDIO PROBLEMS IN SCULPTURE. 2 hrs.
Individual content by consultation. Prerequisite: Senior standing.

470. ADVANCED STUDIO PROBLEMS IN PAINTING. 2 hrs.
Individual content by consultation. Prerequisite: Senior standing.

471. ADVANCED STUDIO PROBLEMS IN PAINTING. 2 hrs.
Individual content by consultation. Prerequisite: Senior standing.

472. ADVANCED STUDIO PROBLEMS IN PAINTING. 2 hrs.
Individual content by consultation. Prerequisite: Senior standing.

490. 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.

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.

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**

**HUMANITIES**

<table>
<thead>
<tr>
<th>Course</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**

<table>
<thead>
<tr>
<th>Course</th>
<th>Semester Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economics, Political Science or Sociology</td>
<td>6</td>
</tr>
<tr>
<td>(6 hours from one discipline named above)</td>
<td></td>
</tr>
<tr>
<td>Economics, Political Science, Sociology or History from</td>
<td>6</td>
</tr>
<tr>
<td>the Division of Humanities. (A minimum of 3 hours in SBS</td>
<td></td>
</tr>
<tr>
<td>in a discipline other than the one chosen above)</td>
<td></td>
</tr>
<tr>
<td>Psychology (PY 103)</td>
<td>3</td>
</tr>
</tbody>
</table>

**SCIENCE-MATHEMATICS**

<table>
<thead>
<tr>
<th>Course</th>
<th>Semester Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>For B.A. Degree 8 hours in a physical science or biology; 4 hours in the other area</td>
<td>12</td>
</tr>
<tr>
<td>Mathematics (MA 104)</td>
<td>3</td>
</tr>
<tr>
<td>For B.S. Degree 8 hours in chemistry or physics; 8 hours in biology</td>
<td>16</td>
</tr>
<tr>
<td>Mathematics</td>
<td>9</td>
</tr>
</tbody>
</table>
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:  

English  
   a. English Composition  6  
   b. Survey of English Literature  6  

Social Sciences  
   a. Origins and Development of the Contemporary World  6  
   b. Economics, Political Science, or Sociology  
      (History majors are encouraged to choose Political Science or Economics.)  6  

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).  12  
   Mathematics (MA 104)  3  
   Speech (EH 110, 113 or 114)  3  
   Psychology  3  

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:  

ED 261 Foundations of Education in the United States  3  
ED 263 Educational Psychology  3  
ED 388 Teaching Secondary School Subjects  3  
ED 490 Principles of High School Teaching  3  
ED 497 Secondary Student Teaching  9  

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

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.

498. 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

493. EDUCATION OF EXCEPTIONAL CHILDREN AND YOUTH. 3 hrs. Introduction to the field of exceptional children and youth. Prerequisite: ED 263.
494. STUDENT TEACHING IN SPECIAL EDUCATION. 3 hrs.
Prerequisite: ED 495, 496, and admission to the teacher education program.

495. PSYCHOLOGY AND EDUCATION OF THE MENTALLY RETARDED I. 3 hrs.
Social, emotional, physical, and learning characteristics of retarded children and youth. Prerequisite: ED 263.

496. 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.

499. EDUCATION AND CARE OF CRIPPLED CHILDREN AND YOUTH. 3 hrs.
Analysis of special problems encountered in teaching orthopedically-involved children and youth; includes cerebral palseied and educational implications and adaptations.

Librarianship

101. INTRODUCTION TO LIBRARIES AND BIBLIOGRAPHY. 2 hrs.
Systems of library retrieval and their use; construction of bibliographies and footnotes; library resources of the area.

380. 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.

571. FUNCTION AND USE OF THE SCHOOL LIBRARY. 3 hrs.
School libraries in educational programs; includes historical development of libraries, standards, library service to teachers and pupils, use of the library.

573. 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.

588. 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 student interested in graduate study in education should refer to the Graduate School Catalog and the College of Education Catalog of the University of Alabama in Tuscaloosa for complete description of admission requirements and courses. Students are advised to seek counseling in establishing their program needs.

Graduate work for the Master of Arts degree is offered by the College of Education in: administration and supervision; art education; business education; counseling and guidance (including stu-
dent personnel work in higher education and vocational rehabilitation counseling; curriculum study and research; educational psychology (including a program for the preparation of reading improvement specialist); elementary education; health, physical education, and recreation; home economics education; music education; school librarianship; secondary education; special education for exceptional children; and vocational industrial education.

Graduate Education Courses

703. SOURCES OF AMERICAN EDUCATIONAL THOUGHT (SAME AS UA EDH 203).

711. PRINCIPLES OF GUIDANCE (SAME AS UA CGP 211).

722. MODERN ELEMENTARY SCHOOL PROGRAMS (SAME AS UA EED 222).

730. MODERN SECONDARY SCHOOL PROGRAMS (SAME AS UA SED 230).

733. INTRODUCTION TO PUBLIC SCHOOL ORGANIZATION AND ADMINISTRATION (SAME AS UA ACD 233).

763. CONTRIBUTIONS OF PSYCHOLOGY TO TEACHING (SAME AS UA EPY 263).

791. PRINCIPLES OF CURRICULUM DEVELOPMENT (SAME AS UA ACD 291).

English (EH)

Area of Concentration (AQC) 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>
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</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></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>
<th>Basic courses (EH 101-102 or 103-104 and EH 205-206)</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Shakespeare (EH 360)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>One course chosen from Groups I, II, or III as listed in requirements for English major</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Electives in English</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>21</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.

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.

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.

120. **PERSUASION AND DEBATE (SPEECH).** 3 hrs. Study and practice in the techniques of problem-solving. Emphasis on the modes of discussion, persuasion, argumentation, and debate. Credit may not be applied to English major or supportive cluster in English.

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.

210. **FICTION WRITING.** 3 hrs. Practice in the writing of fiction, from conception to revision. Approval of instructor.

211. **FICTION WRITING.** 3 hrs. Practice in the writing of fiction, from conception to revision. Approval of instructor.
212. POETRY WRITING. 3 hrs.
Practice in the writing of poetry, from conception to revision. Approval of instructor.

213. POETRY WRITING. 3 hrs.
Practice in the writing of poetry, from conception to revision. Approval of instructor.

240. WORLD LITERATURE. 3 hrs.
Selected major contributions to Western civilization; Homer to Dante.

241. WORLD LITERATURE. 3 hrs.
Selected major contributions to Western civilization; Rabelais to the present.

300. BIBLIOGRAPHY. 1 hr.
Lectures and practice in the techniques and materials of research in English and American literature.

330. MAJOR AMERICAN WRITERS. 3 hrs.
Major writers from the Colonial period to Whitman and Melville.

331. MAJOR AMERICAN WRITERS. 3 hrs.
Dickinson to Eliot and Faulkner.

360. SHAKESPEARE. 3 hrs.
Renaissance background and at least six plays, including history, comedy, and major tragedies.

380. RESTORATION AND EARLY 18TH CENTURY. 3 hrs.
Dryden, Swift, Pope, and others.

381. LATER 18TH CENTURY. 3 hrs.
Johnson, Boswell, and others.

390. THE ROMANTIC PERIOD. 3 hrs.
Poetry and non-fictional prose, 1780-1832.

391. THE VICTORIAN PERIOD. 3 hrs.
Poetry and non-fictional prose, 1832-1901.

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

420. MODERN POETRY. 3 hrs.
Major movements in American and British poetry of the 20th century.

421. MODERN DRAMA. 3 hrs.
A study of the major ideas and forces which originated new movements in drama from Ibsen to the present.

430. THE AMERICAN NOVEL. 3 hrs.
The theme and form of the American novel from Cooper to James.

431. THE AMERICAN NOVEL. 3 hrs.
Representative works from the school of naturalism to the present.

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

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

460. RENAISSANCE NON-DRAMATIC POETRY. 3 hrs.
Renaissance poetry exclusive of Shakespeare and Milton.

79
470. MILTON AND THE 17TH CENTURY. 3 hrs.
Milton, cavalier and metaphysical poetry, and selected prose.

471. ENGLISH DRAMA. 3 hrs.
From its beginnings to 1642, exclusive of Shakespeare.

492. THE ENGLISH NOVEL. 3 hrs.
Critical reading of representative novels, accompanied by historical survey of major trends. Fielding to Thackeray.

493. THE ENGLISH NOVEL. 3 hrs.
Critical reading of representative novels, accompanied by historical survey of major trends. George Eliot to present.

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

500. LITERARY CRITICISM. 3 hrs.
Major theories and methods, with applications by the student.

530. AMERICAN LITERATURE SEMINAR. 3 hrs.
Intensive study of one or more writers, groups, or movements, announced in advance.

540. ENGLISH LITERATURE SEMINAR. 3 hrs.
Intensive study of one or more writers, groups, or movements, announced in advance.

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 501 or 502. 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 America, 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.

Supportive History Clusters

A student interested in an established history cluster should include appropriate history courses involving a minimum of 21 semester hours and including 6 semester hours in courses numbered 300 or above. Appropriate history courses may also form a part of a cluster with other disciplines to support another major program. Such a cluster must be approved by the student’s advisor in coordination with the Department Chairman and must meet the requirements established in (3) above.

History (HY)

101. ORIGINS AND DEVELOPMENT OF THE CONTEMPORARY WORLD, PART I. 3 hrs.
A general survey of the major western civilizations to 1648. Not open to seniors.

101. ORIGINS AND DEVELOPMENT OF THE CONTEMPORARY WORLD, PART I. (Tutorial) 3 hrs.
Similar to HY 101. Students are held responsible for the full work of the course, but emphasis is given to developing the basic skills of historical study. Permission of history faculty required.

101- ORIGINS AND DEVELOPMENT OF THE CONTEMPORARY WORLD, PART I. (Honors) 3 hrs.
Similar to, but more intensive than HY 101. Open only to students whose placement test scores, and high school grades, indicate superior ability. Wider reading assignments, participation in class discussion, and individualized study expected. Permission of history faculty required.
102. ORIGINS AND DEVELOPMENT OF THE CONTEMPORARY WORLD, PART II. 3 hrs.
A study of the development of modern institutions, technological advancements and values within the Western World from 1648 to the present, with particular attention to the rise and dominance of the West and the reaction of the non-Western world. Not open to seniors.

102- ORIGINS AND DEVELOPMENT OF THE CONTEMPORARY WORLD, PART II. (Tutorial) 3 hrs.
Similar to HY 102. Students are held responsible for the full work of the course, but emphasis is given to developing the basic skills of historical study. Permission of history faculty required.

102- ORIGINS AND DEVELOPMENT OF THE CONTEMPORARY WORLD, PART II. (Honors) 3 hrs.
Similar to, but more intensive than HY 102. Open only to students whose placement test scores, and high school grades, indicate superior ability. Wider reading assignments, participation in class discussion, and individualized study expected. Permission of history faculty required.

Courses below are open to all students other than beginning freshmen, with exceptions as indicated.

201. CURRENT AMERICAN ISSUES IN HISTORICAL PERSPECTIVE. 1 hr.
The historical background and present significance of selected topics in twentieth century American experience (e.g. racial problems, the urban crisis, the impact of technology).

202. CURRENT WORLD ISSUES IN HISTORICAL PERSPECTIVE. 1 hr.
A study of selected topics in world history during the twentieth century designed to foster an historical awareness of present day problems (e.g. World Communism, the Meaning of Anti-Semitism, the Emergence of Africa).

221. THE UNITED STATES TO 1877. 3 hrs.
A general survey of the history of the United States from discovery of America through the Civil War and Reconstruction.

222. THE UNITED STATES SINCE 1877. 3 hrs.
A general survey of the history of the United States from the end of the Civil War era to the present.

225. HISTORY OF ALABAMA. 3 hrs.
A survey of the State’s past from colonial times to the present with emphasis on its place in United States history.

229. SURVEY OF ANCIENT TIMES. 3 hrs.
A survey of the history of the ancient Near East, Greece, and Rome. Prerequisite: 101-102 or approval of instructor.

230. THE MEDIEVAL WORLD. 3 hrs.
A survey of the history of Europe from 500 to 1500. Prerequisite: HY 101-102 or approval of instructor.

237. COLONIAL LATIN AMERICA. 3 hrs.
A study of the political, social, and cultural Spanish and Portuguese colonial systems and their development in America.

238. NATIONAL LATIN AMERICA. 3 hrs.
A general study of the peoples, cultures, and societies of Spanish and Portuguese America since Independence with attention to problems of Latin American cultural development and social change and their importance for North Americans.

247. HISTORY OF ENGLAND TO 1660. 3 hrs.
A general study of England from the earliest times to 1660 with attention to
constitutional, political, economic, social, and intellectual developments. Prerequisite: HY 101-102 or approval of instructor.

248. HISTORY OF ENGLAND SINCE 1660. 3 hrs.
A general study of England with attention to constitutional, political, economic, social, and intellectual developments. Prerequisite: HY 101-102 or approval of instructor.

249. CURRENT WORLD HISTORY. 3 hrs.
A broadly based study of the post World War II period involving all continents.

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. HISTORY OF FRANCE SINCE 1715. 3 hrs.
A study of the political, economic, social, and cultural developments from the close of the reign of Louis XIV to the post-DeGaulle era of the Fifth Republic. Prerequisite: HY 101-102.

342. HISTORY OF GERMANY. 1848-1971. 3 hrs.
A study of the Germanies from the Peace of Westphalia to the creation of the German Empire with emphasis upon the rise of Brandenburg-Prussia to the position of rivalry with the Austrian Hapsburgs and leadership in the unification of Germany. Prerequisite: HY 101-102.

343. HISTORY OF GERMANY SINCE 1871. 3 hrs.
A study of the past century of German history with 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 101-102.

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.

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. NINETEENTH-CENTURY RUSSIA, 1801-1905. 3 hrs.
Political, diplomatic, social, economic and intellectual developments in Imperial Russia from Alexander I to the Russo-Japanese War. Emphasis is placed on the influences of Western ideas and Marxism on the institutional structure of Russia. Prerequisite: HY 101-102 or approval of instructor.

376. TWENTIETH-CENTURY RUSSIA, 1905 TO PRESENT. 3 hrs.
The problems and issues involved in the Russian Revolution and the development of the Soviet Union. Prerequisite: HY 101-102 or approval of instructor.

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, FROM THE RENAISSANCE TO NAPOLEON. 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 NAPOLEON. 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 OLD SOUTH. 3 hrs.
The colonial South through secession including the development and operation of the 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 NEW SOUTH. 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.

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 101 or approval of instructor.

477. EUROPE IN THE AGE OF REVOLUTION, 1848. 3 hrs.
A study of revolution and reaction, nationalism, liberalism, and democracy from the French Revolutions of 1848. Prerequisite: HY 221 or approval of instructor.

483. EUROPE, NATIONALISM AND IMPERIALISM. 3 hrs.
An intensive study of Europe in the period of intensification of national power and its repercussions culminating in the outbreak of the War of 1914. Prerequisite: HY 392 or approval of instructor.

528. JEFFERSONIAN-JACKSONIAN AMERICA, 1790-1850. 3 hrs.
A study of the Federalist Period, Jeffersonian Democracy, Jacksonian Democracy, and the era of Manifest Destiny. 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 examination of the period from 1865 to 1914 with particular attention to the origins of twentieth-century United States. Prerequisite: HY 221, 222, or approval of instructor.
538. TWENTIETH CENTURY AMERICAN HISTORY. 3 hrs.
A study of the United States in the twentieth century with particular attention to the period since World War II. 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, 1740-1799. 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>
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</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 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>Area</th>
<th>Semester Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. General Education Requirements</td>
<td>44-52</td>
</tr>
<tr>
<td>II. Area of Concentration</td>
<td>39</td>
</tr>
<tr>
<td>(27 above basic language courses)</td>
<td></td>
</tr>
<tr>
<td>III. Cluster</td>
<td>21-24</td>
</tr>
<tr>
<td>IV. Electives</td>
<td>13-24</td>
</tr>
<tr>
<td></td>
<td>128</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>Area</th>
<th>Semester Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Language courses</td>
<td>9</td>
</tr>
<tr>
<td>303, 304, 308</td>
<td></td>
</tr>
<tr>
<td>2. Literature courses</td>
<td>15</td>
</tr>
<tr>
<td>305, 306 plus 3 courses at the 400 level</td>
<td></td>
</tr>
<tr>
<td>3. Electives</td>
<td>3</td>
</tr>
<tr>
<td>301, 307 or any course at the 400 level</td>
<td></td>
</tr>
<tr>
<td></td>
<td>27</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 Hrs.</th>
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</thead>
<tbody>
<tr>
<td>9</td>
</tr>
</tbody>
</table>

| 1. Language courses 311, 312, 316 or 317 |
| 15 |

| 2. Literature courses 313, 314 plus 3 courses at the 400 level |
| 3 |

| 3. Electives 310, 316, 317 or any course at the 400 level |
| 27 |

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

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

French

001. FRENCH REVIEW. No credit

101. ELEMENTARY FRENCH. 3 hrs.
(No credit without ML 102).

102. ELEMENTARY FRENCH. 3 hrs.
Prerequisite: ML 101.

201. INTERMEDIATE FRENCH. 3 hrs.
Prerequisite: ML 102 or placement

202. INTERMEDIATE FRENCH. 3 hrs.
Prerequisite: ML 201.

301. ADVANCED FRENCH. 3 hrs.
Rapid reading, conversation, literature. Prerequisite ML 202.

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.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>308</td>
<td>PHONOLOGY OF MODERN FRENCH.</td>
<td>3 hrs.</td>
</tr>
<tr>
<td>403</td>
<td>EPIC AND CHIVALRIC POETRY.</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>A study of outstanding epic and chivalric poems.</td>
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<td></td>
<td>The list of authors on the program may vary</td>
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<tr>
<td></td>
<td>from time to time (Chanson de Roland, Marie de</td>
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<td></td>
<td>France, Adenet le Roy, Chrstien de Troyes,</td>
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<td></td>
<td>Beroul, Thomas, etc.). Prerequisite: ML 305-306.</td>
<td></td>
</tr>
<tr>
<td>404</td>
<td>CLASSICAL THEATER.</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>A study of the masterpieces of French</td>
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<tr>
<td></td>
<td>classic authors—Corneille, Racine, Moliere.</td>
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<tr>
<td></td>
<td>Prerequisite: ML 305-306.</td>
<td></td>
</tr>
<tr>
<td>405</td>
<td>THE CENTURY OF THE ENLIGHTENMENT.</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>A study of the representative writings of</td>
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<td></td>
<td>Voltaire, Diderot, Montesquieu, Rousseau.</td>
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<td></td>
<td>Prerequisite: ML 305-306.</td>
<td></td>
</tr>
<tr>
<td>406</td>
<td>NINETEENTH CENTURY FRENCH NOVEL.</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>A study of the principal novelists of</td>
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<td></td>
<td>the nineteenth century—Balzac, Stendahl,</td>
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<td></td>
<td>Flaubert, Zola, Daudet. Prerequisite: ML 305-306.</td>
<td></td>
</tr>
<tr>
<td>407</td>
<td>TWENTIETH CENTURY FRENCH DRAMA.</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>A study of prominent modern and contemporary</td>
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<td></td>
<td>French dramatists—Claudel, Anouilh,</td>
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<td></td>
<td>Montherlant, Giraudoux, Genet, Adamov.</td>
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<td></td>
<td>Prerequisite: ML 305-306.</td>
<td></td>
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<tr>
<td>408</td>
<td>NOVELISTS FROM 1918 TO 1939.</td>
<td>3 hrs.</td>
</tr>
<tr>
<td></td>
<td>A study of the most influential French</td>
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<td></td>
<td>novelists of the period—Proust, Gide, Bernanos,</td>
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<tr>
<td></td>
<td>Malraux. Prerequisite: ML 305-306.</td>
<td></td>
</tr>
<tr>
<td>409</td>
<td>GREAT NAMES OF EXISTENTIALISM.</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>A study of the major works of Sartre, Camus,</td>
<td></td>
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<tr>
<td></td>
<td>Simone de Beauvoir, G. Marcel, Boris Vian.</td>
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<td></td>
<td>Prerequisite: ML 305-306.</td>
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<tr>
<td>499</td>
<td>INDEPENDENT STUDIES.</td>
<td>1-3 hrs.</td>
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<tr>
<td></td>
<td>Prerequisite: Approval of Department Chairman.</td>
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<tr>
<td>501</td>
<td>THE CONTEMPORARY NOVEL.</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>A seminar on the &quot;New Novel&quot;—Robbe Grillet,</td>
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<td></td>
<td>Natalie Sarraute, Butor, etc.</td>
<td></td>
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<tr>
<td></td>
<td>Prerequisite: ML 305-306.</td>
<td></td>
</tr>
<tr>
<td>502</td>
<td>HISTORY OF THE FRENCH LANGUAGE.</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>A phonological and morphological study of the</td>
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<td></td>
<td>developments of the French language from Vulgar</td>
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<td></td>
<td>Latin to Modern French. Prerequisite: ML 305-306.</td>
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</tr>
</tbody>
</table>

**German**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>011</td>
<td>GERMAN REVIEW.</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>(as an elective)</td>
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<tr>
<td>111</td>
<td>ELEMENTARY GERMAN I.</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>(No credit without ML 112.)</td>
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<tr>
<td>112</td>
<td>ELEMENTARY GERMAN II.</td>
<td>3 hrs.</td>
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<tr>
<td></td>
<td>Prerequisite: ML 111.</td>
<td></td>
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<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>
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<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>
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</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>
</tbody>
</table>
215. INTERMEDIATE GERMAN CONVERSATION. 3 hrs.
Optional course for students taking intermediate German courses, but also open to other qualified students. Prerequisite: ML 112 or placement.

310. ADVANCED GERMAN. 3 hrs.
Rapid reading, conversation, literature. Prerequisite: ML 212 or 214 or approval of Department Chairman.

311. GERMAN CONVERSATION. 3 hrs.
Oral drills, pronunciation exercises, simple oral reports. Prerequisites: ML 212 or ML 214 or approval of Department Chairman.

312. ADVANCED GERMAN COMPOSITION AND USAGE. 3 hrs.
Primarily a composition course with emphasis on idiomatic expression. Prerequisite: ML 212 or 214 or approval of Department Chairman.

313. SURVEY OF GERMAN LITERATURE. 3 hrs.
A study of German literature from its beginning to 1785. Prerequisite: ML 212 or 214 or approval of Department Chairman.

314. SURVEY OF GERMAN LITERATURE. 3 hrs.
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.

316. GERMAN CULTURE. 3 hrs.
Lectures and discussions on German cultural history. Prerequisite: ML 212 or 214 or approval of Department Chairman.

317. ADVANCED CONVERSATIONAL GERMAN. 3 hrs.
Prerequisite: ML 212 or 214 and 311 or approval of Department Chairman.

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, Iwein) 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-Hülshoff, 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, Boll, 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.

426. NINETEENTH CENTURY SPANISH NOVEL.
Representative novelists and their works: Valera, Alarcon, Pereda, Galdos, Baroja. Prerequisite: ML 325-326. 3 hrs.

Russian

131. ELEMENTARY RUSSIAN.
(No credit without ML 132.) 3 hrs.
132. ELEMENTARY RUSSIAN.  
Prerequisite: ML 131.  
3 hrs.

231. INTERMEDIATE RUSSIAN.  
Prerequisite: ML 132.  
3 hrs.

232. INTERMEDIATE RUSSIAN.  
Prerequisite: ML 231.  
3 hrs.

234. INTERMEDIATE SCIENTIFIC RUSSIAN.  
Prerequisite: ML 231.  
3 hrs.

331. RUSSIAN CONVERSATION AND COMPOSITION.  
Prerequisite: ML 232, or 234, or approval of instructor.  
3 hrs.

333. RUSSIAN MASTERPIECES IN ENGLISH TRANSLATION.  
Prerequisite: EH 206, or ML 232, or approval of instructor.  
3 hrs.

335. RUSSIAN CULTURE AND CIVILIZATION.  
Prerequisite: ML 232, or 234, or approval of instructor.  
3 hrs.

337. SURVEY OF RUSSIAN LITERATURE.  
A study of Russian literature from its beginnings to Pushkin. Prerequisite: 
ML 232, or 234, or approval of instructor.  
3 hrs.

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

433. MAJOR WRITERS OF THE NINETEENTH CENTURY.  
A study of representative works of Pushkin, Gogol and Dostoevsky. Pre­
requisite: ML 232 and approval of instructor.  
3 hrs.

434. MAJOR WRITERS OF THE NINETEENTH CENTURY.  
A continuation of ML 433. A study of representative works of Tolstoy, 
Turgenev, and Chekhov. Prerequisite: ML 232 and approval of instructor.  
3 hrs.

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 formu­
late his own with the approval of representative faculty advisors 
from the Departments involved.

Music (MU)

100. FUNDAMENTALS OF MUSIC.  
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.  
3 hrs.

101. THEORY OF MUSIC I.  
Intensive training in the fundamentals of musicianship, dealing principally 
3 hrs.
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.

102. THEORY OF MUSIC II. 3 hrs.
A continuation of MU 101. Prerequisite: MU 101.

103. THEORY OF MUSIC III. 3 hrs.
A continuation of MU 102. Prerequisite: MU 102.

110. INTRODUCTION TO MUSIC. 3 hrs.
A general course designed to promote the understanding of music through better listening practices.

111. AMERICAN FOLK MUSIC AND JAZZ. 3 hrs.
An introductory study of the history and development of American folk music and jazz. Special attention is given to current developments.

190. UAH CHOIR. 1 hr.
Mixed voices singing the serious choral repertoire. Open to all students of University. May be repeated.

191. PREMIER SINGERS. 1 hr.
Mixed voices singing “pop” and folk music. Open to all students of University. May be repeated.

192. HUNTSVILLE VILLAGE SINGERS. ½ hr.
Select, small ensemble of mixed voices. Open to all students of University by audition. May be repeated.

193. SUMMER CHORUS. 1 hr.
Mixed voices singing a variety of choral music. Open to all students of University. May be repeated.

201. ADVANCED THEORY OF MUSIC IV. 3 hrs.
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.

202. ADVANCED THEORY OF MUSIC V. 3 hrs.
A continuation of MU 201. Prerequisite: MU 201.

203. ADVANCED THEORY OF MUSIC VI. 3 hrs.

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 or 140 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. PRIVATE INSTRUCTION IN PIANO. 2/3 hr.
For non-music credit. May be repeated. Prerequisite: MU 100 or approval of instructor.

131, 132, 133, 231, 232, 233, 331, 332, 333, 431, 432, 433. PRIVATE INSTRUCTION IN PIANO.
For music credit.

140. PRIVATE INSTRUCTION IN VOICE. 2/3 hr.
For non-music credit. May be repeated. Prerequisite: MU 100 or approval of instructor.

141, 142, 143, 241, 242, 243, 341, 342, 343, 441, 442, 443. PRIVATE INSTRUCTION IN VOICE.
For music credit.

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.

102. INTRODUCTION TO LOGIC. 3 hrs.

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.)

201. HISTORY OF WESTERN PHILOSOPHY. 3 hrs.

From the earliest Greek philosophers to Aristotle.

202. HISTORY OF WESTERN PHILOSOPHY. 3 hrs.

From Aristotle to Descartes.

203. HISTORY OF WESTERN PHILOSOPHY. 3 hrs.

From Descartes to Kant.

204. HISTORY OF WESTERN PHILOSOPHY. 3 hrs.

From Kant to the twentieth century.

302. EPISTEMOLOGY. 3 hrs.

A critical investigation of the fundamental problems of knowledge. 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. Prerequisite: 6 hours of philosophy including PHL 101 or approval of instructor.

322. ETHICS. 3 hrs.

A critical investigation of the fundamental problems of moral values and human conduct. Prerequisite: 6 hours of philosophy including PHL 101 or approval of instructor.

332. PHILOSOPHY OF RELIGION. 3 hrs.

A critical evaluation of religious concepts, creeds, and dogma. Prerequisite: 6 hours of philosophy including PHL 101 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.)

372. AMERICAN PHILOSOPHY. 3 hrs.

Prerequisite: 6 hours of philosophy including PHL 101 or approval of instructor.

377. CONTEMPORARY PHILOSOPHY. 3 hrs.

An examination of some of the major trends in twentieth century philosophy.
such as phenomenology, existentialism and analytic philosophy. Prerequisite: PHL 101 and 3 hours of philosophy at the 200 level or approval of instructor.

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.

422. THE PHILOSOPHY OF DESCARTES. 3 hrs.
A critical evaluation of the major contributions of Descartes to epistemology and metaphysics. Prerequisite: 9 hours of philosophy including PHL 203 and 3 hours of philosophy 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.

428. THE PHILOSOPHY OF LEIBNIZ. 3 hrs.
A critical evaluation of the major contributions of Leibniz to epistemology and metaphysics. Prerequisite: 9 hours of philosophy including PHL 203 and 3 hours of philosophy at the 300 level or approval of instructor.

438. THE PHILOSOPHY OF KANT. 3 hrs.
A critical evaluation of the major contributions of Kant to epistemology, metaphysics and ethics. Prerequisite: 9 hours of philosophy including PHL 204 and 3 hours of philosophy at the 300 level 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 HY 463.)
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, 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 or 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.
In addition to the areas where majors and supportive clusters are authorized, courses are offered in sociology.

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 118-120.

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. A student may, with the advice and consent of the economics faculty, make limited substitutions in the core courses. In addition to these courses, the student is required to take an additional 18 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</th>
<th>Title</th>
<th>Hours</th>
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</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:

AC 111 Principles of Accounting 3
MGT 200 Principles of Management 3
EC 231 Applied Statistics for Social and Behavioral Sciences 3
EC 241 Marketing Economics 3
EC 310 Introduction to the use of Mathematics in Economics 3
EC 325 Intermediate Statistics 3
EC 340 Macro Economic Analysis 3
EC 341 History of American Economic Growth 3
EC 345 Micro Economic Analysis 3
EC 352 Money and Banking 3
EC 448 Development of Economic Theory 3
EC 561 Managerial Economics 3
EC 580 Business Fluctuations 3

39

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

MA 153 Calculus and Analytic Geometry 3
MA 154 Calculus and Analytic Geometry 3
MA 233 Calculus and Analytic Geometry 3
MA 244 Introduction to Linear Algebra 3
MA 251 Calculus and Analytic Geometry 3
MA 352 Introduction to Differential Equations 3
MA 385 Introduction to Probability Theory 3

21

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:

WITH MATHEMATICS

EC 142 Principles of Economics 3
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<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 Sciences</td>
<td>3</td>
</tr>
<tr>
<td>EC 352</td>
<td>Money and Banking</td>
<td>3</td>
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<td></td>
<td><strong>And any three of the following four courses:</strong></td>
<td></td>
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<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>
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**WITH HISTORY**

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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>EC 142</td>
<td>Principles of Economics</td>
<td>3</td>
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<tr>
<td>EC 143</td>
<td>Principles of Economics</td>
<td>3</td>
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<tr>
<td>EC 322</td>
<td>Public Policy Toward Business</td>
<td>3</td>
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<tr>
<td>EC 341</td>
<td>History of American Economic Growth</td>
<td>3</td>
</tr>
<tr>
<td>EC 344</td>
<td>European Economic History</td>
<td>3</td>
</tr>
<tr>
<td>EC 510</td>
<td>Survey of Economic Theory</td>
<td>3</td>
</tr>
<tr>
<td>EC 585</td>
<td>Comparative Economic Systems</td>
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**WITH INDUSTRIAL ENGINEERING AND SYSTEMS**

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<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>EC 142</td>
<td>Principles of Economics</td>
<td>3</td>
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<tr>
<td>EC 143</td>
<td>Principles of Economics</td>
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<tr>
<td>EC 231</td>
<td>Applied Statistics for Social and Behavioral Sciences</td>
<td>3</td>
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<tr>
<td>EC 235</td>
<td>Intermediate Statistics</td>
<td>3</td>
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<tr>
<td>EC 340</td>
<td>Macro Economic Analysis</td>
<td>3</td>
</tr>
<tr>
<td>EC 345</td>
<td>Micro Economic Analysis</td>
<td>3</td>
</tr>
<tr>
<td>EC 430</td>
<td>Introduction to Econometrics</td>
<td>3</td>
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**WITH PSYCHOLOGY**

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<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>EC 142</td>
<td>Principles of Economics</td>
<td>3</td>
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<tr>
<td>EC 143</td>
<td>Principles of Economics</td>
<td>3</td>
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<tr>
<td>EC 241</td>
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<td>Survey of Economic Theory</td>
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<tr>
<td>EC 585</td>
<td>Comparative Economic Systems</td>
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**Total Credits**: 24

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</table>

**Total Credits**: 24
Courses listed below are divided into five categories: economics, business, accounting, management, and finance.

Economics (EC)

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.

231. APPLIED STATISTICS FOR SOCIAL & 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: 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. 3 hrs.
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. 3 hrs.
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.

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. (Same as FIN 452.)

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

510. SURVEY OF ECONOMIC THEORY. 3 hrs.
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. 3 hrs.
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. 3 hrs.
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.)

565. TECHNOLOGICAL ECONOMICS. 3 hrs.
Survey of the economics of change, including basic objectives and constraints as exemplified in the areas of administrative science, operations research, and the other social sciences; the history of economic technology; decision-making; production functions and resource allocations; multiplier and growth effects; public and private policy issues, research and development planning strategies; diffusion of innovation, technology transfer; organizational communication and change; automation effects; model con-
struction; behavioral considerations; and the future of technological planning. Prerequisite: EC 143, 340, 345. (EC 510 and the approval of the instructor for non-economics majors.)

580. BUSINESS FLUCTUATIONS. 3 hrs.
Examination of cyclical fluctuations, measurement of business cycles, business cycle theories, models of economic growth, proposals for stabilizing economic activity, and techniques of forecasting business cycles. Prerequisite: EC 325, 340. (EC 510 and the approval of the instructor for non-economics majors.)

581. SOCIAL ACCOUNTING. 3 hrs.
Concepts and measurement of social accounting, within the context of past developments and present trends, to articulate the sector accounting structure. Analysis of social accounting systems as they relate to income and productivity, input-output, flow-of-funds, and balance of payments. Purposes and uses of social accounts to appraise taxation policy, corporate management, productive activity, income distribution, and consumption trends. Prerequisite: EC 340. (EC 510 and the approval of the instructor for non-economics majors.)

585. COMPARATIVE ECONOMIC SYSTEMS. 3 hrs.
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. 3 hrs.
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. 3 hrs.
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 300, EC 610 or equivalent. (EC 510 and the approval of the instructor for non-economics majors.)

635. WELFARE ECONOMICS. 3 hrs.
Examination of socio-economic criteria and interpretation of optimal economic positions for improvements in resource allocation and welfare. Prerequisite: EC 630 or equivalent. (EC 510 and the approval of the instructor for non-economics majors.)

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. (EC 510 and the approval of the instructor for non-economics majors.)

Business (BUS)

200. INTRODUCTION TO DATA PROCESSING. 3 hrs.  
This course is designed to provide the fundamentals important to the understanding of the concepts, techniques, and components employed in the information processing systems in use in today's business firms. Prerequisite: AC 111.

262. MANAGEMENT & LABOR ECONOMICS. 3 hrs.  
Same as MGT 262.

321. BUSINESS LAW. 3 hrs.  
Introductory course emphasizing the legal environment in business (formerly EC 221).

322. PUBLIC POLICY TOWARD 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 (new title). (Same as PSC 322.)

361. PRINCIPLES OF BUSINESS ORGANIZATION. 3 hrs.  
Same as MGT 361.

363. PERSONNEL ADMINISTRATION. 3 hrs.  
Same as MGT 363.

420. BUSINESS POLICY. 3 hrs.  
Same as MGT 420.

Accounting (AC)

111. PRINCIPLES OF ACCOUNTING I. 3 hrs.  
Basic principles of accounting emphasizing individual proprietorships.

112. PRINCIPLES OF ACCOUNTING II. 3 hrs.  
Accounting principles for partnerships and corporations. Prerequisite: AC 111.

213. INTERMEDIATE ACCOUNTING I. 3 hrs.  
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.

214. INTERMEDIATE ACCOUNTING II. 3 hrs.  
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.

313. INCOME TAX PROCEDURE. 3 hrs.  
Determination of taxable income and selected aspects of tax accounting for individuals. Prerequisite: AC 112.

314. COST ACCOUNTING. 3 hrs.  
Basic theory and procedures involving materials, labor, and manufacturing expenses in job order and process cost systems. Prerequisite: AC 214.
315. INTRODUCTION TO AUDITING. 3 hrs.
Auditing theory and practice, working papers, financial statements, and professional ethics. Prerequisite: AC 214.

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.

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.

Management (MGT)

200. PRINCIPLES OF MANAGEMENT I. 3 hrs.
Nature and functioning of modern management. Historical view of American managerial developments to include prescientific and scientific management schools, and human relations school and the effects of these movements. Prerequisite: EC 143.

201. PRINCIPLES OF MANAGEMENT II. 3 hrs.
Theory of managing modern organizations; theory and practice of decision-making; management of foreign operations; operations research and the future of management science. 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.

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 105 or 143, MGT 201.

361. PRINCIPLES OF BUSINESS ORGANIZATION. 3 hrs.
Basic theories and principles of organization as they are developing in modern society (formerly EC 261). Prerequisite or parallel: EC 143, 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. (Same as BUS 363.)

420. BUSINESS POLICY. 3 hrs.
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 exami-
nation of the theoretical foundation of industrial organization and public
responsibilities. Prerequisite: MGT 361. (Same as BUS 420.)

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, EG 390 (EC 325 or BUS 325 may be substituted for EG 390). (Same as
EG 427.)

450. WAGE AND SALARY ADMINISTRATION. 3 hrs.
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. Prerequi-
site: MGT 363. (Same as BUS 450.)

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 reg-
ulation, promotion, refunding, capital investment decisions, capital cost and the
process of security issues. Prerequisite: MGT 201, FIN 251, FIN 352 or EC
352. (Same as FIN 531.)

561. MANAGERIAL ECONOMICS. 3 hrs.
Analysis of managerial concepts from the multiple fields of business adminis-
tration, 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. 3 hrs.
Treatment of selected topics in management. Prerequisite: Senior or graduate
standing or approval of instructor.

Finance (FIN)

251. CORPORATE FINANCE. 3 hrs.
Promotional, financial, and structural features of the basic types of business
organizations. Prerequisite: AC 112, EC 143.

352. MONEY AND BANKING. 3 hrs.
Organization, operation, and economic significance of the monetary and
banking systems. Prerequisite: EC 143. (Same as EC 352.)

353. PUBLIC FINANCE. 3 hrs.
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 ex-
penditure and their significance will be emphasized. Prerequisite: EC 142.

531. MANAGERIAL FINANCE. 3 hrs.
Examination of principles and tools of analysis available to management.
Topics include financial decision-making as a coordinating process, administra-
tive responsibility, short and long term financial instruments, government regu-
lation, promotion, refunding, capital investment decisions, capital costs, and
the process of security issues. Prerequisite: MGT 201, FIN 251, FIN 352 or
EC 352. (Same as MGT 531.)
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.

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 (PSC)

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, PSC 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 must include a minimum of 6-9 semester hours in courses numbered 300 or above.

The political science faculty has developed a number of AOC models to guide the student in curriculum planning. The models are designed to consider such intellectual and vocational interests as international studies, pre-law training, public service, graduate school preparation, and orientations toward integrated social sciences, humanities, or environmental sciences. A student, however, should consult with members of the political science faculty in order to develop a program to meet his individual interests and objectives.

Political Science (PSC)


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 POLITICS. 3 hrs.
A survey of the evolution of the modern state system and the basic forces and principles in international relations. Not open to freshmen.

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. Required of all students majoring in Political Science.

271. PRINCIPLES OF PUBLIC ADMINISTRATION. 3 hrs.
An examination of administrative principles and practices in public organizations and agencies. Prerequisite: PSC 101, 212.

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 analysis of political institutions, 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 DEVELOPING NATIONS. 3 hrs.
An examination of the political process in the developing world with consideration given to the stresses of change and the impact of social and economic development on political life.

341. AMERICAN PARTIES AND POLITICS. 3 hrs.
A study of pressure groups and political parties with attention given to the social composition, organization, finance, and nomination procedures of political parties.

353. PUBLIC FINANCE. 3 hrs.
An examination of the principles of taxation, government expenditures, borrowing, and fiscal administration. (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 EXECUTIVE. 3 hrs.
An examination of the role of the President, governors, and local executives in the political system.

359. SOCIAL FOUNDATIONS OF POLITICAL BEHAVIOR. 3 hrs.
An analysis of voting patterns and processes of political socialization with emphasis on extremist politics. Includes an examination of theoretical approaches to political power in communities and an analysis of revolution as a social movement. (Same as SOC 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.)
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.)

410. LOCAL GOVERNMENT AND URBAN SOCIETY. 3 hrs.
An examination of the relationship between local governing institutions and the problems of urban society, focusing on intergovernmental power relationships.

411. METROPOLITAN POLITICS. 3 hrs.
An examination of the relationships of divergent political forces that constitute an urban area. Emphasis is placed on defining community power sources and the political behavior patterns of such elements as minority groups, business interests, and the mass media.

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.)

462. POLITICAL ANALYSIS. 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.

472. 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.

473. 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.

490. 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. Prerequisite: Junior standing or permission of 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. Prerequisite: PSC 271 or permission of the staff.
512. **PUBLIC PERSONNEL ADMINISTRATION.** 3 hrs.  
Purposes, functions, and processes of personnel management at the national, state, and local levels. Prerequisite: PSC 271.

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.

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. Prerequisite: PSC 271.

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 and any two of the three courses numbered 300, 302, 304, 231, and 426.

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 courses numbered 300, 302, and 304.

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:**

- **PY 100** Introduction to Psychology 3  
- **PY 103** General Psychology 3  
- **PY 204** Laboratory Procedures 3  
- **PY 231** Applied Statistics for Social & Behavioral Sciences 3  
- **PY 302** Experimental Psychology B: Motivation 4  
- **PY 304** Experimental Psychology C: Perception 4  
- **PY 313** Psychometrics 3  
- **PY 315** Developmental Psychology 3  
- **PY 401** Personality 3  
- **PY 406** Physiological Psychology 3
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<tr>
<td>PY 408</td>
<td>Human Learning</td>
<td>3</td>
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<tr>
<td>PY 420</td>
<td>Seminar in Psychology I</td>
<td>3</td>
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<tr>
<td>PY 426</td>
<td>History and Systems in Psychology</td>
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**Supportive Psychology Clusters**

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<tr>
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<tr>
<td>PY 100</td>
<td>Introduction to Psychology</td>
<td>3</td>
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<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 300</td>
<td>Experimental Psychology A: Learning</td>
<td>4</td>
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<tr>
<td>PY 302</td>
<td>Experimental Psychology B: Motivation</td>
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<tr>
<td>PY 311</td>
<td>Individual Differences</td>
<td>3</td>
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<tr>
<td>PY Elective above 300 level</td>
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<td>3</td>
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<tr>
<td>Social Psychology (SOC 375)</td>
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<td>is strongly recommended.</td>
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<td>Introduction to Psychology</td>
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<td>Laboratory Procedures</td>
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<td>PY 300</td>
<td>Experimental Psychology A: Learning</td>
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<tr>
<td>PY 304</td>
<td>Experimental Psychology C: Perception</td>
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<tr>
<td>PY 311</td>
<td>Individual Differences</td>
<td>3</td>
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<tr>
<td>PY Elective above 300 level</td>
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**WITH BIOLOGY**

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<td>PY 100</td>
<td>Introduction to Psychology</td>
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<tr>
<td>PY 304</td>
<td>Experimental Psychology C: Perception</td>
<td>4</td>
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<tr>
<td>PY 315</td>
<td>Developmental Psychology</td>
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<td>PY 406</td>
<td>Physiological Psychology</td>
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<td>PY 100</td>
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<tr>
<td>PY 103</td>
<td>General Psychology</td>
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</table>
Psychology (PY)

100. INTRODUCTION TO PSYCHOLOGY. 3 hrs.
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. 3 hrs.
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. 3 hrs.
An introduction to behavioral research techniques and descriptive statistics. Prerequisite: PY 100, 103.

207. PRINCIPLES OF PERSONAL RECONCILIATION. 3 hrs.
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. 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 SOC 231.)

300. EXPERIMENTAL PSYCHOLOGY A: LEARNING. 4 hrs.

302. EXPERIMENTAL PSYCHOLOGY B: MOTIVATION. 4 hrs.
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<th>Course Code</th>
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<th>Credits</th>
<th>Description</th>
<th>Prerequisites</th>
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<tr>
<td>304</td>
<td>EXPERIMENTAL PSYCHOLOGY C: PERCEPTION.</td>
<td>4 hrs.</td>
<td>A functional analysis of the processing and interpretation of sensory information. Prerequisite: PY 100, 103.</td>
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<tr>
<td>311</td>
<td>INDIVIDUAL DIFFERENCES.</td>
<td>3 hrs.</td>
<td>A study of the factors, both learned and innate, that lead to individually unique patterns of behavior. Prerequisite: PY 100, 103.</td>
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<tr>
<td>313</td>
<td>PSYCHOMETRICS.</td>
<td>3 hrs.</td>
<td>Theory and practice within psychological testing. Prerequisite: PY 100, 103.</td>
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<td>315</td>
<td>DEVELOPMENTAL PSYCHOLOGY.</td>
<td>3 hrs.</td>
<td>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.</td>
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<td>390</td>
<td>READINGS IN PSYCHOLOGY.</td>
<td>3 hrs.</td>
<td>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.</td>
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<td>401</td>
<td>PERSONALITY.</td>
<td>3 hrs.</td>
<td>Various theories of personality are examined, along with possible implications for research. Prerequisite: 15 hours PY.</td>
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<tr>
<td>403</td>
<td>ABNORMAL PSYCHOLOGY.</td>
<td>3 hrs.</td>
<td>An examination of major behavioral exceptionalities, with an emphasis on empirical findings. Prerequisite: PY 401, or approval of instructor.</td>
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<tr>
<td>406</td>
<td>PHYSIOLOGICAL PSYCHOLOGY.</td>
<td>3 hrs.</td>
<td>A functional analysis of the neural and endocrinological systems underlying behavior. Prerequisite: 15 hours PY.</td>
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<td>408</td>
<td>HUMAN LEARNING.</td>
<td>3 hrs.</td>
<td>Study of contemporary issues and theoretical contingencies regarding factors influencing human learning and forgetting. Prerequisite: 15 hours PY.</td>
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<td>409</td>
<td>BEHAVIOR MODIFICATION.</td>
<td>3 hrs.</td>
<td>The application of principles of human learning to the treatment of behavioral problems, neuroses and psychoses. Prerequisite: PY 403.</td>
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<tr>
<td>420</td>
<td>SEMINAR IN PSYCHOLOGY.</td>
<td>3 hrs.</td>
<td>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.</td>
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<tr>
<td>422</td>
<td>INDIVIDUAL RESEARCH.</td>
<td>3 hrs.</td>
<td>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.</td>
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<td>426</td>
<td>HISTORY AND SYSTEMS IN PSYCHOLOGY.</td>
<td>3 hrs.</td>
<td>A study of the history of psychology as it has led to the development of systematic study within the field. Prerequisite: 12 hours PY.</td>
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<td>502</td>
<td>INDUSTRIAL PSYCHOLOGY.</td>
<td>3 hrs.</td>
<td>Application of the basic principles of learning, motivation and perception to typical industrial problems. Prerequisite: Approval of instructor.</td>
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<tr>
<td>503</td>
<td>ADVANCED GENERAL PSYCHOLOGY.</td>
<td>3 hrs.</td>
<td>A comprehensive survey of the various major areas of psychology. Open only to senior psychology majors. Prerequisite: 15 hours PY.</td>
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<tr>
<td>504</td>
<td>INTRODUCTION TO CLINICAL PSYCHOLOGY.</td>
<td>3 hrs.</td>
<td>This course goes beyond the traditional abnormal psychology course and</td>
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115
introduces the student to non-adaptive behavior dynamics, diagnosis and current treatment techniques. Prerequisite: Open only to senior psychology majors, 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. Prerequisite: Approval of instructor.

508. INDIVIDUAL MENTAL TESTING: WECHSLER. 3 hrs.
Individual testing with the Wechsler tests, along with practical experience. Prerequisite: PY 506.

Sociology (SOC)

Courses in sociology may form, or contribute to a cluster.

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.

211. 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.

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.)

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. Prerequisite: 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 SOCIETY. 3 hrs. Growth and distribution of world population; population characteristics of pre-industrial and industrial nations, rural and urban localities, and religious, educational, and economic sub-groups; cultural explanations of population change.

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 POLITICAL BEHAVIOR. 3 hrs. An analysis of voting patterns and processes of political socialization with emphasis on extremist politics. Includes an examination of theoretical approaches to political power in communities and an analysis of revolution as a social movement. (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 or 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.

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.

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. 3 hrs.
An analysis of the impact of technology on the basic social institutions. Includes a survey of the major social changes of the 20th century with basic projections into the future. Prerequisite: SOC 100 or approval of instructor.

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.

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 18 credit hours in a core curriculum and 15 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 needs of the career 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 174 of this catalog.

Certain courses (at present, AS 609 and AS 610) are given AS labels because they are interdisciplinary. These courses may be used to satisfy requirements in any option.
Administrative Science Core Curriculum

The following courses 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.

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.

606. DATA GATHERING AND ANALYSIS. 3 hrs.
Introduction to the basic assumptions and techniques used in social science research. Designed to enable the student to envision various ways in which needed information can be obtained, evaluated and assessed. Introduces the student to probability and statistics, interviewing techniques, scaling, simulations. Basic computer languages and the uses and limitations of the computer as a data gathering mechanism. Only limited mathematical training will be required as a prerequisite for this course.

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 606.

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 programs 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.

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, earth 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, 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 or mathematics.
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 following courses: (The biology courses BY 113-114 must be taken or exempted but cannot be counted toward a major.) BY 221, 317 or 354, 319, 431 or 432, two biology seminars (597, 598, 599), and at least 12 additional hours of biology related to the student’s individual goal.

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.

Curriculum I—B.A. Degree Appropriate for a Biology Major with an Associated Cluster in Social Sciences.

<table>
<thead>
<tr>
<th>General Education Requirements (humanities and social sciences)</th>
<th>30-36</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic biology courses</td>
<td>16-18</td>
</tr>
<tr>
<td>Biology—BY 278, 371 or 372 and one elective</td>
<td>12</td>
</tr>
<tr>
<td>Chemistry—CH 101, 105, 131</td>
<td>8</td>
</tr>
<tr>
<td>Physics—PH 101, 102; or Earth Science—ES 101, 102</td>
<td>8</td>
</tr>
<tr>
<td>(Earth Science not permitted after 1971-72.)</td>
<td></td>
</tr>
<tr>
<td>Mathematics—MA 105 or 133, 143</td>
<td>6</td>
</tr>
<tr>
<td>Humanities, social sciences, economics or associated cluster</td>
<td>21</td>
</tr>
<tr>
<td>Electives (Education core if a Class B Secondary Professional Teaching Certificate is desired)</td>
<td>27-30</td>
</tr>
</tbody>
</table>

Curriculum II—B.S. Degree for Secondary Teachers of Biology and Chemistry.

<table>
<thead>
<tr>
<th>General Education Requirements (humanities and social sciences)</th>
<th>30-36</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic biology courses</td>
<td>16-18</td>
</tr>
<tr>
<td>Biology—BY 278, 371 or 372, and one elective</td>
<td>12</td>
</tr>
<tr>
<td>Chemistry—CH 121-122, 105, 126, 223, 331-332-333,</td>
<td>19</td>
</tr>
<tr>
<td>335-336</td>
<td></td>
</tr>
<tr>
<td>Mathematics—MA 143, 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>General Educational Requirements (humanities and social sciences)</th>
<th>30-36</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic biology courses</td>
<td>16-18</td>
</tr>
<tr>
<td>Biology—BY 278, 371 or 372, and one elective</td>
<td>12</td>
</tr>
<tr>
<td>Chemistry—CH 121-122, 105, 126, 223, 331-332-333,</td>
<td>19</td>
</tr>
<tr>
<td>335-336, (341 desirable)</td>
<td></td>
</tr>
<tr>
<td>Mathematics—MA 143, 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>

123
Curriculum IV—B.S. Degree with Chemistry Cluster, Preparatory for Graduate Study.

| General Education Requirements (humanities and social sciences) | 30-36 |
| Basic biology courses | 16-18 |
| Biology—BY 278, 371 or 372, and one elective | 12 |
| Chemistry—CH 121-122, 105, 126, 223, 331-332-333, 335-336, 341, 342 | 24 |
| Mathematics—MA 153, 154, 233, 244, or 251, 385 | 15 |
| Physics—PH 109-110, 201 | 11 |
| Electives | 12-20 |

Curriculum V—B.S. Degree with Physics-Chemistry Cluster, Preparatory for Graduate Study.

| General Education Requirements (humanities and social sciences) | 30-36 |
| Basic biology courses | 16-18 |
| Biology—BY 278, 371 or 372, and one elective | 12 |
| Chemistry—CH 121-122, 105, 126, 331-332-333, 335-336 | 15 |
| Mathematics—MA 153, 154, 233, 251, 244 or 385 | 15 |
| Physics—PH 109-110, 201, 202, 203, 301 | 20 |
| Electives | 12-20 |

Curriculum VI—B.S. Degree, Pre-Medical, Pre-Dental, Pre-Veterinary. (See chemistry section for an alternate pre-medical curriculum.)

| General Education Requirements (humanities and social sciences) | 30-36 |
| Basic Biology courses | 16-18 |
| Biology—BY 469, 542 and one elective | 12 |
| Chemistry—CH 121-122, 105, 126, 223, 331-332-333, 335-336 (341 desirable) | 19 |
| Mathematics—MA 143, 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.)

| General Education Requirements (humanities and social sciences) | 30-36 |
| Basic biology courses | 16-18 |
Biology—BY 421, 569, 579 12
Chemistry—CH 121-122, 105, 126, 223, 331-332-333, 335-336 19
Mathematics—MA 143, 153, 154 9
Physics—PH 109-110 8
Internship in an accredited school (or electives) 29

Curriculum VIII—B.S. Degree, Preparatory for Graduate Study in Biology-Mathematics (Biometrics).

General Education Requirements (humanities and social sciences) 30-36
Basic biology courses 16-18
Biology—BY 278, 371 or 372, and one elective 12
Chemistry—CH 121-122, 105, 126, 223, 331-332-333, 335-336 19
Mathematics—MA 153, 154, 233, 244, 251, 352 or 353, 385 21
Physics—PH 109-110 8
Electives 14-22

Biology (BY)

113. GENERAL BIOLOGY. 4 hrs.
A study of the origin, structure, function and evolution of living organisms, as well as their classification interrelationships. Includes laboratory. Credit cannot be received without completion of 114 or equivalent except with special permission of the instructor.

114. GENERAL BIOLOGY. 4 hrs.
Continuation of BY 113. Includes laboratory. Prerequisite: BY 113.

221. GENERAL MICROBIOLOGY. 4 hrs.
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.

238. LOCAL FLORA. 2 hrs.
Identification of local flowering plants. Prerequisite: BY 113-114.

245. HUMAN ANATOMY AND PHYSIOLOGY, PART I. 3 hrs.
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.)

246. HUMAN ANATOMY AND PHYSIOLOGY, PART II. 3 hrs.
A continuation of BY 245. Prerequisite: BY 245 or approval of instructor.

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.
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.

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.

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.

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.

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, photomicography 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.

597, 598, 599. **BIOLOGY SEMINAR.**
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.

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.

571. **PHYSIOLOGY.** 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.

578. **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.

585. **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

Requirements for a chemistry major:

1. Satisfactory completion of the University's 55-61 hour 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:

<table>
<thead>
<tr>
<th>Semester Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Education Requirements (humanities and social sciences)</td>
</tr>
</tbody>
</table>

128
General Education Requirements (science and mathematics) ............................................. 25
Chemistry (Requirement 2 above) ................................................................. 18

Curriculum I—A 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 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—BY 113-114 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.

Chemistry—CH 401 ................................................................................. 3
Biology—BY 113-114 ............................................................................ 8
Secondary Education core .................................................................... 27
Physics or ............................................................................................. 8-9
Biology or .............................................................................................. 12
Mathematics .......................................................................................... 9
Electives ................................................................................................. 3-9

Curriculum III—A Graduate Preparatory Program.
This curriculum follows the recommendations of the American Chemical Society for an undergraduate degree in chemistry. 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.

Chemistry—CH 337, 343, 346, 401, 421, 431, one elective, and a senior project ........................................... 19
Mathematics—MA 244, 251 ........................................................................ 6
Mathematics or physics elective ........................................................... 3
Electives ................................................................................................. 21-27
Curriculum IV—A 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.................................12
Mathematics—MA 244........................................3
Science electives.........................................8-10
Electives..................................................26-28

Curriculum V—A Chemistry-Physics Program Appropriate for Pre-graduate Education.
Chemistry—CH 337, 343, 346, 401, 421, and a senior project.................................14
Physics (a) PH 241, 331, 351, one laboratory from 310-312, and one elective, or ..........13
(b) PH 331, 351, one laboratory from 310-312, and one elective............................11

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 ..........12
Electives..................................................11-15

Curriculum VI—A 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.

Chemistry—CH 337, 343, 346, 361, 421, and a senior project.................................14
Biology—BY 113-114, 221, and two electives............................................20
Mathematics—MA 244........................................3
Electives..................................................12

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. A reading examination 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, gasses, 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: Placement at Level 2 in Mathematics. 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 PHYSICAL CHEMISTRY. 3 hrs.
Beginning course for science and engineering majors. An introduction is presented to basic physical principles concerning gases, liquids, and solids. Included are discussions on the nature of the chemical bond, kinetics, chemical equilibrium, electrochemistry, and thermochemistry. Prerequisite: CH 101 or placement test: Placement at Level 2 in Mathematics. Prerequisite or Parallel: CH 105.

122. INTRODUCTION TO INORGANIC AND ANALYTICAL CHEMISTRY. 2 hrs.
A continuation of CH 121. Includes a modern treatment of the chemical properties of some of the elements, their periodic groups, and their compounds and a brief introduction to nuclear chemistry. Prerequisite: CH 121.

126. QUALITATIVE INORGANIC ANALYSIS LABORATORY. 1 hr.
Application of chemical equilibrium to the systematic separation and qualita-
tive detection of the elements. Familiarizes students with the chemical and physical properties of numerous metal and complex ions, 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: CH 223 or approval of instructor. Parallel: CH 335.

332. ELEMENTARY ORGANIC CHEMISTRY. 2 hrs.
Continuation of CH 331. Prerequisite: CH 331. Parallel: CH 336.

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. Parallel: CH 331.

336. ELEMENTARY ORGANIC CHEMISTRY LABORATORY II. 1 hr.
Continuation of CH 335. Prerequisite: CH 335. 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).

600. ADVANCED INORGANIC CHEMISTRY. 3 hrs.
A survey course with emphasis on the structure and reactivity of inorganic compounds. Prerequisite: CH 401.

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.

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.

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.
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.

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.
Presenta 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.

736. 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. METEROLOGY. 3 hrs.
Same as EG 394. Prerequisite: ES 101 or permission of instructor.

Mathematics

Undergraduate Programs

The mathematics faculty offers courses in mathematics (MA) and statistics (ST) 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 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>Area</th>
<th>Semester Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Education Requirements</td>
<td></td>
</tr>
<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>
<tr>
<td>For B.A.: 8 hrs. in one science or a science cluster with no additional science</td>
<td></td>
</tr>
<tr>
<td>For B.S.: 8 hrs. in one science with the cluster in another, or 8 hrs. in each of two sciences.</td>
<td></td>
</tr>
<tr>
<td>Mathematics Major (minimum requirements)</td>
<td></td>
</tr>
<tr>
<td>MA Basic Core and MA 352</td>
<td>24</td>
</tr>
<tr>
<td>MA 333 or 533 or 570; MA 521 or 551 or 554</td>
<td>6</td>
</tr>
<tr>
<td>MA 570 and 554 are recommended choices for students preparing for graduate study in mathematics.</td>
<td></td>
</tr>
<tr>
<td>MA Electives (numbered above 300)</td>
<td>6</td>
</tr>
<tr>
<td>Cluster (see examples below)</td>
<td>21-24</td>
</tr>
<tr>
<td>Electives (to bring total number of semester hours to 128)</td>
<td>10-41</td>
</tr>
</tbody>
</table>
Curriculum II—For B.A. or B.S. Degree with Major in Mathematics; Meets Requirements for a Class B Secondary Professional Teaching Certificate.

Area Semester Hrs.

General Education Requirements

<table>
<thead>
<tr>
<th>Area</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>
<tr>
<td>Science</td>
<td>4-16</td>
</tr>
</tbody>
</table>

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 |

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.

Area Semester Hrs.

General Education Requirements

<table>
<thead>
<tr>
<th>Area</th>
<th>Semester Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>As in Curriculum II</td>
<td>48-64</td>
</tr>
<tr>
<td>Additional Humanities (ART 215, MU 215, ED 215)</td>
<td>9</td>
</tr>
<tr>
<td>Additional Social Sciences (see PEEC Requirements)</td>
<td>6</td>
</tr>
<tr>
<td>Mathematics (minimum requirements)</td>
<td></td>
</tr>
</tbody>
</table>

(MA 153, 154, 243, 244, 333, 350, 385, 442, and one MA elective numbered above 200) 27

137
Pre-Professional Courses (ED 230, 261, 263, 265, 266) 11

Professional Education Courses
(ED 360, 367, 370 or 371, 372, 373, 491) 16

Electives (to bring total number of semester hours to 128) 0-11

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.

(a) Biology—BY 113, 114, 221, 319, 320, one BY elective numbered above 300, CH 101 or 121, and CH 105.

(b) Chemistry—CH 105, 121, 122, 126, 331, 332, 333, 335, 336, 341, 342, and 345.

(c) Physics—PH 101-102 or 109-110, 201, 241, 321, 331, and 351.

(d) Psychology—PY 100 or 101, 104, 200, 401, ST 287, and PY 303 or MA 385 or MA 585.

(e) Economics—EC 142, 143, 340, 341, 345, 448, and ST 287.

(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.

Students who are full-time students and hold a teaching assistantship for at least one academic year, and who choose the non-thesis option, may be permitted to reduce their program to a total of 30 hours.

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 175).

**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.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
<th>Prerequisites/Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>004</td>
<td>HIGH SCHOOL ALGEBRA (Formerly 091)</td>
<td>No Credit</td>
<td>For students with a deficiency of high school credit in algebra.</td>
</tr>
<tr>
<td>033</td>
<td>HIGH SCHOOL GEOMETRY (Formerly 092)</td>
<td>No Credit</td>
<td>For students with a deficiency of high school credit in geometry. Prerequisite: MA 004 or one unit of high school algebra.</td>
</tr>
<tr>
<td>104</td>
<td>INTRODUCTION TO CONTEMPORARY MATHEMATICS (Formerly 101)</td>
<td>3 hrs.</td>
<td>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.</td>
</tr>
<tr>
<td>105</td>
<td>COLLEGE ALGEBRA (Formerly 109)</td>
<td>3 hrs.</td>
<td>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.</td>
</tr>
<tr>
<td>133</td>
<td>ALGEBRA AND TRIGONOMETRY (Formerly 115)</td>
<td>3 hrs.</td>
<td>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.</td>
</tr>
<tr>
<td>143</td>
<td>FINITE MATHEMATICS (Formerly 118)</td>
<td>3 hrs.</td>
<td>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.</td>
</tr>
<tr>
<td>153</td>
<td>CALCULUS AND ANALYTIC GEOMETRY (Formerly 125)</td>
<td>3 hrs.</td>
<td>Introduction to plane analytic geometry, functions, limits, continuity, differentiation of algebraic functions, applications of the derivative, antidifferentiation. Prerequisite: MA 133 or Level III placement.</td>
</tr>
<tr>
<td>154</td>
<td>CALCULUS AND ANALYTIC GEOMETRY (Formerly 149)</td>
<td>3 hrs.</td>
<td>The definite integral, applications of definite integrals, logarithmic and exponential functions, trigonometric functions. Prerequisite: MA 153.</td>
</tr>
</tbody>
</table>
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 154.

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 III 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 or EG 281.

333. **INTRODUCTION TO GEOMETRY (Formerly 363).** 3 hrs.
Directed geometry, axis theorems, projection and section, duality principles,
elements at infinity, synthetical and analytical geometric form; homogeneous,
punctual, linear and planar coordinates; transversal theory; affine, homologic,
homothetic and bi-rational transformation; harmonic and cross ration, reciprocal
perspectivity and projectivity, theorems of Pappus, Pascal, and Brianchon. Pre­requisite: MA 243 or 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. Prerequisite: MA
243 or 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 or EG 281, 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 their
properties, 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, Sturm-Liouville theory, eigenfunctions, and boundary value problems. 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. VECTOR ANALYSIS. 3 hrs.
Vectors, vector algebra, vector equations; scalar, vector, box and triple products, reciprocal bases, oblique systems, moments of vectors, discrete and continuous line vectors; derivatives, relative derivatives, partial derivatives and directional derivatives of vector functions; differential invariants, line and surface integrals, theorems of Gauss and Stokes. 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 $E^k$, 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 261.
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 func-
tions, exponential integral and related functions, orthogonal polynomials,
cylinder functions, spherical harmonics and hypergeometric functions. Prerequi-
site: MA 521.

624. INTRODUCTION TO CELESTIAL MECHANICS. 3 hrs.
Review of analytical mechanics, the equations of motion in a Newtonian
gravitational field, the two-body problem, elementary theory of the three-body
problem, Euler's problem, elementary perturbation theory and numerical compu-
tations in celestial mechanics. Prerequisite: MA 525.

625. CALCULUS OF VARIATIONS (Formerly 766). 3 hrs.
Types of problems in the calculus of variations, a study of necessary conditions
and sufficient conditions for the extremum of a definite integral in both
parametric and nonparametric representation in the plane, the Bolza
problem, extension to higher dimensions. Prerequisite: MA 525.

627. TENSOR ANALYSIS (Formerly 727). 3 hrs.
Complete study of curvilinear coordinates; linear vector functions, dyadics,
linear vector space, matrices, transformations, the tensor concept, covariant
and contravariant tensors, Christoffel's symbols, covariant and intrinsic
differentiation, applications to analytical and relativistic mechanics. Pre-
requisite: MA 527.

642. ABSTRACT ALGEBRA I. 3 hrs.
Elementary set theory, equivalence relations, elementary group theory, sub-
groups, normal subgroups, factor groups, homomorphisms, inner and outer
automorphisms, permutation groups, rings, integral domains, fields and skew
fields, Euclidean rings, polynomials, vector spaces, modules, extension fields,
roots, and elements of Galois theory. Prerequisite: MA 442, 453, or 544.

644. MATRIX THEORY I (Formerly 720). 3 hrs.
Matrix polynomials, characteristic and minimal polynomials, functions of
matrices, invariant polynomials, elementary divisors, similarity of matrices,
normal forms of a matrix, matrix equations. Prerequisite: MA 544.

653. REAL ANALYSIS I. 3 hrs.
Archimedian ordered fields, nested intervals, Dedekind cuts, the Cantor
set, real line topology, converging theorems, sequences and functions, modes
of convergence, types of continuity, double limits, the Stone-Weierstrass
theorem, Ascoli's theorem, extension of functions, monotone functions,
functions of bounded variation, functions of intervals, continuous nowhere
differentiable functions, and the implicit function theorem. Prerequisite:
MA 554 or 570 or approval of instructor.

656. COMPLEX ANALYSIS I (Formerly 755). 3 hrs.
The complex number system and topology of the complex plane, analytic
functions, elementary functions with an introduction to Riemann surfaces,
integration in the complex plane, Cauchy's integral theorem, Cauchy's integral
formula and its consequences, functions defined by infinite series, Taylor's
series, the identity theorem, the maximum and minimum principles, isolated
singularities, Laurent series, and the residue theorem. Prerequisite: MA 453,
554, or approval of instructor.

670. INTRODUCTION TO FUNCTIONAL ANALYSIS (Formerly 757). 3 hrs.
Linear functionals, the Riesz representation theorem, adjoints, orthogonal
projections and direct sums, unitary and orthogonal transformations,
nowhere-dense sets and category, subspaces, equivalence of norms, products
of normed and inner product spaces, commutative convergence, Bessel's in-
equality, complete orthonormal sets, Parseval's identity, bounded linear func-
tionals, and conjugate spaces. Prerequisite: MA 570.
671. GENERAL TOPOLOGY I. 3 hrs.
Topological spaces, bases, subbases, subspaces, continuity and homomorphisms, topological properties (first and second axiom of countability, separability, Lindelof property, compactness, connectivity, and separation axioms), heredity of topological properties, generalized products, the product topology, product invariance of topological properties, and introduction to Moore-Smith convergence. Prerequisite: MA 570.

685. STOCHASTIC PROCESSES. 3 hrs.
Normal, stationary and Poisson process, counting and renewal processes, discrete and continuous Markov chains, and generalized recurrent events. Prerequisite: MA 585, 544, or approval of instructor.

690. SPECIAL TOPICS IN MATHEMATICS. 3 hrs.
The purpose of this course is to enable the mathematics faculty to comply with requests for courses in special topics. Prerequisite: Approval of instructor.

742. ABSTRACT ALGEBRA II (Formerly 745). 3 hrs.
Topics in the theory of groups, categories and functors, rings, modules, field theory, algebraic extensions, splitting fields, finite fields, and Galois theory. Prerequisite: MA 642.

743. GROUP THEORY. 3 hrs.
Isomorphism theorems, permutation groups, finite abelian groups; the basis theorem, the Remak-Krull-Schmidt theorem, the Sylow theorems, the Jordan-Holder theorem, automorphism groups, infinite abelian groups, free groups, and selected topics in representation theory. Prerequisite: MA 642.

744. MATRIX THEORY II (Formerly 721). 3 hrs.
Special types of matrices, pencils of matrices, nonnegative matrices, localization of eigenvalues, and selected advanced topics. Prerequisite: MA 644 or approval of instructor.

752. THEORY OF DIFFERENTIAL EQUATIONS (Formerly 651). 3 hrs.
A study of the basic theorems for initial value problems. Local existence of solutions, uniqueness of solutions, dependence on parameters, and selected topics. Prerequisite: MA 653.

754. REAL ANALYSIS II. 3 hrs.
Algebras, Borel sets, outer measure, measurable sets, Lebesgue measure, the sigma algebra of measurable sets, measurable functions, theorems Riesz, Egorov and Luzin, sequences of measurable functions, the Riemann integral, the Lebesgue integral of a bounded function over a set of finite measure, the general Lebesgue integral, the theorem of Fatou, convergence in measure, the indefinite Lebesgue integral. Prerequisite: MA 653.

756. COMPLEX ANALYSIS II. 3 hrs.
Applications of the residue theorem, the Mittag-Leffler theorem, infinite products, the Weierstrass theorem, functions defined by integrals, conformal mapping, bilinear transformations, the Schwarz-Christoffel transformation, the inverse function theorem, reflection theorems, the Riemann mapping theorem, analytic continuation, Riemann surfaces, and selected topics. Prerequisite: MA 656.

770. 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.

792. SEMINAR TOPICS IN APPLIED MATHEMATICS. 1-3 hrs.
794. SEMINAR TOPICS IN ALGEBRA. 1-3 hrs.
795. SEMINAR TOPICS IN ANALYSIS. 1-3 hrs.
797. SEMINAR TOPICS IN TOPOLOGY. 1-3 hrs.
798. SEMINAR TOPICS IN PROBABILITY AND STATISTICS. 1-3 hrs.
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, $X^2$, t- and F- distributions; estimation, confidence intervals and tests of significance. Includes laboratory. Prerequisite: MA 105 or Level II placement.

387. APPLIED STATISTICS II. 3 hrs.
Time series, trends, seasonal and cyclical factors; index numbers; linear and nonlinear 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.

Physics (PH)

Undergraduate Programs

The basic courses for a B.S. degree with a major in physics include: PH 109, 110, 201, 241, 331, 351, 321, 310, 311, 312. 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.

Semester Hrs.

General Education Requirements (humanities and social sciences) .............................................................................. 30-36

145
Physics—PH 109-110, 201, 241, 310, 311, 312, 321, 331, 351, 401, 431, 2 senior labs at 400 level, 551-552
Mathematics—MA 153, 154, 233, 244, 251, 352, 491, 521
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.
General Education Requirements (humanities and social sciences)
Physics—PH 104, 109-110, 201, 241, 310, 311, 312, 331, 351, 321
Mathematics—MA 153, 154, 233, 244, 251
Chemistry—CH 121-122, 105, 126

WITH CHEMISTRY CLUSTER
Chemistry—CH 223, 331-332-333, 341, 342 or 335-336
Education core
Electives

WITH MATHEMATICS CLUSTER
Mathematics—MA 333, 442, 385 or 585
Education core
Electives

WITH BIOLOGY CLUSTER
Biology—BY 113-114, 319, 221, 317 or 371 or 372, 432 or 431
Education core
Electives

146
Graduate Programs

The physics faculty offers courses leading to the Master of Science degree under Plan I or Plan II. An entering student must fill out a program approval form with a faculty advisor before embarking on his course of study. PH 792 must be taken twice, but carries no course credit. For Plan II, the following courses are required: PH 601, 622, 631, 632, 651, and 652.

A Ph.D. program in physics will be offered September, 1971.

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, 1971.

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. Winter.

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 311. Fall.

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, Schrödinger's wave equation, hydrogen-like systems, interactions. Prerequisite: PH 241, 331. Fall.

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, photometric 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, Mössbauer 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, Mössbauer 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.

511. MATHEMATICAL METHODS OF PHYSICS I.  1 hr.
Vector spaces and matrices, concepts from the theory of distributions, Fourier transforms, solutions of partial differential equations, and special functions. Prerequisite or parallel: PH 551. Fall.

512. MATHEMATICAL METHODS OF PHYSICS II.  1 hr.
Continuation of PH 511. Prerequisite or parallel: PH 552. Winter.

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. Spring.

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. Fall.

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.

611. MATHEMATICAL METHODS OF PHYSICS III.  3 hrs.
Hilbert space, integral equations, Green’s functions, group theory, perturbation theory. Intended to parallel PH 651. Recommended for all graduate students. Winter.
612. MATHEMATICAL METHODS OF PHYSICS IV. 1 hr.
Continuation of PH 611. Intended to parallel PH 652. Spring.

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.

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, MA 523. Winter.

652. QUANTUM MECHANICS II. 3 hrs.
Identical particles, symmetry principles, time-dependent perturbation theory, variational principles, formal scattering theory. Prerequisite: PH 651. Spring.

702. ADVANCED CLASSICAL DYNAMICS. 3 hrs.
Review of Lagrangian and Hamiltonian dynamics, canonical transformations, Hamilton-Jacobi theory, Lagrangian field theory, selected topics. Prerequisite: PH 601. Upon Demand. Winter.

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. Spring.

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, 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. 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.
DIVISION OF ENGINEERING

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, and the fundamentals of engineering.

Instead of several narrow curricula carrying such labels as civil, mechanical, and electrical engineering, the Division of Engineering offers 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 through the sophomore year, followed by specialization in the junior and senior years in such areas as:

- Electrical Engineering, with applications in electronics, electrical circuitry, networks, radar, instrumentation, and computers;
- 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 space craft 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 degrees of Bachelor of Science in Engineering and Master of Science in Engineering. A Doctor of Philosophy in Engineering degree will be offered September, 1971.

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 has been coded additionally for engineering courses so that the second digit indicates the engineering discipline.
Undergraduate Program

A student may be awarded the degree of Bachelor of Science in Engineering upon successful completion of all requirements, including a total 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 a 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 (32 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>
</tbody>
</table>

Sophomore—Junior—Senior Years (104 Semester Hours)

A. CORE PROGRAM (66 SEMESTER HOURS)

<table>
<thead>
<tr>
<th>Course</th>
<th>Semester Hrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>English:</td>
<td></td>
</tr>
<tr>
<td>Literature Survey (EH 205, 206, 240, or 241)</td>
<td>3</td>
</tr>
<tr>
<td>Economics:</td>
<td></td>
</tr>
<tr>
<td>Principles of Economics (EC 142)</td>
<td>3</td>
</tr>
</tbody>
</table>
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:
Statics (EG 171) 2
Fortran Programming (EG 196) 2
Electrical Circuits I (EG 201) 3
Introduction to Industrial Management (EG 220) 3
Thermodynamics I (EG 241) 3
Particle Dynamics (EG 263) 2
Mechanics of Deformable Bodies (EG 273) 3
Applied Linear Algebra (EG 281) 2
Applied Vector Analysis and Complex Variables (EG 282) 2
Nature and Properties of Materials (EG 294) 3
Electronics and Instrumentations Laboratory (EG 301) 1
Electronics and Instrumentations (EG 311) 3
Introduction to Fluid Mechanics (EG 341) 3
Heat Transfer (EG 343) 3
Operational Methods in Engineering (EG 381) 2
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. PROFESSIONAL SPECIALIZATION

Students are required to take 17 semester hours within one of the four engineering departments. Programs in Computer Engineering and Environmental Engineering are also available. Interested students should obtain details concerning the Computer Engineering program from the Chairman of the Electrical Engineering Department, and concerning the Environmental Engineering program from the Chairman of the Fluid and Thermal Engineering Department.

Electrical Engineering:
Electrical Engineering Laboratory (EG 304) 1
Electrical Circuits II (EG 313) 3

153
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  

**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 342) 3  
Fluid-Thermal Laboratory I (EG 358) 2  
Fluid Mechanics II (EG 441) 3  
Introduction to Transport Phenomena (EG 442) 3  
Fluid-Thermal Laboratory II (EG 458) 1  
Elective in Fluid and Thermal Engineering (EG 264, 443, 444, 445, 540, 545, or 541) 5  

**Engineering Mechanics:**  
Rigid Body Dynamics (EG 264) 2  
Thermo-Fluid Mechanics I (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 philoso-
phy, 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.

Graduate Study

The Division of Engineering offers programs leading to the degree of Master of Science in Engineering with specializations 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

A Ph.D. degree will be offered September, 1971.

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.

Conditional 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 conditionally 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.

A student who is admitted to the University as an irregular Post Graduate but who has been denied admission to the Graduate School because of his deficiency in quality point average (QPA) and/or GRE score may be reconsidered for graduate admission provided he is otherwise eligible to pursue a particular engineering discipline. In order to be reconsidered he must successfully complete 12 hours of courses numbered 500 or above in engineering, mathematics, physics, or chemistry with a QPA exceeding 2.00 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 examining committee should be appointed after the student has completed 12 semester hours.

**General Requirements for the MSE 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 MSE degree are specified by the Division of Engineering.

General course requirements (in addition to those established by the Division of Graduate Programs and Research) are:

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. Each graduate student, during the first 12 semester hours of his program, will be required to register for Graduate Seminar I, EG 695, and, during a term in which he is actively engaged
in work on his thesis (Plan One) or his paper (Plan Two), to reg-
ister for Graduate Seminar II, EG 795. A total credit of one
semester hour in these courses may be applied toward gradu-
ation requirements.

4. All courses are selected by the student with the counsel of
his adviser and are subject to approval by the appropriate
discipline 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, or chemistry.

(c) 6 hours of approved electives, chosen in support of the pri-
mary area of specialization.

(d) 6 hours of courses in mathematics beyond Differential
Equations.

(e) EG 695 and EG 795.

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 num-
bered 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.

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.

091. DIGITAL COMPUTER FUNDAMENTALS I. No credit.
Computer elements; programming; number systems and codes; Boolean Algebra; simplification techniques; counters and registers.

092. DIGITAL COMPUTER FUNDAMENTALS II. No credit.
Minimization techniques; analysis and synthesis of sequential logic circuits; examples of digital circuit design with application to computers. Prerequisite: EG 091 or approval of instructor.

093. PATENT LAW FOR ENGINEERS AND SCIENTISTS. No credit.
A study of patents and the legal protection of inventions from the viewpoint of the inventor including rights conferred by patent, requisite for patentability, prosecution of application, interference proceedings, infringement, trade secrets, and relative rights of employees and employers (contracts, shopright, comparison of proprietary rights including design patents, copyrights and trademarks).

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. FRESHMAN SEMINAR.
Required of all Freshmen.

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. 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.)

158
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, network theorems, and introduction to two-part networks. Prerequisite: EG 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. (Not open to Seniors.)

241. THERMODYNAMICS I. 3 hrs.
Study of the basic laws of thermodynamics which apply in all branches of engineering. Unsteady and steady-states. Properties of matter, processes of fluids, zeroth, first and second laws, availability of energy. Irreversibility. Prerequisite: PH 102, 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. 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. 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. 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 AND COMPLEX VARIABLES. 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.

294. NATURE AND PROPERTIES OF MATERIALS. 3 hrs.
An introductory course covering the structure of matter; basic concepts of phase transformations; mechanical electrical, magnetic, and thermal properties; and corrosion. Prerequisite: CH 122, PH 102.

301. ELECTRONICS AND INSTRUMENTATIONS LABORATORY. 1 hr.
Experiments related to the basic types of electronic instrumentation and to apply and verify the principles presented in EG 311. Prerequisite or parallel: EG 311.

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, 313 and parallel with EG 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, 281, PH 102.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>311</td>
<td>ELECTRONICS AND INSTRUMENTATIONS.</td>
<td>3 hrs.</td>
<td>A study of electronic devices such as solid state and vacuum diodes, triodes and transistors, amplifiers, rectifiers, voltmeters, ammeters, display devices, and simple instrumentation systems. Prerequisite: EG 201.</td>
</tr>
<tr>
<td>313</td>
<td>ELECTRICAL CIRCUITS II.</td>
<td>3 hrs.</td>
<td>Basic concepts of network topology and analysis; steady-state response to sinusoidal driving functions, resonance, transfer functions, ideal transformers, network theories. Prerequisite: EG 381.</td>
</tr>
<tr>
<td>316</td>
<td>ELECTRONICS I.</td>
<td>2 hrs.</td>
<td>Graphical and small signal analysis of electronic devices; piecewise linear models; rectifiers and power supplies. Prerequisite: EG 311.</td>
</tr>
<tr>
<td>321</td>
<td>ENGINEERING ECONOMY.</td>
<td>3 hrs.</td>
<td>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.</td>
</tr>
<tr>
<td>341</td>
<td>INTRODUCTION TO FLUID MECHANICS.</td>
<td>3 hrs.</td>
<td>Properties of fluids and the fundamental principles governing fluid motion, including hydrostatics, continuity, conservation of momentum and energy, with applications to one-and two-dimensional flows. Prerequisite: EG 241, 263.</td>
</tr>
<tr>
<td>342</td>
<td>THERMODYNAMICS II.</td>
<td>3 hrs.</td>
<td>Irreversibility, availability, cycles, chemical reactions, phase and chemical equilibrium. Basic relationships among properties. Prerequisite: EG 241.</td>
</tr>
<tr>
<td>343</td>
<td>HEAT TRANSFER.</td>
<td>3 hrs.</td>
<td>Study of the basic principles of heat, momentum, and mass transfer; and the application of these principles to problems in conduction, convection and radiation. Prerequisite: EG 241, MA 251.</td>
</tr>
<tr>
<td>358</td>
<td>FLUID-THERMAL LABORATORY I.</td>
<td>2 hrs.</td>
<td>Use of technique and instrumentation for determining state and field variables of static and dynamic fluid systems in order to experimentally verify fundamental principles of thermodynamics, fluid mechanics, and transport phenomena. Experiments include determination of thermodynamic and transport properties, verification of gas laws, and the demonstration of conservation principles and similitude. Prerequisite: EG 241. Parallel: EG 341.</td>
</tr>
<tr>
<td>381</td>
<td>OPERATIONAL METHODS IN ENGINEERING.</td>
<td>2 hrs.</td>
<td>A study of Fourier Series, Fourier and Laplace transforms with emphasis on their physical interpretation. Prerequisite: EG 201, 282.</td>
</tr>
<tr>
<td>390</td>
<td>PROBABILITY AND ENGINEERING STATISTICS I.</td>
<td>3 hrs.</td>
<td>An introduction to probability theory, estimation, sampling, hypothesis testing, and one way analysis of variance. Prerequisite or parallel: MA 251.</td>
</tr>
<tr>
<td>394</td>
<td>METEOROLOGY.</td>
<td>3 hrs.</td>
<td>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.</td>
</tr>
<tr>
<td>396</td>
<td>NUMERICAL METHODS AND COMPUTATIONS.</td>
<td>2 hrs.</td>
<td>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.</td>
</tr>
<tr>
<td>404</td>
<td>ELECTRICAL NETWORKS LABORATORY.</td>
<td>1 hr.</td>
<td>Experiments, problems, and reports to apply and verify the principles presented in EG 381 and 414. Prerequisite or parallel: EG 414.</td>
</tr>
</tbody>
</table>
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 262. Prerequisite or parallel: EG 414.

414. **ELECTRICAL NETWORKS.** 3 hrs.
Driving point and transfer functions, frequency response of networks; Bode plots; introduction to filter theory. Prerequisite: EG 297, 303, 312, 313.

416. **ELECTRONICS II.** 3 hrs.
Multistage active circuits; impulse and step function response; frequency response; tuned-coupled stages, feedback and oscillators, switching circuits. 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. 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. 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.** 2 hrs.
Emphasis placed upon the study of fluid flows and processes in which molecular transport effects due to viscosity, thermal conductivity, and mass diffusivity are important. Topics include the constitutive equations for Newtonian and non-Newtonian fluids, heat transfer, diffusion, and an introduction to turbulence. Prerequisite: EG 441.

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 343, 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.

458. FLUID-THERMAL LABORATORY II. 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 358. Parallel: EG 441.

463. APPLIED DYNAMICS. 3 hrs.
Applications of the principles of dynamics to various fields of engineering. Prerequisite: EG 246.

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. 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 problem 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 491 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 non-linear differential equations en-
countered in vibration analysis, flow problems, automatic controls, electrical network theory and modulation. Includes laboratory. Prerequisite: EG 311, 381.

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, modulation systems, noise, and the use of statistics in the analysis of information transmission. Prerequisite: EG 381.

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.

516. ADVANCED ELECTRONICS. 3 hrs.
Non-sinusoidal generating and wave-shaping circuits, timing circuits, limiters, comparators, clampers, 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.

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. 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 aspects. Topics include confounding, fractional replication, factorial and nested designs. Prerequisite: EG 421 or 621.

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.

164
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.

591. **MACHINE-LANGUAGE PROGRAMMING AND ASSEMBLER DESIGN.** 3 hrs.
Introduction to machine-code programming. Data structures. Macros, subroutines, and their application to program structures. Assembler and loader design. Prerequisite: Senior or graduate standing.

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 609.

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.

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: queuing 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.

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 multi-stage 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.


642. FUNDAMENTALS OF THERMODYNAMICS II. 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.

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.
Physical laws of thermal radiation. Methods of analysis; geometrical and
spectral characteristics. Special problems in design. Prerequisite: EG 343.

648. HEAT CONDUCTION IN SOLIDS. 3 hrs.
Derivation of general differential equation of heat conduction; methods of
solution. Steady-state transient, and periodic heat flow. Internal heat sources
in solids. Prerequisite: EG 343, 381.

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 semi­
conductor devices. Prerequisite: EG 641.

658. DIMENSIONAL ANALYSIS. 3 hrs.
Nature and use of dimensions; principles of dimensional analysis; systematic
calculation of dimensionless products; algebraic theory of dimensional analy­
sis, 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.

659. SELECTED TOPICS IN FLUID AND THERMAL ENGINEERING. Credit to be arranged.

660. THEORY OF VIBRATIONS. 3 hrs.
Matrix treatment of systems with many degrees of freedom. Vibrations of
elastic bodies. Nonlinear vibration of systems with single degree of freedom.
Prerequisite: EG 560, 561.

661. ADVANCED DYNAMICS. 3 hrs.
Special theory of relativity, Hamilton’s equations, canonical transformations,
Hamilton-Jacobi theory. Lagrangian and Hamiltonian formulation for con­
tinuous 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. Prerequisites: 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 approxima-
tion. 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 pre-
ceding 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 (mon-
itors), input-output systems, interpreters and compilers for procedure-orient-
ed languages. Syntactic analysis and semantic interpretation of formal
languages. Prerequisite: EG 591.

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 502.

704. NONLINEAR CONTROL SYSTEMS. 3 hrs.
Classical and modern methods for the analysis and design of nonlinear auto-
matic 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.
Analysis of nonlinear communication processes using Hilbert transforms.
Optimum nonlinear and time-varying systems and non-stationary signals.
Phase lock demodulation. Orthogonal multiplexing. Modulation, detection and
series approximation for nonlinear systems. Prerequisite: EG 606.

710. SELECTED TOPICS IN ELECTRICAL ENGINEERING. Credit to be arranged.

715. MICROWAVE FILTER THEORY. 3 hrs.
Microwave filter design. Synthesis of reflection. Coefficient. Tchebyscheff,
Butterworth design. Theory of coupled cavity filters. Prerequisite: EG 609 or
618.

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. Prereq-
site: EG 608 or approval of instructor.

717. PLASMA DYNAMICS II. 3 hrs.
Macroscopic motion and transport phenomena. Basic equations for single-and
multi-particle media. Magnetohydrodynamic equations. Waves in plasma,
complex refractive index (Appleton). Plasma diagnostics, man-made applica-
tions and natural phenomena. Prerequisite: EG 716.
718. ADVANCED TOPICS IN SERVOMECHANISMS. 3 hrs.
Advanced topics in linear, non-linear, 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 rela-
tivity. Prerequisite: EG 609.

739. SELECTED TOPICS IN INDUSTRIAL AND SYSTEMS
ENGINEERING. Credit to be arranged.

741. STATISTICAL THERMODYNAMICS. 3 hrs.
Statistical ensembles: Maxwell-Boltzmann, Bose, Einstein, and Fermi-Dirac
statistics. Application of statistical mechanics to thermodynamic processes.
Information theory and its formalism. Prerequisite: EG 641.

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.
Energy and momentum transfer in rarefied gas and supersonic flows. Blotz-
mann statistical distribution unsteady gas-solid interaction; accommodation
coefficients. Free molecular flow, slip flow, and transition flow. Prerequisite: EG 541, 741.

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 appropri-
date discipline chairman.

755. THEORY OF FLOW OF VISCOUS FLUIDS I. 3 hrs.
Navier-Stokes equations including several exact solutions and several ap-
proximate 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. Prere-
quisite: 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. Prop-
agation 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 668.

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.
DIVISION OF GRADUATE PROGRAMS
AND RESEARCH

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): Physics, Chemistry
Master of Science in Engineering (MSE)

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.

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.

PLANS FOR 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 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.

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 re-
quirements for admission may, upon recommendation of the ap-
propriate 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 cata-
log.) A student admitted in this category may register in courses at
UAH providing all prerequisites for the courses have been satis-
factorily 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
probationally if acceptance is recommended by the appropriate aca-
demic 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
institutions 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."

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.*

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 hours undertaken.

2. Grade of B or better must be received on at least 75% of all credit hours undertaken.

*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).
3. Credits toward a master’s degree are earned only with grades of C or better.

4. At least 50% of the hours required for a master’s degree must be completed in courses numbered 600 or above.

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.

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 Director of Graduate Programs. 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.

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 #3 results in dismissal from the Graduate School.

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.
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 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.

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).
DIVISION OF CONTINUOUS EDUCATION

The Division of Continuous Education offers credit and non-credit courses to provide for individual enrichment and professional advancement. Generally, by virtue of scheduling, duration, or content, these courses do not fit into the regular academic programs. This Division also offers conferences, seminars, and institutes in a variety of subjects.

Non-credit short courses and seminars are presented to provide the most up-to-date information for professional personnel. Representative topics are:

- Radar Systems
- Contamination Control
- Program Management
- Industrial Safety
- Decision Mathematics
- Computer Applications
- Configuration Management
- Simulation Techniques
- R&D Contract Management
- Federal/State Income Tax.

Engineering and mathematics review courses serve as refreshers to technical personnel who terminated their formal education some years in the past and also provide surveys of fundamentals for persons who wish to take the State professional registration examination.

Certificate programs are currently being developed in a variety of areas including paraeducation, supervisory development, commercial education, correctional administration, and engineering technology.

Many activities are sponsored by the Continuous Education Division which are directed toward cultural, civic, and recreational interests. Typical offerings include:

- Drug Abuse Seminar
- Interior Decorating
- More For Your Money
- Painting Workshop
- Current Affairs Seminar
- Parent Education

Inquiries concerning offerings should be directed to the division of Continuous Education. Brochures are usually available for the current programs.
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FACULTY

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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.

ALLEN, ANN B., B.A. (Newcomb College of Tulane University), M.A. (University of Alabama in Tuscaloosa), Instructor in English, 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; Chairman, Department of Electrical Engineering, 1964, 1970.


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.


BROWN, ROBERT A., B.S. (U. S. Naval Academy), M.S., Ph.D. (Ohio State University). Associate Professor of Industrial Engineering, 1967.


BURNS, ROBERT W., A.B. (Syracuse University), Graduate Study (The Sorbonne, France). Instructor in Philosophy, 1970.


CAPLENOR, C. DONALD, B.S., M.A. (George Peabody College for Teachers), Ph.D. (Vanderbilt University). Professor of Biology; Dean of the Faculty, 1970.
CASTLE, JOHN GRANVILLE, JR., B.A. (University of Buffalo), Ph.D. (Yale University). Professor of Physics; Director, Division of Natural Sciences and Mathematics, 1969, 1970.

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.


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.


EMERSON, MERLE THOMAS, B.S. (Whitworth College), M.S. (Washington State University), Ph.D. (University of Washington). Associate Professor of Chemistry, 1968.


FORTE, ALDO, D.Sc. (University of Havana, Cuba). Associate Professor of Mathematics, 1966.


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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.

GUPTA, JATINER, B.E. (University of Delhi), M.Tech. (Indian Institute of Technology), Ph.D. (Texas Technological College). Assistant Professor of Engineering, 1969.


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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.


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HOLT, CECELIA ANN, B.A. (Florence State College), M.S. (University of Kentucky). Instructor in Mathematics, 1968.


HORNER, JAMES M., B.S., M.A., Ph.D. (University of Alabama in Tuscaloosa). Associate Professor of Mathematics; Chairman, Department of Mathematics, 1965, 1970.

HUDSON, RALPH M., B.A., B.Sc., M.A. (Ohio State University), Ed.D. (University of Alabama in Tuscaloosa). Professor of Art History; Chairman, Department of Art, 1969.


MIRAKHOR, ABBAS, B.A., M.A., Ph.D. (Kansas State University). Assistant Professor of Economics; Chairman, Department of Economics, 1968, 1970.


MORIN, LORRAINE PAULINE, B.S., M.S. (University of Rhode Island). Ph.D. (Southern Illinois University). Assistant Professor of Biology, 1967.


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.

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PIERCE, DAWSEY, B.S. (Purdue University), Ph.D. (University of Massachusetts). Visiting Associate Professor of Biology, 1969.

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RILEY, CLYDE, B.S. (University of Rochester), Ph.D. (Florida State University). Associate Professor of Chemistry, 1967, 1968.


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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.


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SMALLEY, LARRY L., B.S., M.S., Ph.D. (University of Nebraska), Assistant Professor of Physics, 1967.

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, 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.

STREMSKI, RICHARD, B.S. (Loyola University), M.S., Ph.D. (University of Wisconsin), Assistant Professor of History, 1968.

STROMECKY, OSTAP, A.B. (Realschule, Ulm, Germany), M.A., Graduate Study (Vanderbilt 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.

TARTER, DONALD E., B.S. (Middle Tennessee State College), Ph.D. (University of Tennessee), Associate Professor of Sociology, 1965, 1969.

THOMPSON, KENNETH O., B.S., B.A.E., B.B.A., M.S. (University of Minnesota), Ph.D. (University of Alabama), Associate Research Professor of Engineering; Assistant Director, Research Institute, 1969.

THURSTONE, ROBERT L., B.S. (Illinois Institute of Technology), M.S. (University of Missouri), Ph.D. (North Carolina State University), Associate Professor of Electrical Engineering, 1965, 1967.

TODD, FRANCIS C., B.S. (Oklahoma State University), M.S. (Carnegie-Mellon University), Ph.D. (University of Chicago), Professor of Physics, 1969.

TRAYLOR, JOSEPHINE Z., A.B. (University of Missouri), M.S. (Middlebury College), Assistant Professor of French, 1965, 1969.

TRAYLOR, ORBA F., B.A. (Western Kentucky State University), M.A., Ph.D. (University of Kentucky), J.D. (Northwestern University), Professor of Economics, 1965, 1968.

WELKER, ROBERT L., A.B. (George Peabody College), M.A., Ph.D. (Vanderbilt University), Professor of English, 1964, 1968.


WHARRY, RHODA E., B.S.E. (University of Arkansas), M.S. (Memphis State University), Ph.D. (Purdue University), Associate Professor of Education, 1967.

WHITE, CAROLYN W., A.B. (University of North Carolina), M.A., Graduate Study (Duke University), Instructor in Political Science, 1967.

WHITE, JOHN C., B.A. (Washington & Lee University), M.A., Ph.D. (Duke University), Associate Professor of History; Chairman, Department of History, 1967, 1970.

WOLFE, WALTER N., B.S. (Auburn University), M.S. (DePaul University), Graduate Study (Auburn University), Instructor in Mathematics, 1968.

WOODARD, CHARLES R., B.A., M.A., Ph.D. (University of Tennessee), Professor of English; Chairman, Department of English, 1966, 1970.
WU, CRAIG CHI-YEN, B.A. (National Taiwan University), M.A., doctoral work, (Vanderbilt University), Instructor in Economics, 1970.

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.

WYSKIDA, RICHARD M., B.S. (Tri-State College), M.S. (University of Alabama in Tuscaloosa), Ph.D. (Oklahoma State University). Assistant Professor of Engineering; Chairman, Department of Industrial and System Engineering, 1968, 1970.

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ADAMS, DAVID M., B.S., M.S. (Texas A & M University), Ph.D. (Oklahoma State University). Lecturer of Engineering, 1965.


ATHA, LARRY C., B.S.M.E., M.S.M.E. (Missouri University, Rolla), Ph.D. (Missouri University, Columbia). Lecturer in Engineering, 1968.


BRYANT, WILLIAM S., B.S., Graduate Study (Ohio State University). Lecturer in Economics, 1964.


CAREY, PHILLIP, B.S. (Oklahoma State University), M.S. (Oklahoma State University). Lecturer in Sociology, 1970.


DAILEY, GRACE E., A.B. (Colby College), M.Ed. (Harvard University). Lecturer in English, 1967.


DAVIS, ROBERT TAYLOR, B.S. (Middle Tennessee State University), M.S. (University of Tennessee). Lecturer in Chemistry, 1966.

DEZENBERG, GEORGE J., B.E.E. (Auburn University), M.S. (University of Arkansas), Ph.D. (Georgia Institute of Technology). Lecturer in Engineering, 1966.


DOZIER, JAMES B., B.S., M.S. (Auburn University), Ph.D. (University of Alabama). Lecturer of Physics, 1961, 1967.


EGGERT, JOHN DWYER, B.S. (St. John's University), M.S. (Rensselaer Polytechnic Institute). Lecturer in Physics, 1967.


ESSENWANGER, Oskar M., Diplom (Technical University of Danzig, Germany), M.S. (University of Vienna, Italy), Dr. rer. nat. (University of Wuerzburg, Germany). Lecturer of Earth Sciences, 1961, 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.


GREEN, ONIS C., B.S. (Auburn University), M.S., (Stevenson Institute of Technology). Lecturer in Engineering, 1961.


GUINN, GERALD R., B.M.E. (Auburn University), M.S.M.E. (Purdue University), Ph.D. (University of Alabama). Lecturer in Engineering, 1967.

HALE, DANIEL P., Ph.D. (University of Tennessee). Lecturer of Physics, 1967.

HARTMAN, RICHARD L., Ph.D. (Carnegie Institute of Technology). Lecturer of Physics, 1966.


HOLL, HERBERT B., Ph.D. (University of Jena, Germany). Lecturer of Physics, 1965.

HUMPHRIES, WILLIAM R., M.S.E. (University of Alabama in Huntsville). Lecturer in Physics, 1969.

HUNG, FRANK T., B.S. (Taiwan College of Engineering), M.S., Ph.D. (Kansas State University). Lecturer of Engineering, 1968.


IGNATOWSKI, ELIZABETH K., A.B. (Bucknell University), M.S., Ph.D. (Purdue University). Lecturer of Psychology, 1967.


JOINER, HARRY M., B.A. (DePauw University), M.A. (University of Kentucky), Ph.D. candidate (University of Kentucky). Lecturer in Political Science, 1970.


KASTING, MARTHA F., B.A. (Wellesley College), M.A., Graduate Study (University of Alabama in Huntsville). Lecturer in Mathematics, 1968.

KERNER, HELMUT, Masters, Ph.D. (University of Vienna, Italy). Lecturer of Engineering, 1968.


LEHNIGK, SIEGFRIED H., Diplom, Dr. rer. nat. (University of Braunschweig, Germany). Lecturer of Mathematics, 1960, 1968.


MARSHALL, GEORGE LEON, JR., B.S. (University of Tennessee), Graduate Study (Indiana University and University of Alabama in Huntsville). Lecturer in Physics, 1968.


MILLER, JAMES ROLLAND, III, B.S. (Western Kentucky State College), M.A. (University of Alabama). Lecturer in Physics, 1967.


MURRAY, BARBARA B., B.S. (Clemson University), Graduate Study (University of Alabama in Huntsville). Lecturer of Biology, 1970.


PETERS, PALMER N., Ph.D. (University of Tennessee). Lecturer of Physics, 1969.


RAO, YEDLA K., B.S., M.S. (Banaras Hindu University, India), Ph.D. (University of Maryland). Lecturer of Economics, 1968.

RICHARDSON, GEORGE M., B.S. (Memphis State University), M.S. (Purdue University). Lecturer in Mathematics, 1962.


SNYDER, JOSEPH E., B.S. (Bowling Green College of Commerce), C.P.A. Lecturer in Accounting, 1955.

SODEK, BENARD ANTON, JR., B.S. (Loyola University of the South), M.S., Ph.D. (Oklahoma State University). Lecturer of Physics, 1967.

SPEROING, HANS J., Diplom, Dr. rer. nat. (University of Marburg, Germany). Lecturer of Mathematics, 1960.

SPILMAN, LAVINIA W., B.S. (University of Arkansas), M.S. (Purdue University). Lecturer in Mathematics, 1967.

STEVERDING, BERNARD, Ph.D. (Institute of Technology Aachen). Lecturer of Physics, 1963.


TAYLOR, LENNIE E., B.S. (Bowling Green College of Commerce), L.L.B. (Cumberland University). Lecturer in Accounting, 1956.

TEUBER, DIETER L., Diplom-Ingenieur, Dr.-Ing. (Technical University, Darmstadt, Germany). Lecturer of Engineering, 1967.


WALKER, BILLY JAY, B.S., M.S., Ph.D. (University of Oklahoma). Lecturer of Engineering, 1969.


WATSON, RAYMOND C., B.S. (Jacksonville State College), M.S.E. (University of Alabama), M.S. (University of Florida). Lecturer of Electrical Engineering; Director, Division of Continuous Education, 1963, 1970.


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Student Affairs
Office of Student Affairs
Index

Academic Workload ........................................... 47
Accreditation .................................................. 11
ACT Program ................................................... 19
Administration ................................................ 185
Administrative Science ....................................... 118
Admissions Information
  Graduate ..................................................... 173
  Special Student ............................................ 20
  Undergraduate ............................................. 19
Area of Concentration (AOC) ................................ 53
  When to declare ........................................... 53
Art, Visual ..................................................... 62
Athletics ......................................................... 35
Audit Students ................................................ 23
Biology .......................................................... 22
Board of Trustees ............................................ 183
Business Administration ..................................... 56
Calendar, Academic .......................................... 6
Chemistry ....................................................... 128
Class Attendance ............................................. 46
Classification, Student
  Full-Time .................................................... 47
  Part-Time ................................................... 47
Commerce ....................................................... 56
Conduct .......................................................... 45
Continuous Education ....................................... 181
Correspondence Study ....................................... 52
Counseling ...................................................... 43
Course Changes ............................................... 44
Course Numbering System ................................... 47
Degrees, Offered ............................................. 54, 12
Degree Requirements
  Graduate ..................................................... 173
  Undergraduate ............................................. 57
Dental ........................................................... 54
Earth Science .................................................. 135
Economics ...................................................... 100
Education
  Courses ....................................................... 70
  Graduate Study ............................................ 75
  Student Teaching ......................................... 69
Engineering, Division of .................................. 12, 54, 151
English ........................................................ 76
Employment, Student ....................................... 31
Examinations .................................................. 46
202
<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facilities</td>
<td>15</td>
</tr>
<tr>
<td>Faculty</td>
<td>187</td>
</tr>
<tr>
<td>Fees</td>
<td>25</td>
</tr>
<tr>
<td>Financial Assistance (Student Aid)</td>
<td>27</td>
</tr>
<tr>
<td>Financial Information</td>
<td>25</td>
</tr>
<tr>
<td>Foreign Languages</td>
<td>86</td>
</tr>
<tr>
<td>Foreign Students, Admission of</td>
<td>23</td>
</tr>
<tr>
<td>French</td>
<td>89</td>
</tr>
<tr>
<td>GED Test</td>
<td>20</td>
</tr>
<tr>
<td>German</td>
<td>90</td>
</tr>
<tr>
<td>Grades</td>
<td>47</td>
</tr>
<tr>
<td>Graduate Programs</td>
<td>12, 173</td>
</tr>
<tr>
<td>Cooperative Programs</td>
<td>179</td>
</tr>
<tr>
<td>Ph.D. Programs</td>
<td>179</td>
</tr>
<tr>
<td>Graduation, Application for</td>
<td>51</td>
</tr>
<tr>
<td>Grants</td>
<td>30</td>
</tr>
<tr>
<td>History</td>
<td>80</td>
</tr>
<tr>
<td>Honors</td>
<td>50</td>
</tr>
<tr>
<td>Humanities, Division of the</td>
<td>12, 54, 61</td>
</tr>
<tr>
<td>Irregular Post Graduate</td>
<td>175</td>
</tr>
<tr>
<td>Job Placement</td>
<td>31</td>
</tr>
<tr>
<td>Law</td>
<td>56</td>
</tr>
<tr>
<td>Law Enforcement Education Program</td>
<td>32</td>
</tr>
<tr>
<td>Lecturers</td>
<td>195</td>
</tr>
<tr>
<td>Library</td>
<td>12, 17</td>
</tr>
<tr>
<td>Loans</td>
<td>29</td>
</tr>
<tr>
<td>Mathematics</td>
<td>135</td>
</tr>
<tr>
<td>Medical Technology</td>
<td>124</td>
</tr>
<tr>
<td>Music</td>
<td>93</td>
</tr>
<tr>
<td>Choral Organizations</td>
<td>38</td>
</tr>
<tr>
<td>Natural Sciences and Mathematics, Division of</td>
<td>12, 54, 121</td>
</tr>
<tr>
<td>Numbering System</td>
<td>47</td>
</tr>
<tr>
<td>Nursing</td>
<td>56</td>
</tr>
<tr>
<td>Organizations</td>
<td>38</td>
</tr>
<tr>
<td>Physics</td>
<td>145</td>
</tr>
<tr>
<td>Philosophy</td>
<td>95</td>
</tr>
<tr>
<td>Placement Tests</td>
<td>43</td>
</tr>
<tr>
<td>Political Science</td>
<td>109</td>
</tr>
<tr>
<td>Pre-Medical Program</td>
<td>.54, 121, 124</td>
</tr>
<tr>
<td>Probation</td>
<td>50</td>
</tr>
<tr>
<td>Program, Change of</td>
<td>51</td>
</tr>
<tr>
<td>Psychology</td>
<td>112</td>
</tr>
<tr>
<td>Publications, Student</td>
<td>36</td>
</tr>
<tr>
<td>Quality Points</td>
<td>47</td>
</tr>
<tr>
<td>Readmission</td>
<td>.50, 24</td>
</tr>
<tr>
<td>Refunds</td>
<td>27</td>
</tr>
<tr>
<td>Registration</td>
<td>43, 176</td>
</tr>
</tbody>
</table>

203
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research Institute</td>
<td>17</td>
</tr>
<tr>
<td>Rowing Club</td>
<td>36</td>
</tr>
<tr>
<td>Russian</td>
<td>92</td>
</tr>
<tr>
<td>Schedule, Class Periods</td>
<td>7</td>
</tr>
<tr>
<td>Scholarships</td>
<td>28</td>
</tr>
<tr>
<td>Second Bachelor's Degree</td>
<td>52</td>
</tr>
<tr>
<td>Social and Behavioral Sciences, Division of</td>
<td>54, 12, 99</td>
</tr>
<tr>
<td>Sociology</td>
<td>116</td>
</tr>
<tr>
<td>Spanish</td>
<td>92</td>
</tr>
<tr>
<td>Sports</td>
<td>37</td>
</tr>
<tr>
<td>Student Government</td>
<td>35</td>
</tr>
<tr>
<td>Student Life</td>
<td>35</td>
</tr>
<tr>
<td>Suspension</td>
<td>50</td>
</tr>
<tr>
<td>Term System</td>
<td>5</td>
</tr>
<tr>
<td>Transcripts</td>
<td>52</td>
</tr>
<tr>
<td>Transfer Students</td>
<td>21</td>
</tr>
<tr>
<td>Transient Students</td>
<td>23</td>
</tr>
<tr>
<td>Undergraduate Academic Programs</td>
<td>53</td>
</tr>
<tr>
<td>Veterans</td>
<td>32</td>
</tr>
<tr>
<td>Withdrawal</td>
<td>45, 27</td>
</tr>
</tbody>
</table>

