Students can search the library catalog and hundreds of databases at any library location — and through the UT Libraries' web site. Interlibrary Services is available to help students find and retrieve materials that are not available in the UT Libraries. The services and facilities of the University Libraries are accessible to persons with disabilities.

The John C. Hodges Main Library (1015 Volunteer Boulevard) is a 350,000 square-foot building housing collections in all subject areas. The Hodges Library can accommodate more than 3,500 people, with space for group and individual study. The second floor CyberCafe is open for late night study, with networked computers, reading tables, and a coffee shop. Students may check out laptop computers equipped for connection to the Library’s wireless network. The Studio (located in the second floor Media Center) offers students a hands-on lab for creating and manipulating digital media. Workshops and classes are offered throughout the semester to help students learn how to get the most out of the Libraries’ services.

The Agriculture and Veterinary Medicine Library (Room A-113, Veterinary Teaching Hospital) has a strong collection in agriculture; veterinary, comparative and human medicine; environmental studies and biodiversity; and related biological sciences.

The Map Library (Room 15, basement of the Hoskins Library, Cumberland Avenue and 15th Street) houses a large collection of sheet maps, atlases, journals, and books related to cartography. Materials in print, film, and digital formats are gathered from commercial sources as well as the Government Depository program.

The Music Library (301 Music Building) has a comprehensive collection of music and music literature, including books, scores, audio and video recordings, current periodicals, and microfilm. Most materials in the Library of Congress “M” classification are located here.

Special Collections (2nd floor, west wing, of the Hoskins Library) is a repository of rare books, manuscripts (including the papers of James Agee and Alex Haley), and historical ephemera. Students are welcome to use Special Collections. Materials from Special Collections cannot be checked out, but they can be used in the Special Collections Reading Room. The University Archives are also housed in the Hoskins Library. The Archives contain official records of the university; items published by its units, departments, and agencies; and materials that document University of Tennessee life.

The Social Work Library (Suite 292, 193-E Polk Avenue, Nashville) serves College of Social Work students in field practice across the state. The library has a working collection of materials in social work and related disciplines.

The Law Library on the UT Knoxville campus and the libraries located on the campuses in Chattanooga, Martin, Memphis, and Tullahoma are separately administered. The students and faculty of the university can use all of the libraries affiliated with the University of Tennessee.
University Studies

Neil Greenberg, Chair

http://web.utk.edu/~unistudy/

University Studies has three general objectives: to foster interdisciplinary teaching and scholarship, especially across departmental and collegiate boundaries; to promote active and integrative learning; and to nurture the scholarly and creative development of faculty, staff, and students.

In pursuit of these objectives, University Studies sponsors several activities. Faculty colloquies are on-going, structured, interdisciplinary conversations on a topic or nexus of topics. Colloquies explore important contemporary issues which involve faculty and students from several disciplines and colleges. Advanced undergraduate and graduate students may attend by permission of colloquy coordinator.

Current colloquies include: Applied Phenomenological Studies; Technology, Society, and the Common Good; the Gerontology Colloquy; the Interdisciplinary Colloquy on Rhetoric; Psychoanalysis and the Humanities; Evolution and Culture; the Creativity Group; Critical Theory; Appalachian Forum; Cultural Diversity; the Great Conversation; Spirituality and Health; and Educational Technology. Colloquies continue as long as they have faculty involvement and new colloquies form each year.

Interdisciplinary undergraduate courses are innovative offerings that are typically collaborative or team-taught. Most courses stem from the interdisciplinary colloquy discussions. There are several honors offerings for undergraduates. In addition, University Honors students are encouraged to take a University Studies (200-level or higher) course during their first two years to help fulfill their four honors courses requirement.

Centripetals are monthly faculty and staff luncheons held over the academic year designed to encourage conversation among faculty and staff about their creative and scholarly work. University Studies also works with other units across campus to facilitate visits by distinguished scholars of multidisciplinary interest. Such visiting scholars work with faculty groups on specific projects, participate in interdisciplinary forums, or present special lectures.

For further information, contact:
Dr. Neil Greenberg, Chair
F239 Walters Life Science Building
Phone: (865) 974-8177
FAX: (865) 974-2665
E-mail: unistudy@utk.edu
Army ROTC at the University of Tennessee, Knoxville

The military program at the University of Tennessee, Knoxville, pre-dates that of any other state university in the country, having been introduced in 1844. In that year, Professor Albert Miller Lea, a U.S. Military Academy graduate, organized an infantry company. With the outbreak of the Mexican War, the entire company, as well as thousands of other Tennesseans, volunteered for service in the war. Thus, Tennessee became known as the “Volunteer State.”

When the University of Tennessee, Knoxville reopened after the War Between the States, a system of military discipline was adapted. A Code of Military Regulations was drawn up and a copy was provided each student when he matriculated. The whole institution was put under regular U.S. military academy discipline. The student body was organized into a battalion of cadets, which consisted of four companies fully officered, armed and equipped under the command of the commandant and his staff of cadet officers. UT Knoxville remained as a Military Garrison for a period of six years, until 1877. Military Science and Leadership continued to be taught, since the university was a Land Grant Institution and the 1862 Act of Congress required instruction in Military Science and Leadership.

The National Defense Act of 1916 changed the old military organization into an ROTC unit. For the first time, the Federal Government began to pay a part of the uniform cost for basic course students. The government provided uniforms and other equipment for juniors and seniors, and a monthly subsistence allowance was given to advanced course students.

From 1928-1930, Major (later Brigadier General) Robert R. Neyland was the Professor of Military Science and Leadership and football coach at the University of Tennessee, Knoxville.

Objectives of the program are to provide students with an understanding of the fundamental concepts and principles of
military art and science; to develop a basic understanding of associated professional knowledge, a strong sense of personal integrity, honor, and individual responsibility, an appreciation of the requirements for national security; and to establish a sound basis for the students’ future professional development.

ROTC draws young men and women for training from all geographical, economic, and social strata of our society, as well as from the many educational disciplines required for the modern Army. The program ensures that men and women educated in a liberal and broad spectrum of American institutions of higher learning are commissioned annually into the officer corps.

The Program

Basic Course

Students entering the Basic Course register for classes at the same time and in the same manner as they enroll in their other college courses. All four classes (Military Science and Leadership 101, 102, 201, and 202) are available to any UT Knoxville student as an elective course without any military obligation. Completion of the Basic Course, graduation from Leader’s Training Course (Military Science and Leadership 200), or prior military service qualifies students for entry into the Advanced Course, which is normally taken during the last two years of college.

Advanced Course

The Advanced Course is designed to develop and mentor “leaders of character,” who, upon degree completion, will accept a commission in the U.S. Army. The Advanced Course requirement is that applicants have two academic years remaining at either the undergraduate or graduate levels, or a combination of both. Students normally enter the Advanced Course during the last two years of their degree program (junior year for undergraduates, first year of master’s program for graduate level students). The Advanced Course is made up of five Military Science and Leadership classes (Military Science and Leadership 301, 302, 400, 401, 402) and takes two years to complete. All classes except Military Science and Leadership 400 are offered during spring/fall semesters. Military Science and Leadership 400 is a “paid” five-week summer camp held in Seattle, Washington.

Army ROTC develops students under the “whole person” concept. Cadets must maintain academic standards while taking on the additional responsibilities of ROTC. Army ROTC cadets are required to participate in organized physical fitness training. Students enrolled in the Advanced Course are required to be full-time students, taking at least 12 hours each semester.

Placement Credit and Course Substitution

Placement credit and/or course substitution may be granted by the Professor of Military Science and Leadership on the basis of previous honorable active military service, participation in a Junior ROTC program, completion of Military Science and Leadership 200, or completion of Army Basic Training and advanced individual training. A student may request placement credit for a portion of the entire Basic Course. Military Science and Leadership courses taken at other colleges or universities are transferable as approved by the Professor of Military Science and Leadership.

Military Science and Leadership 200 is a “paid” five-week Summer Leader’s Training Course offered to any University of Tennessee student without any military obligation. Students completing this course receive four academic credits, qualify for the Advanced Course by receiving Basic Course credit, and can compete for two years of academic "tuition" scholarships.

Requirements for Enrollment and Continuance

The general requirements for enrollment and continuance in the Army ROTC program are:

1. Basic Course students
   a. Be a citizen of the United States.
   b. Be physically qualified.
   c. Freshman or sophomore standing. Students with higher standing require consent of instructor.

2. Basic Course Cadets applying for enrollment in the Advanced Course who seek a Commission must:
   a. Have successfully completed Military Science and Leadership 101, 102, 201, and 202 or have accomplished one of the following:
      Prior Military Service, ROTC Basic Military Studies; Practicum (Military Science and Leadership 200); 3-Year High School ROTC Basic Course.
   b. Have two years remaining at the university (either undergraduate, graduate or in pursuit of additional course work).
   c. Have completed a minimum of 55 semester hours.
   d. Be under 30 years old at time of graduation and commissioning (waiverable).
   e. Be enrolled as a full-time student, either at the University of Tennessee, Knoxville, or at a nearby institution in a partnership program.
   f. Meet military screening and physical requirements.
   g. Maintain a 2.0 G.P.A.
   h. Maintain B average in Military Science and Leadership Courses.

Regularly enrolled students who meet the academic prerequisites may take individual courses as electives with the permission of the department head and academic advisor.

Requirements for All Military Science and Leadership Commissionees

The following Military Science and Leadership Advanced Course Curriculum must be successfully completed:

301 Leadership and Problem Solving (4); 302 Leadership and Ethics (4); 400 National Advanced Leadership Camp (4); 401 Leadership and Management (4); 402 Officership (4); 430 U.S. Military History, 1754 to Present or 303 Military History (3).

In addition to a baccalaureate degree, there are required and recommended courses in designated fields of study that students must complete prior to commissioning. Students meet these prerequisites by successful completion of required and elective courses taken from the university curriculum in the required areas of concentration.

Courses in the following designated fields of study are strongly recommended of students seeking a commission in the United States Army: one course in written communications; one course in human behavior; one course in math reasoning; one course in computer literacy.
Special Programs

Pay and Entitlements

All scholarship cadets and cadets enrolled in the ROTC Advanced Course receive uniforms and equipment plus a monthly allowance during the academic year. While attending the ROTC summer studies each cadet receives approximately $740 for Advanced Summer Studies, $740 for Basic Summer Studies, plus meals and clothing are provided.

Army ROTC Scholarship Program

The Army ROTC scholarship program offers financial assistance to outstanding young men and women in Army ROTC who are interested in the Army as a career. Each scholarship provides for free tuition, textbooks subsidy, and laboratory fees in addition to a monthly subsistence allowance for the period that the scholarship is in effect. Scholarships may be awarded for either two, three or four years. High school seniors should contact their guidance counselors early in August or September of their senior year to apply for the four-year scholarship. Two and three-year scholarship applicants should contact the Professor of Military Science and Leadership for further information. Other privately financed scholarships and grants are also available to ROTC cadets.

Leadership Grant Program

The University of Tennessee, Knoxville, ROTC Leadership Grants are designed to attract and retain high quality/caliber students to the Army ROTC program for future positions of leadership within their service and our country. These grants are intended to complement other ROTC and University scholarships by providing funds to offset costs for such areas as: room and board; out-of-state tuition; and first year expenses for Army ROTC scholarship winners.

Up to ten (10) $1,000 Leadership Grants are available each year and are available to scholarship winners and any full-time student enrolled in the AROTC program. Awarding of these Leadership Grants will be determined by the Professor of Military Science and Leadership who will evaluate each candidate in the following areas: ACT/SAT scores; leadership activities; and recommendations from high school personnel and community leaders.

Simultaneous Membership Program

The “SMP” option combines the Army ROTC living allowance with membership in the Army Reserve or Army National Guard and allows the student to receive pay from both programs. ROTC cadets serve as “officer-trainees” in direct leadership/management positions. SMP participation with National Guard or reserve forces is one weekend per month and two weeks each year. Cadets participating in the SMP program are eligible for tuition reimbursement up to $4,000 per year.

Branch Selection

The curriculum of the Army ROTC Program is designed to qualify the cadet for appointment as an officer. Selection for assignment to the various branches of the Army is based upon: the personal interests of the cadet; the major course of study; academic accomplishments; leadership potential; and the needs of the Service. Under this system a cadet may be commissioned in any branch for which he or she is qualified and in which a need for officers exists. After graduation and commissioning, the officer will attend a service school for further specialized military training which will qualify him or her for the branch to which he or she is assigned.

Extra Curricular Activities

Numerous military related activities are available to cadets throughout the school year. These include the Tennessee Rangers, Scabbard and Blade Honor Society, and UT Color Guard. These organizations provide both student-to-student contact and a valuable opportunity to acquire military skills. Additionally, each semester, a number of field training exercises are conducted to develop such military skills as small unit tactics, land navigation and rifle marksmanship.

Physical Fitness Training

The Cadet Battalion conducts physical fitness training Monday, Wednesday, and Friday. The exercise program focuses on flexibility, muscular strength, and cardio respiratory endurance. Any University of Tennessee, Knoxville, student may take the course by registering for Army ROTC Fitness Program 103.

Military Science and Leadership Curriculum

Normal Course

<table>
<thead>
<tr>
<th>Freshman</th>
<th>Hours Credit</th>
</tr>
</thead>
<tbody>
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<td>Military Science and Leadership 101, 102</td>
<td>4</td>
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<tr>
<td>Military Science and Leadership 103</td>
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<tr>
<td>Sophomore</td>
<td>Hours Credit</td>
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<td>6</td>
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<tr>
<td>Military Science and Leadership 103</td>
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<tr>
<td>Junior</td>
<td>Hours Credit</td>
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</tr>
<tr>
<td>Military Science and Leadership 103</td>
<td>1</td>
</tr>
<tr>
<td>Senior</td>
<td>Hours Credit</td>
</tr>
<tr>
<td>Military Science and Leadership 401, 402, 430, 303</td>
<td>11</td>
</tr>
<tr>
<td>Military Science and Leadership 103</td>
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</tr>
<tr>
<td>Total</td>
<td>33</td>
</tr>
</tbody>
</table>

Basic Military Studies—Practicum

Summer

| Sophomore | Hours Credit |
| Military Science and Leadership 200 | 4 |
| Junior | Hours Credit |
| Military Science and Leadership 400 | 4 |
| Total | 8 |

The Professor of Military Science and Leadership may approve variations to these sequences of study on a case-by-case basis. Lower division credit hours granted by the university for military service are dependent upon time spent in service and service schools attended.

Progression Requirements

1. Minimum semester hours/GPA for entrance into Basic Military Studies-Practicum (Military Science and Leadership 200): 30—59.9 semester hours/2.00 GPA.
2. Minimum overall GPA for entrance into the Advance Course (Military Science and Leadership 301, 302, 400, 401, 402): 2.00 GPA.
3. Minimum GPA in Military Science and Leadership Courses: 3.00.
4. Minimum overall GPA for commissioning: 2.00.
5. Semester counseling sessions with military advisor required for Advance Course and scholarship students only.
AFROTC develops students under the “whole person” concept. Cadets must maintain academic standards while taking on the additional responsibilities of AFROTC. These extra responsibilities include being physically fit and demonstrating integrity and good moral character. Cadets normally participate in approximately two hours per week of physical activity outside of class requirements.

Women in AFROTC

AFROTC at the University of Tennessee, Knoxville, has been coeducational since 1970. Women complete the same courses as men and have the same opportunities. Upon successful completion of the AFROTC program and degree requirements, women are commissioned in the Air Force as Second Lieutenants. Pay and job opportunities are equal for women and men. Virtually all career fields in the Air Force are open to women, including pilot and navigator positions.

Scholarships

Air Force ROTC Scholarships are available to qualified applicants in both the Four- and Two-Year Programs. Each scholarship provides full tuition, laboratory and incidental fees, and book fee. In addition, scholarship cadets receive a non-taxable stipend ranging from $250 to $400 each month during the school year while on scholarship status.

High School Students

Competitive four-year scholarships are available to high school students who enroll in certain scientific and engineering career fields. Some scholarships are also available to students who enroll in certain non-technical majors. Four-year scholarship application information is available on the AFROTC website at http://www.afrotc.com/.

College Students

Other scholarship opportunities exist for students already in college. Three- and two-year scholarships are available on a competitive basis and the student must have at least four, three, or two undergraduate or graduate years of study remaining in order to compete. Applications for these scholarships should be made directly to the Department of Aerospace Studies.

Leadership Grants

The University of Tennessee, Knoxville, AFROTC Leadership Grants are designed to attract and retain high quality students to the Air Force ROTC program for future positions of leadership within their service and our country. These grants are intended to complement other AFROTC and University scholarships by providing funds to offset costs for such areas as: room and board; out-of-state tuition; and first year expenses for 3-year AFROTC scholarship winners.

Up to twenty (20) $500 Leadership Grants are available each year and are open to scholarship winners and any full-time student enrolled in the AFROTC program. Awarding of these Leadership Grants will be determined by the Professor of Aerospace Studies who will evaluate each candidate in the following areas: ACT/SAT scores; AFOQT test scores; GPA; physical fitness scores; leadership activities; and recommendations from people who can attest to the applicant’s leadership experience and skills.
Pay and Entitlements

All cadets enrolled in AFROTC are furnished texts and uniforms. Qualified junior and senior cadets with a cumulative grade point average (GPA) of 2.5 or better may receive a $3,000 scholarship that is applied toward their tuition and books. Additionally, these cadets receive a monthly stipend ranging from $250 to $400. In addition, they are paid mileage to and from field training, plus pay commensurate with active duty rates while at field training.

Active Duty Commitments

Commissioned graduates going into non-flying duties will be required to serve four years of active duty. Those graduates going into pilot assignments will be required to serve ten years active duty after completion of pilot training. Those graduates going into navigator assignments will be required to serve six years active duty after completion of navigator training.

This information is subject to change. For the most up-to-date information regarding AFROTC, contact AFROTC Detachment 800, 974-3041.

Air Force Aerospace Studies Curriculum

To receive a commission as a Second Lieutenant in the United States Air Force through the Air Force ROTC program, a student must successfully complete a 4- or 6-week Field Training encampment and take or receive credit for the following courses. Attendance at a 6-week Field Training encampment satisfies all freshman and sophomore level course requirements.

<table>
<thead>
<tr>
<th>Freshman</th>
<th>Hours Credit</th>
</tr>
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<tbody>
<tr>
<td>Aerospace Studies 101, 102</td>
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<tr>
<td>Aerospace Studies 103, 104 (Leadership Laboratory)</td>
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</tr>
<tr>
<td>Aerospace Studies 202, 204 (Leadership Laboratory)</td>
<td>1.1 (S/NC)</td>
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<table>
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</thead>
<tbody>
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<tr>
<td>Aerospace Studies 303, 304 (Leadership Laboratory)</td>
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</table>

<table>
<thead>
<tr>
<th>Senior</th>
<th>Hours Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerospace Studies 401, 402</td>
<td>3.3</td>
</tr>
<tr>
<td>Aerospace Studies 403, 404 (Leadership Laboratory)</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Professional Development Training Programs

To help cadets gain knowledge of the challenges in leadership and human relations encountered by a junior Air Force officer and to motivate them toward an Air Force career, cadets have the opportunity to participate in a variety of summer professional development training programs. Many of these programs are highly competitive. Some of these programs are:

**Army Airborne Training**

Training lasts for 24 days and is physically and mentally demanding. Upon successful completion, cadets are awarded the parachutist rating. All training is conducted at Fort Benning, Georgia.

**ASSIST**

Rising sophomore cadets spend two weeks touring an active duty Air Force base and ‘shadowing’ junior officers in various career fields.

**British Exchange**

Cadets are attached to a British University Air Squadron for 17 days of training and orientation at various Royal Air Force Bases in the United Kingdom.

**Combat Survival Training**

A 20-day program incorporating combat, basic aircrew, and water survival training. Training is conducted at the US Air Force Academy, Colorado Springs, Colorado.

**Field Engineering and Readiness Lab**

Provides opportunities for cadets with entry-level civil engineering courses to get hands-on work experience in the Civil Engineering career field. Training consists of two weeks working with Civil Engineering at an Air Force base and three weeks hands-on construction activities at the Air Force Academy, Colorado Springs, Colorado.

**Foreign Language Immersion**

Provides cadets majoring in a foreign language the opportunity to receive intensive language and cultural training. Training lasts for four weeks in various overseas countries.

**Nurse Orientation Program**

During a four-week internship program at Wilford Hall USAF Medical Center, Lackland AFB Texas, nursing cadets receive hands-on experience and practical knowledge of Air Force nursing.

**Operation Air Force**

A three-week program of general orientation and ‘shadowing’ of junior officers in various career fields. Program is conducted at Air Force installations throughout the United States.

**Pentagon Internship Program**

A three-week program to provide cadets an opportunity to work in the Pentagon. Students selected for the program gain problem-solving experience working with both military and civilian personnel on real world issues and participate as a team member with professionals in their chosen field of study.

**Civil Engineering**

Training consists of two weeks working with Civil Engineering at an Air Force base and three weeks hands-on construction activities at the Air Force Academy, Colorado Springs, Colorado.

**Nurse Orientation Program**

During a four-week internship program at Wilford Hall USAF Medical Center, Lackland AFB Texas, nursing cadets receive hands-on experience and practical knowledge of Air Force nursing.

**Operation Air Force**

A three-week program of general orientation and ‘shadowing’ of junior officers in various career fields. Program is conducted at Air Force installations throughout the United States.

**Pentagon Internship Program**

A three-week program to provide cadets an opportunity to work in the Pentagon. Students selected for the program gain problem-solving experience working with both military and civilian personnel on real world issues and participate as a team member with professionals in their chosen field of study.
The College of Law has, since 1890, continuously sought to provide high quality legal education in a university community. The college offers a professional curriculum leading to the degree of Doctor of Jurisprudence. Two dual degree programs are available in conjunction with the College of Law: the JD-MBA program with the College of Business Administration and JD-MPA program with the Department of Political Science.

Information regarding admission, financial aid, academic policies, extracurricular activities, and student services is available from the Admissions Office, The University of Tennessee, College of Law, 1505 W. Cumberland Avenue, Knoxville, Tennessee 37996-1810. The completed application should be received before February 1 of the year of requested admission.

The College of Veterinary Medicine, established in 1974, offers a professional curriculum leading to the degree of Doctor of Veterinary Medicine (DVM). The college offers graduate studies leading to the degrees of Master of Science (MS) and Doctor of Philosophy (PhD) with a major in Comparative and Experimental Medicine. Residency training programs in the various clinical specialties are also offered.

The Graduate Catalog contains complete information concerning the programs in the college. Forms and instructions for making application for admission may be obtained beginning June 1 from the Office of the Associate Dean, The University of Tennessee, Knoxville, College of Veterinary Medicine, 2407 River Drive, Room A102, Knoxville, Tennessee 37996-4550. Applications must be received by the Veterinary Medical College Application Service (VMCAS) by November 1 of the year prior to requested admission. All pre-veterinary requirements must be completed by the end of the spring term of the year in which the student plans to enroll in the college.

A wide range of graduate programs leading to master’s and doctoral degrees is available. The university offers master’s programs in 76 fields, the Specialist in Education degree, doctoral work in 44 fields, 2 professional programs, and several graduate certificate programs. More than 6,000 graduate and professional students are enrolled on and off campus under the tutelage of 1,500 faculty members.

Complete information concerning graduate study at The University of Tennessee, Knoxville, is available in the Graduate Catalog, published annually and on the Graduate Studies Web site: http://web.utk.edu/~gsinfo.
The University of Tennessee, Knoxville, is committed to its land-grant mission of public service. The institution meets that mission by extending its continuing education services and programming resources through outreach initiatives. University Outreach and Continuing Education works with academic departments to offer courses, educational services and programs. The division offers programs using a variety of modes, helping people of all ages achieve degrees and certificates, accomplish professional development goals, and pursuit intellectual and self-improvement interests.

Programs and courses are based upon student needs and desires, whether for self-motivated learning; for leisure and recreational programs; or for professional promotion, certification, licensure, re-licensure, or mid-career changes. The division provides these opportunities through program coordination and development of the four departments: Department of Conferences, Department of Distance Education and Independent Study, English Language Institute, and Professional and Personal Development.

For more information, contact:

University Outreach and Continuing Education
The University of Tennessee
1534 White Avenue
Knoxville, Tennessee 37996-1526
Phone: (865) 974-3181, fax: (865) 974-6629
E-mail: outreach@tennessee.edu
Web Site: www.outreach.tennessee.edu

Department of CONFERENCES
Norvel Burkett, Associate Dean and Director
Robert Gibbs, Assistant Director

The Department of Conferences, housed in the Conference Center Building in downtown Knoxville, provides management services to university departments and faculty or outside groups that desire to hold an educational meeting anywhere in Tennessee or across the United States.

The department assists organizations in designing and managing programs to meet the needs of attendees. The staff provides professional guidance and management for small group meetings as well as for major conventions of several thousand delegates. Consulting and support services can include planning and budgeting, registration, lodging, food services, promotional materials, meeting-site management and all details to ensure a successful event. Some programs qualify for Continuing Education Units (CEUs), which become a permanent record maintained by the University Outreach and Continuing Education. Additional information may be obtained from:

University of Tennessee Conferences
University Outreach and Continuing Education
The University of Tennessee
P.O. Box 2648
Knoxville, Tennessee 37901
Phone: (865) 974-0250, fax: (865) 974-0264
E-mail: conferences@tennessee.edu
Web Site: www.outreach.tennessee.edu/conferences
University Conference Center
Norvel Burkett, Associate Dean and Director
Robert Gibbs, Assistant Director

The University Conference Center, managed by the Department of Conferences, offers quality meeting facilities and service to university units, business and industry groups, professional organizations, and government agencies. Professional groups and interested individuals can request interactive video-conferencing to locations worldwide. Arrangements can also be made to receive (downlink) programming or transmit (uplink) programming via satellite. The University Conference Center is located at 600 Henley Street in downtown Knoxville.

Additional information may be obtained from:

UT Conference Center
University Outreach and Continuing Education
The University of Tennessee
Suite 212
Knoxville, Tennessee 37996
Phone: (865) 974-0250, fax: (865) 974-0264
E-mail: conferences@tennessee.edu
Web Site: www.outreach.tennessee.edu/conferences

English Language Institute
Jim Hamrick, Director

The English Language Institute (ELI) offers a non-credit language-study program. It is designed to assist students in their pursuit of career goals or educational objectives in the United States. The courses emphasize development of communicative ability in listening, speaking, reading, and writing. Faculty members are trained in teaching English to speakers of other languages and different national backgrounds, with varying proficiency in English.

The curriculum consists of eight proficiency levels: 101-108, Introductory through Pre-Academic.

Classes meet three to five periods each day with emphasis on English Structure (Grammar); Listening Comprehension, Writing/Composition (Rhetoric), Conversation Practice for Communicative Purposes, Reading and Vocabulary.

Classes also assist students in pronunciation, test-taking strategies, U.S. culture orientation, and university study skills.

Additional information may be obtained from:

English Language Institute
University Outreach and Continuing Education
The University of Tennessee
907 Mountcastle Street
Knoxville, Tennessee 37996-3505
Phone: (865) 974-3404
Fax: (865) 974-6383
E-mail: eli@tennessee.edu
Web Site: www.outreach.tennessee.edu/eli

Department of
PROFESSIONAL AND PERSONAL DEVELOPMENT
Mary F. Jerger, Interim Director

The Department of Professional and Personal Development provides a comprehensive array of non-credit courses, certificates, and seminars designed to serve the needs of individuals and businesses in Knoxville and surrounding communities. Courses are offered on the university campus, at off-campus locations (including two Oak Ridge classrooms), and on-line. Classes are taught by university faculty, staff, and community experts. Courses also are delivered on-site for business clients, with instructional services tailored to the needs of each group.

Business topics include professional development, career planning, computer training, and several specialized certificate programs. Personal interest topics range from creative writing to art, dance, gardening, music, and sports. There are also courses that meet requirements of the state or other agencies for certification in real estate and financial planning.

Special programming also includes Kids U which provides summer hands-on workshops for elementary and secondary education students; Seniors for Creative Learning, a membership-based program focusing on issues and courses for senior adults; and the Smoky Mountain Field School, a program co-sponsored with Great Smoky Mountains National Park.

For further information or to register, contact:

Department of Professional and Personal Development
University Outreach and Continuing Education
The University of Tennessee
1534 White Avenue
Knoxville, Tennessee 37996-1526
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Department of
DISTANCE EDUCATION AND INDEPENDENT STUDY
George H. Hoemann, Assistant Dean

The Department of Distance Education and Independent Study, in concert with academic departments, offers Internet-based, Web-delivered classes, and programs leading to certificates and degrees. The College of Communication and Information and the College of Engineering offer master’s degree programs through Web-based courses, while the Departments of Nuclear Engineering and Statistics, Operations and Management Science offer courses leading to degree and certificate programs. Other undergraduate and graduate classes and programs are available, as well as a variety of individual courses in many disciplines. Current course availability can be found on the Web at: anywhere.tennessee.edu.

The department provides services and support for faculty, students, and industry interested in flexibly-delivered education. The Internet eLearning Institute provides certificate programs, professional development courses and training.

For information and registration forms, contact the Distance Education Program at:

Distance Education and Independent Study
University Outreach and Continuing Education
The University of Tennessee
1534 White Avenue
Knoxville, Tennessee 37996-1525
Phone: (865) 974-1534 or (800) 670-8657
Fax: (865) 974-4684
E-mail: DistEducation@tennessee.edu
Web Site: anywhere.tennessee.edu
Courses of Instruction

Courses fulfilling the University General Education Requirement are designated as follows:

(AH) Arts and Humanities
(CC) Cultures and Civilizations
(OC) Communicating Orally
(NS) Natural Sciences
(QR) Quantitative Reasoning
(SS) Social Sciences
(WC) Communicating through Writing

ACCOUNTING (009)

201 Principles of Financial Accounting (3) Introduction to financial accounting theory and practice with emphasis on the role of financial information in business decisions. Prerequisite to all other courses in Accounting.

202 Principles of Managerial Accounting (2) Introduction to managerial and cost accounting concepts with emphasis on uses of accounting data by managers in planning operations, controlling activities, and decision making. Prereq: 201.

207 Honors: Accounting: Principles of Financial Accounting (3) Introduction to financial accounting theory and practice with emphasis on the role of financial information in business decisions. The course will make extensive use of computer technology for retrieving and analyzing financial information. Eligibility: 28 ACT Composite or 1250 recentered SAT Composite.

311 Financial Reporting and Analysis (3) Theory and practice that underlies the preparation, analysis, and use of financial statements. Prereq/Coreq: Finance 301 and Business Administration 342.

321 Cost Management (3) Cost information for products, services, and how cost information is recorded, analyzed, reported, and used in decision making. Topics include cost concepts and behavior, cost systems, budgeting, activity-based costing and management, and strategic cost management. Prereq/Coreq: Business Administration 342.

411 Financial, Compliance, and Operational Auditing (3) Auditing’s role in society from an internal and external perspective, audit methodology, role of internal control and statistical sampling in auditing, fraud auditing, operational auditing, compliance auditing, and application of auditing procedures to specific transaction cycles. Prereq: 202.

414 Advanced Financial Reporting (3) Accounting standards for advanced financial reporting topics such as statement of cash flows, income taxes, leases, accounting changes, consolidated financial statements, and foreign operations. Prereq: 311 with a C or better.

415 Governmental and Nonprofit Accounting (3) Advanced study of governmental and nonprofit entities. Governmental accounting principles, revenues and expenditures, budgeting, and financial reporting. Accounting principles and reporting models of nonprofit organizations. Integration of economic and social issues with reporting standards for governmental and nonprofit organizations. Prereq: 414 or permission of the instructor.

431 Federal Income Taxation (3) Fundamentals and concepts of federal income taxation. Emphasis on tax strategy, business taxation, and individual taxation. Topics include tax strategy modeling, gross income, deductions, credits, tax determination, property transactions, business entities, and basics of international taxation. Prereq: 311 with a C or better or consent of instructor.

451 Operational Auditing and Consulting (3) Approaches auditors might use to evaluate an entity’s efficiency and effectiveness in a variety of settings and techniques auditors might use in consulting to provide the entity a competitive advantage.

492 Accounting Internship (1-6) Prereq: Consent of instructor. Satisfactory/No Credit grading only.

AEROSPACE ENGINEERING

See Engineering Aerospace.

ADVERTISING (012)

250 Advertising Principles (3) Survey of the role of advertising in American business and society. Relationship between advertising and marketing; functional components of the advertising process: research, media, creative, and management.

310 Advertising and Public Relations Design (3) Study, use, and application of design, color, type, and layout styles as they affect concept development in the creation of promotional materials. Analysis of organizational goals and how they mold strategic and conceptual development. Application of relevant computer software for creation of promotional material. Prereq: 250 or Public Relations 270 and admission to the School of Advertising and Public Relations.


350 Advertising Creative Strategy (3) Basic concepts of creative strategy with intensive practice in developing creative platforms, writing and designing advertisements, and judging creative work. Prereq: 250, Communication and Information 150 or Communication Studies 201.

AFRICAN AND AFRICAN-AMERICAN STUDIES (022)

162 Art of Africa, Oceania, and Pre-Columbian America (3) (Same as Art History 162.) (AH)

201 Introduction to African-American Studies (3) Multidisciplinary approach to the African-American experience through the Civil War period which examines such issues as traditional African societies, the institution of slavery, the development of African-American culture, the beginnings of African-American protest tradition, and the Civil War and Reconstruction.

202 Introduction to African-American Studies (3) Multidisciplinary approach to the African-American experience from the Civil War through the Civil Rights era which focuses on such topics as African-American rural and urban societies, the African-American church and education and African-American intellectual and protest movements.

233 Major Black Writers (3) (Same as English 233.) (AH)

235 Introduction to African Studies (3) Multidisciplinary approach to the study of African traditions, cultures, religions, political economies, precolonial democracies, and states form the first through the sixteenth century. (CC)

236 Introduction to African Studies (3) The Multidisciplinary study of Africa and its incorporation into the world economy between the sixteenth and the twentieth century. Includes the rise of nationalism, post-colonial dependency, contemporary problems, and current liberation struggles in various areas of the continent. (CC)

310 Introduction to African-American Music (3) (Same as Music History 310.)

315 The African Diaspora (3) (Same as Anthropology 315.)

319 Caribbean Cultures and Societies (3) (Same as Anthropology 319; Latin American Studies 319.)

331 Race and Ethnicity in American Literature (3) (Same as English 331.)

333 Black American Literature and Aesthetics (3) (Same as English 333.)

343 Race and Ethnicity (3) (Same as Sociology 343; American Studies 343.)

350 History of Jazz (3) (Same as Music History 350.)

352 African-American Religion in the United States (3) (Same as Religious Studies 352.)

353 Topics in African-American Religion (3) (Same as Religious Studies 353.)


371-372 African History (3,3) (Same as History 371-372.)

373 African Religions (3) (Same as Religious Studies 373; Anthropology 373.)

379 Geography of Africa (3) (Same as Geography 379.)

431 Research Seminar in African-American Studies (3) Teaches basic approaches to the research process and development of research skills. Students design and implement a research project of their choice in the field of African-American Studies. Prereq: 201-202 and senior standing. Writing-emphasis course.

442 Comparative Poverty and Development (3) (Same as Sociology 442.)

443 Topics in Black Literature (3) (Same as English 443.)

445 The African-American Experience From the Colonial Period to the Present (3) (Same as History 445.)

450 Issues and Topics in African-American Studies (3) Topics vary, but include a variety of problems, issues, and individuals from the field of African-American Studies. Prereq: 201-202 and senior standing. May be repeated. Maximum 6 hours.

452 African-American and African Politics (3) (Same as Political Science 452.)

461 Art of Southern and Eastern Africa (3) (Same as Art History 461.)

462 Art and Archaeology of Ancient Africa (3) (Same as Art History 462.)

463 Arts of the African Diaspora (3) (Same as Art History 463.)

473 Black Male in American Society (3) Examines historical images, myths and stereotypes which have developed concerning African-American males in American society. Includes the impact of such critical factors as Black feminism, violence, concepts of masculinity, the family, white males, white females, homosexuality, nationalism, and athletics on African-American males in America.

480 African-American Communities in Urban America (3) Evaluates the benevolent and historical influence of three major institutions: the church, the family, and the school upon the African-American struggle to survive. Includes political, economic, and social factors utilized by Black people in developing coping strategies and mechanisms. Writing-emphasis course.

483 African-American Women in American Society (3) Focuses on historical and contemporary social, economic and political factors in American society as they relate to the Black woman. Writing-emphasis course. (Same as Women's Studies 483.)

491 Foreign Study (1-15) Prereq: 201-202 and consent of instructor.

492 Off-Campus Study (1-15) Prereq: 201-202 and consent of instructor.

493 Independent Study (1-15) Prereq: 201-202 and consent of instructor.

496 Biology of Human Variability (3) (Same as Anthropology 496.)

AGRICULTURAL AND EXTENSION EDUCATION (042)

201 Field Experience in Agricultural and Extension Education (1) Field observation/experience in potential agricultural and extension education career fields. Grade requirements: daily journal, formal written report, complete required hours, seminar. Prereq: Consent of instructor (may include off-campus experience). May be repeated if changing concentrations.

211 Foundations of Agricultural and Extension Education (3) History and philosophy of agricultural education and extension education. Major areas of emphasis include, the historical development of agricultural education in the public schools and the federal extension education system. Formal and nonformal methods of education used, audiences served, organizational structure, and programming emphases will be studied by students. Foundation course for departmental majors and service course for those interested in related careers.

301 Non-Formal Youth Development Programs (1-2) Structured experience in administrating, organizing, conducting, and evaluating youth education programs in agricultural and extension education. Prereq: Consent of instructor.

345 Agricultural Education and Program Planning (3) Overview of the historical and philosophical aspect of agriculture education, the role of teacher and learner, emphasis on SAE, FFA, community service, and summer programs. Prereq: 201, 211 or consent of instructor.
346 Instructional Strategies for Teaching Agricultural Education (3) Methods and techniques for teaching agriculture, preparing lesson plans and units of instruction, developing activities for agriculture programs, and utilizing resources, multimedia, and computer technology into instruction. Prereq: 201, 211, 345 or consent of instructor.

420 Methods of Teaching Agricultural Mechanics (2) Methods for teaching high school agricultural education students. Special competencies for planning, conducting, and evaluating an agricultural mechanics program. Prereq: Biosystems Engineering Technology 202 or consent of instructor.


492 Internship In Agricultural and Extension Education (1-6) Pre-approved off-campus supervised experience in county Extension offices, agricultural businesses, or agricultural related agencies. Requires living off-campus for a specified time. Prereq: 211, or consent of instructor. May be repeated. Maximum of 6 hours.

493 Independent Study (1-3) Individualized study of a special project or problem in Agricultural and Extension Education. Must be selected in consultation with the instructor. Prereq: Consent of instructor. May be repeated. Maximum 6 hours.

AGRICULTURAL ECONOMICS (047)

110 Opportunities in Agricultural Economics and Business (1) Overview of current issues and career opportunities. For majors and non-majors.

212 The Agribusiness Firm (3) Introduction to agribusiness firm characteristics and decision-making. Overview of economic principles and the basic functions of management: planning, organizing, controlling, and directing. Specific topics include production structure, forecasting, marketing and selling, budgeting, breakeven analysis, uses of financial statements, capital investment, supervision, staffing, and evaluation.

310 The Agricultural Employment Process (1) Career planning, job markets in the agricultural industry, and techniques to obtain employment including recruitment/placement services, resume construction, personal interviewing, and job offer evaluation/analysis.

315 Agricultural Law (3) Survey of legal topics related to agribusiness operations and production in Tennessee. Topics include the introduction to legal system, torts, property, contracts, farm and business organization, environmental and natural resource regulation, estate planning, and effective utilization of legal counsel. Prereq: Junior standing.

320 Agricultural Microeconomics (3) Application of microeconomics to agriculture. Production, consumption, firm behavior, and efficiency in the food and fiber industries. Prereq: 212, Economics 201.

330 Economics of Agricultural Biotechnology (3) Analysis of economic issues associated with the development and adoption of agricultural biotechnology, especially the introduction of genetically modified organisms. Specific topics include farm level adoption decisions, changes in agribusiness industry structure, changes in the marketing system, consumer attitudes and the role of labeling, international trade issues, and agricultural development in the Third World. Prereq: Economics 201, junior standing.

337 Honors: Economics of Agricultural Biotechnology (3) Meets at same time as Agricultural Economics 330 but requires additional work in the form of article reviews and a research paper. Prereq: Economics 201, junior standing.

342 Farm Business Management (3) Principles and procedures for determining most profitable business organizations and systems of operation; attention to traditional and nontraditional agricultural enterprises and businesses; nature of managerial processes; business records and their uses; budgeting; acquisition and management of capital, land, labor and machinery; farm business planning. Prereq: 212, Economics 201.

350 The Agricultural Marketing System (3) Survey of U.S. food and fiber marketing system; marketing functions; industry structure; market channels; marketing options of farmers; basic analysis of marketing problems. Prereq: 212, Economics 201.

355 Agribusiness Marketing and Professional Selling (3) Role of marketing in the agribusiness organization, planning marketing efforts, and the strategic selling process. Topics include identification of market opportunities, targeting, marketing mix, and personal selling in agribusiness. Prereq: 212, Economics 201.

356 Marketing Team Participation (1-2) Participation in the development of a total marketing plan for a product sold to or by farmers. Includes product identification, market research, and development of an action plan including an extensive promotional plan, financial analysis, and evaluation. Requires preparation of final plan for presentation in written, oral and visual formats. Plan presented in national competition during the National AgriMarketing Conference. May be repeated. Maximum 6 hours. Prereq: Consent of instructor.

360 Rural Economic Development (3) Use of economic principles and analytical concepts in understanding the theory and process of rural economic development at the regional and subregional levels. Integrating historical and current information, students will explore the impetus of efficiency and equity as driving forces behind public sector and private sector initiatives to induce, manage and forecast development. Prereq: Economics 201.

410 Seminars in Agricultural Economics and Business (1) Restricted to Agricultural Economics and Business majors in their senior year. Practice of critical thinking, ethical behavior, teamwork, and conflict resolution within the content of agribusiness decision making. Analysis of contemporary issues in the field of agricultural economics.

412 Agricultural Finance (3) Macro-finance, financial objectives, acquisition of debt and equity funds, capital investments, capital allocation, debt repayment, cash budgeting, loan application analysis, insurance strategies, computer applications, kinds and sources of agricultural credit, and financial intermediation. Prereq: 212, Economics 201.

420 International Agricultural Trade and Marketing (3) Introduction to real and monetary aspects of international trade effect on agricultural commodity flows; partial equilibrium analysis of international trade in agricultural products; institutional aspects of international marketing of agricultural products. Prereq: 320 or consent of instructor.

430 Agricultural Policy (3) Values, goals and policy process. Economic rationale and effects of policy. Historical development and current characteristics of commodity, credit, food, and trade policy. Prereq: 320 or consent of instructor.

442 Agribusiness Management (3) Advanced concepts in developing business; and marketing plans and in applied management principles such as inventory control and pricing techniques. Discussion of management issues including planning, personnel, employer-society relations, social responsibility, and guerrilla marketing. Teamwork emphasized in managing an agribusiness firm through game simulation. Written and oral presentation required. Prereq: 342 or Accounting 201-202; Economics 201.

444 Economics of Precision Farming Technologies (3) Economic rationale for precision farming technologies. Topics include technology adoption, production economics, development of decision-making tools and the use of spatial data for management of crop production systems. Prereq: Economics 201, Agriculture and Natural Resources 290.

450 Agricultural Industry Analysis and Forecasting (3) Analytical tools for decision making in the agricultural sector; analysis of commodity supply and demand conditions; economic modeling; market forecasting; analysis of temporal and spatial patterns. Prereq: 320, Statistics 201 or consent of instructor.

470 Natural Resource Economics (3) Nature of natural resources; economic efficiency as a basis for natural resource use; externalities in natural resource use; factors influencing environmental quality; alternative public policy tools for influencing natural resource use or improving environmental quality. Prereq: Economics 201.

492 Off-Campus Internship (1-3) Pre-approved supervised experience with firm or organization in the field. Prereq: Junior standing or consent of advisor. May be repeated for a different experience up to a maximum of 6 hours. Satisfactory/No Credit grading only.

493 Independent Study (1-3) Directed individual or team research and report writing. Special courses in specific topics. Student must arrange with instructor before registering. Prereq: Junior standing. May be repeated. Maximum 6 hours.

AGRICULTURE AND NATURAL RESOURCES (088)

100 Orientation to Studies in Agriculture and Natural Resources (1) Orientation to academic advising and procedures in, and information about the College will be emphasized. Various invited guests will review University resources available to help students succeed at their studies. Student-to-student and advisor-to-student sessions are included to discuss the CASNR experience. Enrollment is restricted to freshmen and transfer sophomores. A, B, C, No Credit grading only.

290 Computer Applications to Problem Solving (3) Use of computer technology to analyze and report problems related to agricultural sciences and natural resources. The use and integration of computer applications such as spreadsheets, databases, presentation graphics, word processing, and other applications as needed for problem analysis and reporting. 2 hours and 1 lab. Prereq: Satisfactory performance on a skills/ placement test. For details, see advisor.

317 Agriculture and Natural Resources Honors Seminar (1) Discussion of selected topics, issues and problems influencing national and international food, agriculture and natural resources systems. Primarily for College Scholars students. May be repeated. Maximum 4 hours. A, B, C, No Credit grading only.
333 Food, Forests and the Environment (3) Overview of the environmental tradeoffs that have been, are, and will be required to produce the food, fiber and other products needed to feed, clothe, and house a growing world population. Topics to include basic natural resources, current practices in agriculture, forestry, and food handling, and practices related to quality of life issues, such as wildlife and landscape design. May not be used to satisfy directed elective requirements.

491 International Experience in Agriculture and Natural Resources (1-15) Credit for formalized international experiences related to agricultural sciences and natural resources. Determination of credit based on nature of the proposed experience. Students should discuss the opportunity with their faculty advisor prior to the trip to determine if it is appropriate for credit. Credit hours will be determined by the department and college depending on the extent of activity and types of projects and/or presentations to be completed by the student upon return.

497 Honors: Independent Project (1-6) For students participating in the CASNR Honors Research and Creative Achievements Program. Consists of independent work with a faculty member. Prereq: Participation in the CASNR Honors Program.

498 Honors Presentation (1) For students participating in the CASNR Honors program. Final written report and oral presentation of the honors project. Prereq: Participation in the CASNR Honors Program.

AIR FORCE AEROSPACE STUDIES (094)

101-102 The Air Force Today (1,1) Survey that focuses on the organizational structure and missions of the Air Force; officer/ships and professionalism; and includes an introduction to communicative skills. A weekly Leadership Laboratory (LLAB) consisting of Air Force customs and courtesies, health and physical fitness, and drill and ceremonies is mandatory.

103-104 Leadership Laboratory (1,1) Includes a study of Air Force customs and courtesies, drill and ceremonies, and giving military commands; instructing, correcting, and evaluating the preceding skills; studying the environment of an Air Force officer; and learning about opportunities available to commissioned officers. Satisfactory/No Credit grading only.

201-202 The Development of Air Power (1,1) Focuses on factors contributing to the development of air power from its earliest beginnings through two world wars; the evolution of air power concepts and doctrine; and a assessment of communicative skills. A weekly Leadership Laboratory (LLAB) consisting of Air Force customs and courtesies, Air Force environment, drill and ceremonies, and field training orientation is mandatory.

203-204 Leadership Laboratory (1,1) Includes a study of Air Force customs and courtesies, drill and ceremonies, and giving military commands; instructing, correcting, and evaluating the preceding skills; studying the environment of an Air Force officer; and learning about opportunities available to commissioned officers. Satisfactory/No Credit grading only.

205 Field Training (Academic Program) (1,4) Role of United States military forces in the contemporary world, with particular attention to the United States Air Force, its organization and mission, various component forces of U.S. military power, organization of America’s defense structure, policies of major powers, and elements and processes in making of defense policy. Conducted at Field Training bases throughout the country. Open only to 2-year program applicants.

301-302 Air Force Leadership and Management (3,3) Study of leadership and quality management fundamentals, professional knowledge, leadership ethics, and communicative skills required of an Air Force officer. Case studies are used to examine Air Force leadership and management situations as a means of demonstrating and exercising practical application of the concepts being studied. A mandatory weekly Leadership Laboratory (LLAB) provides advanced leadership experiences in office-type activities and gives students the opportunity to apply leadership and management principles to this course.

303-304 Leadership Laboratory (0,0) Consists of activities classified as advanced leadership experiences. They involve planning, organizing, staffing, coordinating, directing, and controlling the military activities of the cadet corps; preparation and presentation of briefings and other oral and written communications; and providing interviews, guidance, and information which will include the understanding, motivation, and performance of other cadets.

401-402 National Security Forces in Contemporary American Society (3,3) Examines the need for national security, analyzes the evolution and formulation of the American defense policy, strategy, and joint doctrine; investigates the methods for managing conflict; and overviews regional security, arms control, and terrorism. Special topics of interest focus on the military as a profession, officer/ships, the military justice system, and current issues affecting military professionalism. Within this structure, continued emphasis is given to the refinement of communicative skills. A weekly Leadership Laboratory (LLAB) consisting primarily of advanced leadership experiences in office-type activities is mandatory.

403-404 Leadership Laboratory (0,0) Consists of activities classified as advanced leadership experiences. They involve planning, organizing, staffing, coordinating, directing, and controlling the military activities of the cadet corps; preparation and presentation of briefings and other oral and written communications; and providing interviews, guidance, and information which will increase the understanding, motivation, and performance of other cadets.

AMERICAN STUDIES (099)

310 Introduction to American Studies (3) Explores dynamics and nature of the culture(s) of the United States through interdisciplinary study and interpretation. Considers both mainstream and minority cultures. Writing-emphasis course.

312 Popular Culture and American Politics (3) (Same as Cinema Studies 312; Political Science 312.)

320 American Cultures (3) (Same as Anthropology 320.)

334 Film and American Culture (3) (Same as Cinema Studies 334; English 334.)

343 Race and Ethnicity (3) (Same as African and African-American Studies 343; Sociology 343.)

345 Collective Behavior and Social Movements (3) (Same as Sociology 345.)

355 Religion and Culture in the United States (3) (Same as Religious Studies 355.)

356 The 1960s in America (3) (Same as History 356.)

381 Introduction to Folklore (3) (Same as English 381.)

410 Topics in American Culture (3) Content varies. May be repeated once.

420 Political Attitudes and Behavior (3) (Same as Political Science 420.)

423 Geography of American Popular Culture (3) (Same as Geography 423.)

442 American Humor (3) (Same as English 442.)

450 Seminar in American Studies (3) Intensive study of a major issue in American Studies scholarship.

469 Freedom of Speech (3) (Same as Communication Studies 469; Legal Studies 469.)

491 Foreign Study (1-15)

492 Off-Campus Study (1-15)

493 Independent Study (1-15)

ANIMAL SCIENCE (113)

160 Introduction to Animal Science (3) Preparation of academic plans and career discussion. Introduction to structure and production principles of the food animal and horse industries. Overview of companion and alternative livestock. Market classes and grades of cattle, poultry and poultry products, lamb and wool, and swine. 3 labs.

220 Anatomy and Physiology of Farm Animals (3) Skeletal and joints; muscles; blood and microcirculation; the nervous, endocrine, cardiovascular, respiratory, and digestive systems; demonstrations of physical-chemical phenomena. 2 hours and 1 lab. Prereq: Biology 120,130.

280 Biotechnology and Management Practices in Animal Production (3) Exposure to current animal agriculture management practices and biotechnology techniques as they affect beef, dairy, horse, poultry, sheep and swine industries. Includes animal behavior, restraint and welfare, computer applications, nutrients and nutrient utilization, waste management, food safety, animal reproduction, health and well being, and emerging technologies and opportunities in animal agriculture. Two 3 hour labs.

285 Horse Handling and Care (3) Proper procedures for horse-human interaction and the recommended management procedures for horse care. The basic behavioral characteristics of the horse, an understanding of his physical and mental parameters and their use in horse-human communication. Interactions include imprinting, halterering, halter training, lunging, long-line driving, bridling, bitting, round pen training, saddling and teaching to guide. Basic care includes feed selection and management, post-natal care, restraint, foot care, dental care, grooming, loading and trailering, stall maintenance, internal and external parasite control, exercising, identification techniques, routine vaccinations and first aid. Safety for both horse and handler will be emphasized. Three 2-3 hour labs.
320 The Physiology of Reproduction and Lactation (3) Biology of sex and sexual differentiation, functional anatomy of male and female, reproduction and lactation, gametogenesis, neuroendocrinology and endocrinology of reproduction and lactation, sex cycles, folliculogenesis, ovulation, spermatogenesis, fertilization, embryonic development, implantation, pregnancy, parturition, initiation of lactation and maintenance of the dry period, artificial control of reproduction and lactation. 2 hours and 1 lab. Prereq: Biology 102, 130. (Same as Biochemistry and Cellular and Molecular Biology 320.)


340 Principles of Animal Breeding (3) Genetic and environmental bases of animal production. Selection and mating systems, mechanisms of genetic change. Planning breeding programs for economically important domestic species. 2 hours and 1 lab.


380 Animal Health Management (3) Characteristics, symptoms, prevention, and treatment of major diseases and parasites. Immunization, health regulations and herd health programs for all farm livestock species and poultry. 2 hours and 1 lab. Prereq: Animal Science 220.

381 Animal Nutrition and Production Systems (3) Fundamentals of production and management systems with an emphasis on nutrition in beef, dairy, pork, and poultry. Principles of production. 2 hours and 1 lab. Prereq: Animal Science 220. (Same as Biochemistry and Cellular and Molecular Biology 381.)

390 Nutrient Evaluation and Ration Formulation (3) Ration nutrient analysis and formulation for beef and dairy cattle, sheep, horses, swine poultry, laboratory, zoo and companion animals. Mathematics and computer solutions and applications to formulating complex rations with constraints. 2 hours and 1 lab. Prereq: Animal Science 330 and introductory computer course.

395 Careers Seminar (1) Preparing students for career opportunities in animal agriculture including both industry and academic advancement. Topics will include resume writing, interview skills, internship opportunities, and web-based employment search guides. Prereq: Junior standing.

410 Advanced Reproduction (3) Collection, evaluation, and preservation of ova, spermatozoa and embryos; application of methods of natural breeding and techniques of artificial insemination and embryo transfer; herd sire and dam evaluation; pregnancy determination; gestation and parturition; infertility; recent advances in theriogenology. 1 hour and 2 labs. Prereq: Consent of instructor. (Same as African and African-American Studies 315.)

430 Nutrient Evaluation and Ration Formulation (3) Ration nutrient analysis and formulation for beef and dairy cattle, sheep, horses, swine poultry, laboratory, zoo and companion animals. Mathematics and computer solutions and applications to formulating complex rations with constraints. 2 hours and 1 lab. Prereq: Animal Science 330 and introductory computer course.

470 Beef Cattle Production and Management (3) Integration of principles of nutrition, breeding, physiology, and marketing into complete production and management programs. Structure of industry, enterprise establishment, systems of production, production practices, and improvement programs. Management evaluated in terms of production response and economic returns. Comparisons made to small ruminant, forage-based production systems. 2 hours and 1 lab. Prereq: Completion of Animal Science sophomore and junior core courses or consent of instructor.

481 Beef Cattle Production and Management (3) Integration of principles of nutrition, breeding, physiology, and marketing into complete production and management programs. Structure of industry, enterprise establishment, systems of production, production practices and herd improvement programs. Alternatives evaluated in terms of production responses and economic returns, 2 hours and 1 lab. Prereq: Completion of Animal Science sophomore and junior core courses or consent of instructor.

482 Dairy Cattle Production and Management (3) Integration of principles of nutrition, breeding, physiology, and marketing into complete production and management programs. Structure of industry, enterprise establishment, systems of production, production practices and herd improvement programs. Management evaluated in terms of production responses and economic returns, 2 hours and 1 lab. Prereq: Completion of Animal Science sophomore and junior core courses or consent of instructor.

483 Pork Production and Management (3) Integration of principles of nutrition, breeding, physiology, and marketing into complete production and management programs. Structure of industry, enterprise establishment, systems of production, production practices, and improvement program. Management evaluated in terms of production responses and economic returns, 2 hours and 1 lab. Prereq: Completion of Animal Science sophomore and junior core courses or consent of instructor.

484 Poultry Production and Management (3) Integration of principles of nutrition, breeding, physiology, and marketing into complete production and management programs. Structure of industry, enterprise establishment, systems of production, production practices, and improvement programs. Management evaluated in terms of production responses and economic returns, 2 hours and 1 lab. Prereq: Completion of Animal Science sophomore and junior core courses or consent of instructor.

485 Horse Production and Management (3) Integration of principles of nutrition, breeding, physiology and ethology into complete production and management programs. Types of enterprises, management of feed and pasture resources, health maintenance and first aid, breeding and foaling, farm structures and equipment. 2 hours and 1 lab. Prereq: Consent of instructor.

489 Companion, Zoo, and Lab Animal Management (3) Principles of nutrition, physiology, breeding, handling, and history of breeds of common household pets, zoo animals, and animals used in scientific research. Specific species requirements and peculiarities. Laws and agencies governing use of laboratory animals. Laboratory analysis of blood metabolites commonly used to monitor health and nutritional status. 2 lectures and 1 lab. Prereq: Consent of instructor.

492 Animal Science Field Study (1-6) Off-campus work experience approved by the department. Objective is to complement traditional classroom activities and give the student an opportunity to gain experience in industry. Students must submit official approval form prior to registration. The student will be evaluated on knowledge and skills and must submit a written summary after program completion.

493 Independent Study in Animal Science (1-3) Approved supervised study in areas not formally presented in a course offered in the department. Written proposal of study is approved by the Department of Animal Science Undergraduate Committee. After completion of study, a written report is required and this report is maintained on file in the reference room of the department. May be repeated for a maximum of 6 credits. Prereq: Senior standing and consent of instructor and department head.

494 Animal Science Teaching Assistant (1) Assist the primary instructor in laboratory instruction and demonstrations. Prereq: Senior standing and consent of the instructor and department head. Satisfactory/No Credit grading only.

495 Ethics in Animal Agriculture (1) Discussion and presentations on issues related to ethics in animal research and industry. Prereq: Senior standing.

ANTHROPOLOGY (122)

110 Human Origins (3) Survey of humanity’s background, fossil primates, paleoanthropology, early hominins, and living races of hominids. Prereq: 130 or consent of instructor.

120 Prehistoric Archaeology (3) Introduction to methods and techniques used to identify and date archeological cultures, reconstruct past lifeways and describe cultural evolution. Overview of the prehistory of Africa, western Europe, southwest Asia, and the Americas from earliest dated human cultures to rise of complex civilizations.

130 Cultural Anthropology (3) Major concepts and methods in the study of culture; survey of cross-cultural similarities and differences in subsistence, social organization, economic, political, and religious institutions; language, ideology and arts. Contributions of anthropology to resolving contemporary human problems. (SS)


302 Anthropology of Religion (3) (Same as Religious Studies 302.)

305 Evolution and Society (3) (Same as Ecology and Evolutionary Biology 305.)

306 Genetics and Society (3) (Same as Botany 306.)

310 North American Indians (3) Comparative overview of Indian cultures of North America. Topical coverage ranges from prehistoric and aboriginal lifeways to problems resulting from contact and acculturation. Writing-emphasis course.

311 Southeastern Indians (3) Survey of Southeastern American Indian cultures at the time of European contact. Emphasis on Cherokee culture and on the social, economic, and religious organization of aboriginal groups. Prereq: 130 or consent of instructor.

312 Appalachian Culture (3) Traditional Southern Appalachian subsistence patterns and economy, social organization, beliefs and values, folklore and customs; socio-cultural impacts of industrialization and modernization. Prereq: 130 or consent of instructor. Writing-emphasis course.

313 Peoples and Cultures of Mesoamerica (3) Pre-Columbian and Hispanic cultures of Mexico, Guatemala, Belice, El Salvador and Honduras. Patterns of cultural continuity and cultural change throughout Mesoamerica’s history. Prereq: 130 or consent of instructor. Writing-emphasis course. (Same as Latin American Studies 313.)

315 The African Diaspora (3) An overview of anthropological perspectives on people of African descent and the impact of an African presence on societies in the Americas. The sociocultural experiences of U.S. African Americans and their counterparts elsewhere in the hemisphere are situated in the context of a broader diaspora. Prereq: 130 or consent of instructor. Writing-emphasis course. (Same as African and African-American Studies 315.)
316 Peoples and Cultures of South America (3) An introduction to contemporary analysis and debate on South America that places the concept “culture” in historical perspective and discusses the anthropological notion of “people” within the complexity of indigenous and black social formations. Writing-emphasis course. (Same as Latin American Studies 314.)

319 Caribbean Cultures and Societies (3) Anthropological approaches to key aspects of Caribbean history, sociocultural pluralism, racial and class stratification, patterns of economic development, and local and national-level political processes. Prereq: 130 or consent of instructor. Writing-emphasis course. (Same as African and African-American Studies 319; Latin American Studies 319.)

320 American Cultures (3) Anthropological perspectives on cultural diversity in America, including the immigrant experience and expressions of ethnicity, intercultural relations, occupational and interest group subcultures. Writing-emphasis course. (Same as American Studies 320.)

321 Indians of Northwest North America (3) Survey of American Indian cultures found in the Northwest Coast, Columbia Plateau, and Northern Great Basin culture areas. Writing-emphasis course.

322 Topics in Ethnography (3) Overview of culture patterns and ethnographic research on selected social groups or culture areas. May be repeated. Maximum 6 hours. Prereq: 130 or consent of instructor.

357 Junior Honors in Anthropology (3) Analytical, integrative review of current directions of research and theory in Anthropology. Open to students with an overall GPA of 3.2 who have fulfilled progression requirements to declare a major in Anthropology.

360 North American Prehistory (3) Prehistoric cultures of North America from initial occupation of the continent to European contact. Writing-emphasis course.

361 Historical Archaeology (3) Historical archaeology of Euro-American, African-American, and Asian American cultures in the United States from 15th to 20th centuries.

362 Principles of Archaeology (3) Research strategies used in developing method and theory, constructing cultural histories, identifying site function and settlement-subistence patterns, and evaluating explanations of cultural change. Prereq: 120 or consent of instructor.

363 Prehistory of Tennessee (3) Archaeological principles and theory illustrated in history of archaeological research in Tennessee and through survey of prehistoric Indian cultures from initial occupation of the state to European contact. Prereq: 360 recommended. Writing-emphasis course.

373 African Religions (3) (Same as African and African-American Studies 373; Religious Studies 373.)

400 Readings in Anthropology (1-6) Problem-oriented directed readings in anthropology. Prereq: Anthropology majors with senior standing or consent of instructor. May be repeated. Maximum 6 hours.

410 Principles of Cultural Anthropology (3) Exploration and illustration of major concepts, theories, and methods in cultural anthropology, with application to analysis of specific ethnographies. Prereq: 130.

411 Linguistic Anthropology (3) Basic linguistic concepts applied to research in cultural anthropology, particularly investigation of relationships between language and culture. Prereq: 130, Linguistics 200. (Same as Linguistics 411.)

412 Folklore in Anthropology (3) Introduction to anthropological study of folklore, using folklore and folklore materials from various tribal, peasant, and complex societies. Prereq: 130 or consent of instructor.

413 Dynamics of Culture (3) Definition and in-depth study of major forms of culture change, ranging from evolution and diffusion to religious revitalization and political revolt. Continuity and change in diverse cultural settings examined through use of archaeological, ethnographic, and contemporary cases. Prereq: 130 or consent of instructor.

414 Political Anthropology (3) Examination of the organization and dynamics of political power and politics in both stateless and state-level societies. The role of symbols, rituals, and ideologies in producing and reproducing power relations. The relationship between actors (individuals) and structures. The encapsulation of traditional political forms and systems within modern states. Prereq: 130 or consent of instructor. Writing-emphasis course.

416 Applied Anthropology (3) Introduction to principles, practice and ethics of anthropology applied to practical problems in non-academic settings. Overview of career opportunities in various domains of applied anthropology. Prereq: 130 or consent of instructor.

430 Fieldwork in Archaeology (3-9) Practicum work in archaeological data recovery and analytical techniques. Prereq: Consent of instructor. May be repeated. Maximum 9 hours.

431 Ethnographic Research (3) Conceptual and practical exploration of methods and techniques cultural anthropologists use in fieldwork. Prereq: 130 or consent of instructor.

435 Historical Archaeology Laboratory (3) Laboratory procedures for the processing, identification, and interpretation of artifacts from historical sites. Artifactual material from historic East Tennessee sites will be used for class projects. Prereq: 361 recommended.

436 Cities and Sanctuaries of the Greek and Roman World (3) (Same as Classics 436.)

440 Cultural Ecology (3) Concepts and methods in studying dynamic interaction between prehistoric and present day cultures and their environments. Topics include ecological theory, methods of analysis, and review of selected case studies. Prereq: 120, 130, 410, or consent of instructor.

442 Intensive Survey of the Archaeology of the Prehistoric Aenean (3) (Same as Classics 442.)

443 Intensive Survey of the Archaeology of Greece (3) (Same as Classics 443.)

444 Intensive Survey of the Archaeology of Etruria and Rome (3) (Same as Classics 444.)

450 Current Trends in Anthropology (3) Analytical, integrative review of current directions of research and theory in anthropology. May be repeated. Maximum 6 hours.

457 Senior Honors in Anthropology (3) Research and writing of the senior honors thesis. Open to students with overall GPA of 3.2 and an Anthropology GPA of 3.5 who have completed 357 with a grade of B or better.

459 Selected Topics in Anthropology (3) Theoretical issues in anthropology for undergraduate students. Topics may include practical experience or laboratory study of anthropological materials. Prereq: Either 110, 120, 130 or consent of instructor. May be repeated. Maximum 6 hours.

462 Early European Prehistory (3) Origins and evolution of human culture in Europe through the beginnings of settled life. Primary focus on Paleolithic/ Mesolithic chronology and lifeways. Prereq: 120 or consent of instructor. Writing-emphasis course.

463 Rise of Complex Civilizations (3) Development of complex societies in Old World from origins of agricultural economics to rise of States. Focus on Mesolithic, Neolithic, and Metal Age lifeways in Africa, Europe, and Asia. Prereq: 120 or consent of instructor. Writing-emphasis course.

464 Principles of Zooarchaeology (3) Basic osteological studies of major vertebrate groups, with emphasis on the aboriginal’s use of animals in subsistence and culture. Identification and interpretation of archaeologically derived molluscan and vertebrate remains, with introduction to laboratory use of comparative collections. Prereq: 120 or consent of instructor.

465 Urban Archaeology (3) Field archaeology and interpretation of archaeological remains on historic urban sites in the United States. Course content will include lectures and field and laboratory research on urban sites in East Tennessee. Prereq: 361 recommended.

480 Human Osteology (4) Intensive examination of the human skeleton. Prereq: 110 or consent of instructor. 3 hours and 1 hour lab.

481 Museology I: Museums, Purpose and Function (3) (Same as Art 481.)

482 Museology II: Exhibition Planning and Installation (3) (Same as Art 482.)

484 Museology III: Field Projects (1-12) (Same as Art 484.)

485 Oral Biology (4) Intense examination of human dentition and oral skeletal structures including dento-facial embryology/growth, histology, gross tooth morphology and pathology. Prereq: 480 or consent of instructor.

490 Primate Evolution (3) Living and fossil primate taxonomy, ecology, and comparative anatomy. Survey of primate fossil record with emphasis on the origin or major primate lineages. Prereq: 110 or consent of instructor.

491 Foreign Study (1-15)

492 Off-Campus Study (1-15)

493 Independent Study (1-15)

494 Primate Behavior (3) Social organization and behavior of selected primates including group composition, size, and structure; patterns of mating; other social interactions; communication; and cultural behavior. Application of primate studies to human ethology. Prereq: 110 or consent of instructor.

495 Human Paleontology (4) Intensive survey of the human fossil record from the earliest hominid remains to the earliest origins of modern human form. Prereq: 110 or consent of instructor.

496 Biology of Human Variability (3) Introduction to human populations; human adaptation, biological features of major human races, relationships of major groups to one another. Prereq: 110 or consent of instructor. (Same as African and African-American Studies 496.)
ARCHITECTURE (133)

101 Introduction to the Built Environment (3) Scope and definition of the built environment in relation to contemporary society, building industry, and allied design professions. Architectural design as a creative process. Orientation to courses and programs of the school. Coreq: 171.


111 Architecture and the Built Environment (3) An introduction to architecture and the built environment for non-architecture majors. Significance of our surroundings, forces that create them. Creative aspects of design. Survey of examples from local to global. Strategies for individual and collective involvement.

121 Drawing and Perception (2) Exploration of drawing as a means of visual thinking and method of communication, addressing perceptual phenomenon. Exploration of different media, concentrating on freehand drawing. Includes line drawing, tone, shade, shadow, depth cues. Compositional principles will be introduced. Drawings based on observation, including figure drawing and campus visits. Coreq: 171.

122 Drawing and Abstraction (2) Exploration of drawing as a means of visual thinking and method of communication, addressing process of abstraction and transformation inherent in drawing. Exploration of different media and techniques of representation. Drawings based on observation, abstraction, and transformation. Coreq: 172.


180 Introduction to Architecture (2) Introduction to architecture as an intellectual discipline. Design as a creative endeavor central to the discipline and its profession.

181 Introduction to Graphic Skills (4) Introduction to freehand drawing and orthographic techniques emphasizing visualization and simulation. The work will be explored and developed in the studio. 4 credit hours studio.

182 Introduction to Basic Design (6) Introduction to basic design principles in both two and three dimensions. The work will be explored in a seminar format and developed in the studio. 1 credit hour seminar and 5 credit hours studio.

211 History and Theory of Architecture I (3) Architecture and ideas of building and community form in major world cultures from the prehistoric era to about 1500 AD. (AH)

212 History and Theory of Architecture II (3) Architecture and ideas of building and community form from 1500 AD to the mid-twentieth century. Prerequisite: 211. (AH)

213 History and Theory of Contemporary Architecture (3) Architectural thought in design practice in late twentieth century. Examples of contemporary works and review of theoretical issues. Prereq: 212. (WC)

231 Computer Applications in Design I (3) Introduction to computer systems, software, hardware, and application in architecture. Emphasis on learning how the computer can assist in the design process by modeling, visualizing and analyzing building designs. Introduction to drafting, three-dimensional modeling, and desktop publishing.

232 Introduction to Architectural Technology (3) Place of building technology in architectural design. Introduces concepts and theory of structures; building materials and construction; and environmental controls. Prereq: Physics 161.


272 Architectural Design II (6) Studies in architectural space. The role of function, habitation, movement, structure and scale as determinants of spatial form explored through a series of design projects ranging in scale from furniture to dwellings. Development of design processes, including analytical skills, diagramming, and determining design organizational strategies. Use of computer aided visualization techniques. Prereq: 271.

281 Principles of Architectural Form (6) Principles of architectural form emphasizing building configuration and order. Design of simple buildings which explore possibilities of site, use, shape materials and color. 1 credit hour seminar and 5 credit hours studio. Prereq: 182 or equivalent.

282 Principles of Architectural Design (6) Principles of architectural design emphasizing site, function, circulation, structure, technology, context and expression of building. 1 credit hour seminar and 5 credit hours studio. Prereq: 281.


332 Architectural Structures II (4) Continuation of analysis of design of composite structures of steel, wood and concrete based upon specific loading requirements. Use of construction and building codes, handbooks and design tables — selection of structural members. Prereq: 331.

335 Structures in Architecture I (3) Introduction to the structural properties of materials, foundations and simple statically determinate assemblies of buildings. Prereq: 180 and M.Arch. admission.

336 Structures in Architecture II (3) Continuation of analysis and design of simple structures in wood, steel and concrete. Introduction of building codes, loading tables and handbooks for selection of structural members. Prereq: 335 or special permission.

341 Environmental Control Systems I (3) Heating, ventilating, and air-conditioning systems, including passive and active solar energy systems. Plumbing and fire protection systems. Prereq: 231, 232.


345 Principles of Environmental Control I (3) Introduction to heating, ventilating, air-conditioning, solar energy, plumbing and fire-protection systems. Prereq: 180 and M.Arch admission.

346 Principles of Environmental Control II (3) Introduction to electrical design and wiring, lighting and acoustics in buildings. Prereq: 180, M.Arch admission.


401 Architectural History/Theory I (3) Architectural history and theory from earliest beginnings to about 1600 in Europe, Asia, and the Americas. Examination of theoretical ideas, building forms, and urban patterns in cultural and historical context. Prereq: M.Arch. admission or consent of instructor.

402 Architectural History/Theory II (3) Architectural History/Theory II (3) Survey of architectural history and theory from about 1600 through the present day. Examination of theoretical ideas, building forms, and urban patterns in cultural and historical context. Prereq: 401 and M.Arch admission or consent of instructor. Open to undergraduates with consent of instructor.

403 Introduction to Preservation (3) History, theory, and legal aspects of architectural preservation and restoration.

404 Preservation Technology (3) Techniques of preservation: methods of analysis, history of materials and technology used in old buildings. Prereq: 403.

406 Ideas in Architecture (3) Historical and critical review of the major ideas of architecture through the ages. Open to all students.

410 History and Theory of Urban Form (3) Patterns of community development. Selected historical and contemporary examples. Basic urban design issues and exemplary design approaches examined through lectures, readings, essays, and sketch studies including historical change in urban form and design.
COURSES OF INSTRUCTION

412 Non-Western and Indigenous Architecture (3) Building responsive to climate, material availability, and economic level, as designed by anonymous builders. Examples from prehistoric times to the present including the fertile Crescent; the Indus Valley; Hindu, Buddhist, and Mughal architecture of India, China, and Japan.

415 Medieval Architecture (3) History of architecture from the decline of Rome to the beginning of the Renaissance. (Same as Medieval Studies 415.)

417 The International Style (3) A survey of architecture of the early modern movement, primarily in Europe and America, covering the years 1900 to 1940.

420 History of American Architecture (3) Consideration of architecture and city planning in the United States from the pre-Columbian period until the mid-twentieth century.

425 Special Topics in Architecture (1-6) Faculty initiated courses. Topics vary. Prereq: consent of instructor. May be repeated. Maximum 12 hours.

431 Structural and Mechanical Applications (3) Case study analysis and selection of structural and mechanical systems, investigating the conceptual integration of technical information into a unified design solution. Prereq: 332, 342. Coreq: 471.

432 Computer Applications in Design II (3) Advanced computer aided design using three-dimensional modeling software. Design analysis using computer animation, rendering techniques, visualization, and video. Prereq: 231.

433 Computer Applications in Design III (3) Advanced course that integrates three-dimensional modeling and technical analysis using computers to augment building design. Independent studies under faculty direction. Prereq: Consent of instructor.

445 Advanced Lighting (3) In-depth analysis and innovative concepts in design of lighting. Prereq: 342.

462 Professional Practice (4) Management and organizational theories and practices for delivering professional design services. Included are assessment of the building industry and its influence on practice; analysis of the basic management functions within professional firms; and legal and ethical concerns facing practitioners today. Special obligations and privileges of the design professional.

463 Architectural Development (3) Principles and practice of the architect as a developer. Impact of economics, finance and urban policy on the design and development of real estate. Open to all students.


472 Architectural Design VI (6) Order and form in complex buildings developed to address programmatic, structural, energy and environmental issues. Prereq: 471.

473 Architectural Photography (3) Photography as a design, research, and presentation medium. Application of photographic techniques, printing and processing. Color, black and white.

480 Comprehensive Design Project I (3) Preparation and Programming for Projects, (3) Formation of project statement, documentation and analysis of project data. Preparation of background and program information. Goals and concepts set forth. To be taken the semester preceding 482.

481 Advanced Architectural Design Topics (6) Faculty initiated design projects. Advanced architectural topics not covered under 483, 484, 485, 486, or 489. Prereq: 471.

482 Self-directed Design Project (6) Student-selected project under faculty direction. Exploration of design hypothesis that informs the character of a substantial building design. Completed project will address issues of environment, structure, enclosure, use and ethical consideration of design appropriateness. Design is expected to stand up to rigorous scrutiny regarding strength of idea, economy of means, durability, validity for stipulated use, quality of cultural expression, and character of setting. Prereq: 480, satisfactory completion of a self-directed project proposal and program for that project, satisfactory completion of all design courses.

483 Urban Design (6) Urban design projects responding to specific community conditions. Exploration of urban issues in making and understanding the architecture of the city. Prereq: 471.

485 Development and Design (6) Exploration of image making, consumerism and the allocation of scarce resources. Issues of finance, economics, urban economics, and marketing are analyzed in relation to urban and architectural design. Application of financial feasibility models. Prereq: 471, 463 or consent of instructor.

486 Design of Sustainable Architecture (6) Architectural design studio emphasizing concern for the environment, consideration of energy conservation techniques, and use of renewable resources. Prereq: 471.


491 Foreign Study (1-15) Research and design projects conducted in various locations abroad.

492 Off-Campus Study (1-15) Studies conducted under direction of architect or expert in an allied profession, in service to public service organizations or agencies of government, and public groups. Not a Design Course elective.

493 Independent Study in Architecture (1-6) Individual studies and projects under faculty direction. Credit adjusted to complexity and level of effort required. May be repeated once. Prereq: Consent of dean.

494 Foreign Studies Sketchbook (1-3) Investigations of historic urban fabric and architecture in various locations abroad. Analysis and sketch records in sketchbook format required.

496 Design Studies in Krakow (6) Studio meets in Krakow, Poland. Design studies responding to specific community conditions in an European city.

497 Sketchbook Study of Architecture in Central Europe and Krakow (3) Analysis and sketch records in sketchbook format required. Lectures and field trips related to Krakowian, Polish, and European architecture and urban traditions.

498 Fine Arts Studies in Krakow (3) Studio meets in Krakow, Poland. Fine arts investigations related to architectural design.

ART (140)

101 Studio Fundamentals: Drawing and Design (2) Introduction to basic drawing media, concepts and techniques and to the elements and principles of pictorial organization.

103 Studio Fundamentals: Three Dimensional Design (2) Projects dealing with real space and three-dimensional materials. Primarily for art, architecture, art education, and interior design and housing majors.

191 Introduction to Studio Art: Various Media (3) Individual sections for various artistic disciplines. For non-majors only. Courses may be repeated, medium may not be repeated. Maximum 12 hours.

200 Special Topics (2-4) Student- or instructor-initiated course offered at convenience of department. May be repeated.

210 Drawing (2-4) Beginning to intermediate. May be repeated.

220 Ceramics (2-4) Beginning to intermediate. May be repeated.

230 Photography (2-4) Beginning to intermediate. May be repeated.

240 Painting (2-4) Beginning to intermediate. May be repeated.

250 Metal Design (2-4) Beginning to intermediate. May be repeated.

260 Fibers (2-4) Beginning to intermediate. May be repeated.

270 Fabric (2-4) Beginning to intermediate. May be repeated.

280 Enameling (2-4) Beginning to intermediate. May be repeated.

290 Wood (2-4) Beginning to intermediate. May be repeated.

295 Intermediate Design and Color (3) Further exploration of basic techniques of two-dimensional design, with emphasis on color theory and technique. Prereq: 101, 103.

299 Special Topics (3) Student or instructor-initiated course offered at convenience of department. May be repeated. Maximum 12 hours.

300 Inter-area Portfolio Review (2) Review of prior studio work. Successful completion required prior to registration for junior and senior courses. Prereq: Art History 172, 173 with a grade of C or better. Satisfactory/No Credit grading only.

400 Special Topics (2-4) Student or instructor initiated course offered at convenience of department. May be repeated.

410 Drawing (2-4) Intermediate to advanced. May be repeated.

420 Ceramics (2-4) Intermediate to advanced. May be repeated.

430 Photography (2-4) Intermediate to advanced. May be repeated.

440 Painting (2-4) Intermediate to advanced. May be repeated.

450 Metal Design (2-4) Intermediate to advanced. May be repeated.

460 Fibers (2-4) Intermediate to advanced. May be repeated.

470 Fabric (2-4) Intermediate to advanced. May be repeated.

480 Enameling (2-4) Intermediate to advanced. May be repeated.
481 Museology I: Museums, Purpose and Function (3) Purposes, functions and development of museums of art, history, natural and applied science. (Same as Anthropology 481.)

482 Museology II: Exhibition Planning and Installation (3) Exhibition concept development and implementation. Exhibition design and installation techniques. Publicity, production, matting and framing, shipping and storage. Prereq: 481 or consent of instructor. (Same as Anthropology 482.)

484 Museology III: Field Projects (1-12) Special field projects including restoration, preservation, registration, and other related research on or off campus. Prereq: 481 and 482 and consent of instructor. May be repeated. Maximum 12 hours. (Same as Anthropology 484.)

490 Wood (2-4) Intermediate to advanced. May be repeated.

491 Foreign Study (1-15)

492 Off-Campus Study (1-15)

493 Independent Study (1-15) Prereq: Consent of instructor.

494 Individual Problems (3) Prereq: Consent of instructor. May be repeated. Maximum 12 hours.

495 Visiting Artist Seminar (2) Study and discussion of contemporary art issues conducted by different visiting artists each semester. (Does not apply toward art history requirement.) May be repeated. Maximum 8 hours.

499 Special Topics (3) Student or instructor-initiated course offered at convenience of department. May be repeated. Maximum 12 hours.

ART CERAMICS (135)

191 Introduction to Studio Art: Various Media (3) Individual sections for various artistic disciplines. For non-majors only. Courses may be repeated; medium may not be repeated. Maximum 12 hours.

221 Ceramics: Handbuilding I (3) Introduction to handbuilding, glazing, clay preparation and firing. Prereq: Art 101, 103.


225 Portfolio Practicum—Handbuilding (3) Intense post-introductory studio experience to develop work for application to Ceramics Portfolio Review 320. Art majors only. Not repeatable for credit. Prereq: 221, 222, and consent of department.

226 Portfolio Practicum—Throwing (3) Intense post-introductory studio experience to develop work for application to Ceramics Portfolio Review 320. Art majors only. Not repeatable for credit. Prereq: 221, 222, and consent of department.

229 Ceramics: Special Topics (3) Student or instructor initiated courses to be offered at convenience of department. Prereq: Consent of instructor. May be repeated. Maximum 12 hours.

320 Ceramics: Portfolio Review (0) Review of prior work in ceramics. Successful completion required prior to registration for junior and senior courses. Prereq: Art 101, 103; Art History 172, 173, 162, 183 (choose two); Art Ceramics 221; Art Sculpture 241; all with a grade of C or better. Prereq/Coreq: Art 295. Coreq: 222. Satisfactory/No Credit grading only.

321 Ceramics: Handbuilding II (3) Continued investigation of handbuilding with an emphasis on the development of individual ideas and expression. Prereq: 320.

322 Ceramics: Throwing II (3) Continued investigation of throwing with an emphasis on the development of individual ideas and expression. Prereq: 320.


424 Ceramics: Clays and Glazes (3) Clay chemistry, clay bodies, glaze theory, and calculation. Formulating, mixing and testing of clay bodies and glaze formulas. Prereq: 320.

429 Ceramics: Special Topics (3) Student or instructor initiated courses to be offered at convenience of department. Prereq: Consent of instructor. May be repeated. Maximum 12 hours.

493 Independent Study (1-15) Prereq: Consent of instructor.

494 Individual Problems (3) Prereq: Consent of instructor. May be repeated. Maximum 12 hours.

495 Visiting Artist Seminar (2) Study and discussion of contemporary art issues conducted by different visiting artists each semester. (Does not apply toward art history requirement.) May be repeated. Maximum 8 hours.

ART DESIGN/GRAPHIC (136)

151 Graphic Design History (3) Major movements and pivotal artists/designers and directors, 1850 to the present, and their impact on current graphic design trends. (Cannot be used to fulfill art history requirement.)

191 Introduction to Studio Art: Various Media (3) Individual sections for various artistic disciplines. For Non-majors only. Courses may be repeated, medium may not be repeated. Maximum 12 hours.

251 Beginning Graphic Design I (3) Introduction to the elements and principles of graphic design including typography and layout. Survey of graphic design tools, materials and processes. Emphasis on visual problem-solving. May be repeated. Maximum 6 hours. Prereq: Art 101, 103. Prereq/Coreq: 151. All with a grade of C or better. In special circumstances, permission of instructor may be granted in place of prereq.

252 Beginning Graphic Design II (3) Continuation of 251 and the exploration of the elements and principles of graphic design including typography and layout. Survey of graphic design tools, materials and processes. Emphasis on visual problem-solving. May be repeated. Maximum 6 hours. Prereq: 251. Prereq/Coreq: 151 or permission of instructor.

254 Black and White Illustration (3) Black and white media and production techniques as applied to product and editorial illustration. Prereq: Art 101.

256 Individual Projects in Graphic Design (3) Prereq: Consent of instructor. May be repeated. Maximum 6 hours.

259 Special Topics: Graphic Design (3) Student or instructor initiated course offered at discretion of department. Prereq: Consent of instructor. May be repeated. Maximum 12 hours.

350 Graphic Design Portfolio Review (0) Review of prior work in graphic design. Successful completion required prior to registration for junior and senior courses. Prereq: Art History 172, 173 with a grade of C or better. Coreq: 252. May be repeated. Satisfactory/No Credit grading only.

351 Intermediate Graphic Design I (3) Concept development and the study of graphic design elements including typography and imagery and their interrelationships within the graphic design layout. Prereq: Art 295. Coreq: 350, 356.

352 Intermediate Graphic Design II (3) Investigation of sign, symbols, marks and identity systems. Prereq: 351 with a grade of C or better.

354 Color Illustration (3) Flat and process color media and production techniques as applied to product and editorial illustration. Prereq: 254 and successful completion of any portfolio review.

356 Graphic Design Production (3) Traditional and computer-generated techniques for the production of print media in graphic design. Introduction to computer systems, software and techniques.

396 Airbrush Painting (3) Techniques of airbrush painting; skills and creative applications emphasized. Prereq: Art Drawing 211.

405 Computer Enhanced Graphic Design (3) Exploration of new technologies and their significance to graphic design. Prereq: 351, 356 with a grade of C or better and consent of instructor. May be repeated. Maximum 12 hours.

444 Graphic Design Center Practicum (3) Practical work experience in a student-managed, on-site studio. Prereq: 350 and consent of instructor. May be repeated. Maximum 12 hours.

451 Advanced Graphic Design (3) Theory and techniques of visual problem-solving as applied to advanced applications of graphic design. Prereq: 352 with a grade of C or better.

452 Graphic Design Seminar (3) Discussion of design and professional issues including politics, economics, and ethics for the graphic designer. Culminates in a student-initiated project. Prereq: 451 with a grade of C or better.

453 Advertising Illustration (3) Media and techniques as applied to advertising illustration. Prereq: 254 and successful completion of any portfolio review.

454 Editorial Illustration (3) Media and techniques as applied to editorial illustration for books, magazines, and newspapers. Prereq: 254 and successful completion of any portfolio review.

455 Graphic Design Professional Seminar (3) Professional practices including client relationships, design management and business practices. Assembly, organization and editing of the professional portfolio. Prereq/Coreq: 452.

456 Graphic Design Practicum (1-12) Practical work experience in the graphic design field. Only by pre-arrangement with the department. Prereq: Consent of instructor. May be repeated. Maximum 12 hours.
459 Special Topics in Graphic Design (3) Student or instructor initiated course offered at discretion of department. Prereq: Consent of instructor. May be repeated. Maximum 12 hours.

493 Independent Study (1-15) Prereq: Consent of instructor.

494 Individual Problems (3) Prereq: Consent of instructor. May be repeated. Maximum 12 hours.

495 Visiting Artist Seminar (2) Study and discussion of contemporary art issues conducted by different visiting artists each semester. (Does not apply toward art history requirement.) May be repeated. Maximum 8 hours.

ART DRAWING (137)

191 Introduction to Studio Art: Various Media (3) Individual sections for various artistic disciplines. For non-majors only. Courses may be repeated, medium may not be repeated. Maximum 12 hours.


212 Drawing II: Life Drawing (3) Development of drawing and observational skills with special emphasis on structure and dynamics of the human figure and of the figure in environment. Prereq: 211. May be repeated. Maximum 6 hours.

219 Special Topics in Drawing/Painting (3) Student or instructor-initiated course offered at convenience of department to enhance and expand the painting, drawing, and watercolor curriculum. Prereq: Consent of instructor. May be repeated. Maximum 12 hours.

311 Drawing III (4) Development of personal drawing techniques and concepts through class problems. Prereq: 212, 312 or consent of instructor. May be repeated. Maximum 8 hours. Total of 8 hours required for students in the Drawing concentration.

312 Drawing Portfolio Review (0) Review of prior work in drawing. Successful completion required prior to registration for junior and senior courses. Prereq: Art History 172, 173 with a grade of C or better. Satisfactory/No Credit grading only.

411 Drawing IV (6) Individualized pursuit of personal drawing techniques and concepts, supplemented by individual and group critiques and weekly life drawing sessions. Prereq: 8 hours of Art Drawing 311 with a grade of C or better or consent of instructor. May be repeated. Maximum 12 hours. Total of 12 hours required for undergraduate students in the Drawing concentration.

419 Special Topics in Drawing and Painting (3) Student or instructor-initiated course offered at convenience of department to enhance and expand the painting, drawing, and watercolor curriculum. Prereq: Consent of instructor. May be repeated. Maximum 12 hours.

493 Independent Study (1-15) Prereq: Consent of instructor.

494 Individual Problems (3) Prereq: Consent of instructor. May be repeated. Maximum 12 hours.

495 Visiting Artist Seminar (2) Study and discussion of contemporary art issues conducted by different visiting artists each semester. (Does not apply toward art history requirement.) May be repeated. Maximum 8 hours.

ART EDUCATION (141)

301 Foundation of Art Education (3) Basic philosophy and structure including directed learning activities in two and three dimensional design, art appreciation, and teaching methodology.

302 Multiculturalism in Visual Art (3) Selected cognitive and productive experiences involving multicultural visual art. Prereq: Permission of instructor.

303 Concepts of Sculpture and Crafts (3) Processes in teaching of sculpture and crafts including pertinent literature and research. Prereq: 301.

350 Field Experience (1) Tasks related to teaching and to teacher roles. May be repeated. Maximum 2 hours. Prereq: Admission to Teacher Education Program. Satisfactory/No Credit grading only.

400 Curriculum Planning and Teaching Strategies (3) Program development, instructional methods, professional literature, contemporary issues, simulation and micro teaching situations. Prereq: 301 and admission to Teacher Education Program.

ART HISTORY (139)

161 Oceanic Art (3) Survey of the sculpture, textiles, architecture and other traditional art forms of Polynesia, Micronesia and Melanesia. Objects are discussed on the basis of style, style relationships, iconography and the uses to which they were put in their traditional religious, political or social contexts. Writing-emphasis course.

162 Art of Africa, Oceania, and Pre-Columbian America (3) Survey of the traditional arts of the cultures of Black Africa, the Pacific and the Americas (focusing primarily on the period before the European conquest). Sculpture, painting, pottery, textiles, architecture and human adornment will all be examined. (Same as African and African-American Studies 162.) (AH)

167 Honors: Art of Africa, Oceania, and Pre-Columbian America (3) Consent of instructor required. Survey of the traditional arts of the cultures of Black Africa, the Pacific and the Americas. Study grounded in reading, writing and discussion. Writing-emphasis course. (AH)

172 Western Art I (3) Major monuments in Western Art with emphasis on Europe from prehistory through the Middle Ages. Two-hour lecture and one-hour discussion each week. (AH)

173 Western Art II (3) Major monuments in the history of European and American Art from the Renaissance to the present. Two-hour lecture and one-hour discussion section each week. (AH)

177 Honors: Western Art I (3) Consent of Department required. Major monuments in Western Art with emphasis on Europe from prehistory through the Middle Ages. Study grounded in reading, writing, and discussion. Writing-emphasis course. (AH)

178 Honors: Western Art II (3) Consent of Department required. Major monuments in the history of European and American Art from the Renaissance to the present. Study grounded in reading, writing, and discussion. Writing-emphasis course. (AH)

183 Asian Art (3) Selected works of painting, sculpture, architecture, and other forms in India, China, Japan, and to a lesser extent, Korea and Southeast Asia from antiquity through the 19th century. (AH)

187 Honors: Asian Art (3) Consent of instructor required. Selected works of painting, sculpture, and architecture and other forms in India, China, Japan, Korea and Southeast Asia, from antiquity through the 19th century. Study grounded in reading, writing, and discussion. Writing-emphasis course. (AH)

279 Special Topics in Art History (3) Student or instructor-initiated course offered at convenience of department. Prereq: Determined by department for individual topic. May be repeated. Maximum 12 hours.

376 Seminar in Art History (3) Variable theme; emphasis on methodology and skills in writing. Required for Art History majors. Prereq: junior or senior standing and completion of at least 12 hours in art history, or consent of instructor. May be repeated with consent of instructor. Maximum of 6 hours. Writing-emphasis course.

403 History of Photography (3) Survey of the history of photography from the introduction of the daguerreotype and calotype to more recent trends. Emphasis will be placed on aesthetics and the use of photography as a medium for artistic expression.

411 Art of South and Southeast Asia (3) A survey of the art and architecture of the Indian subcontinent and Southeast Asia from 2000 B.C. to the 20th century. The major achievements of each period are examined in relation to their religious, political, and social contexts. Writing-emphasis course.

415 Art of China (3) A survey of the art and architecture of China from the neolithic period to the 20th Century. The major achievements of each period are examined in relation to their religious, political, and social contexts. Writing-emphasis course.

416 Chinese Art of the 20th and 21st Centuries (3) Survey of Chinese art from the late nineteenth century through the present. Hong Kong, Taiwanese, and expatriate artists are also considered. Writing-emphasis course.

419 Art of Japan (3) A survey of the art and architecture of Japan from the neolithic period to the 20th century. The major achievements of each period are examined in relation to their religious, political, and social contexts. Writing-emphasis course.

425 Early Christian and Byzantine Art to 1350 (3) Art in Italy and the Eastern Empire from the beginnings of Christian art to c. 1350. Mosaic and painting, sculpture and architecture. Writing-emphasis course. (Same as Judaic Studies 425.)

431 Medieval Art of the West, 800-1400 (3) Western European art of the “Dark Ages,” Romanesque, and Gothic periods. Writing-emphasis course. (Same as Judaic Studies 431; Medieval Studies 381.)

441 Northern European Painting, 1350-1600 (3) From courtly art of late Middle Ages to Northern Renaissance. Jan van Eyck, Roger van der Weyden, and Durer; early printmakers. Writing-emphasis course. (Same as Medieval Studies 372.)

442 Art of Northern Europe, 1600-1675 (3) Concentrated study of Bruegel, Rubens, Rembrandt, Georges de La Tour, Vermeer, Poussin, and Habs. Writing-emphasis course.
451 The Art of Italy, 1250-1450 (3) Development of exploration of naturalism. Revival of antiquity and development of theories of perspective in the Early Renaissance. Including Duccio, Giotto, Masaccio, Donatello, Botticelli. Writing-emphasis course. (Same as Medieval Studies 382.)

452 Art of Italy, 1455-1580 (3) Concentrated study of Leonardo da Vinci, Michelangelo, Titian, Raphael, Pontormo, and Giorgione. Writing-emphasis course.

453 Art of Southern Europe: 1575-1700 (3) Concentrated study of Caravaggio, Bernini, and Italian Baroque developments in all media. Spanish Baroque painting and sculpture with special attention to Velazquez. Writing-emphasis course.

454 Renaissance and Baroque Theory (3) Addresses the theory of Western art in the early modern period with emphasis on the development and evolution in European art during the Renaissance and Baroque periods. Prereq: 172, 173 (or their Honors equivalents) or consent of instructor. Writing-emphasis course.

461 Art of Southern and Eastern Africa (3) Art traditions of the eastern and southern regions of Africa. Theories to be covered include prehistoric rock paintings; art from archaeological sites and ancient kingdoms. The time period covered ranges from the first and second millennia B.C. for some of the early terracotta sculpture and rock paintings, the 11th through 19th centuries A.D. for the later ancient kingdoms. Writing-emphasis course. (Same as African and African-American Studies 461.)

462 Art and Archaeology of Ancient Africa (3) Historical art traditions of sub-Sahara Africa. Topics to be covered include prehistoric rock paintings; art from archaeological sites and ancient kingdoms. The time period covered ranges from the first and second millennia B.C. for some of the early terracotta sculpture and rock paintings, the 11th through 19th centuries A.D. for the later ancient kingdoms. Writing-emphasis course. (Same as African and African-American Studies 462.)

463 Arts of the African Diaspora (3) Examines the aesthetic, philosophical and religious patterns of the African descendants of Brazil, Surinam, the Caribbean and the United States. Emphasis will be placed on the full range of art forms, including the sculptural and performance traditions as well as architecture, textile, basketry and pottery art forms. Writing-emphasis course. (Same as African and African-American Studies 463.)

471 History of North American Art (3) Survey of landmarks in painting, architecture, sculpture, and design from prehistory to 1900. Writing-emphasis course.

472 History of 20th-Century American Art (3) Developments in architecture, painting, and design from 1900. Writing-emphasis course.

473 19th-Century American Painting (3) From West and Copley to emergence of “The Eight.” Writing-emphasis course.

474 Theory of 20th-Century Art in Europe and America (3) Addresses the theoretical basis for the modern movement. Emphasis on analyzing and discussing individual works of art in light of contemporary writings by artists and theorists. Prereq: 172, 173 (or their Honors equivalents), or consent of instructor. Writing-emphasis course.


476 History of 20th-Century Painting and Sculpture in Europe (3) Development of the Modern and Post-Modern movements in Europe. Investigation of the progression of abstraction through more recent conceptual trends. Analysis of the work of individual artists such as Picasso, Matisse, and many others. Writing-emphasis course.

479 Special Topics in Art History (3) Student or instructor-initiated course offered at convenience of department. May be repeated. Maximum 12 hours.

483 History of American Sculpture (3) American sculpture from prehistory to the 1960s. Writing-emphasis course.


489 Studies in Art History (3) Concentration in individually selected area. Prereq: Consent of instructor. May be repeated. Maximum 6 hours.

493 Independent Study (1-15) Prereq: Consent of instructor.

494 Individual Problems (3) Prereq: Consent of instructor. May be repeated. Maximum 12 hours.

ART MEDIA ARTS (134)

191 Introduction to Studio Art: Various Media (3) Individual sections for various artistic disciplines. For non-majors only. Courses may be repeated, medium may not be repeated. Maximum 12 hours.

231 Photography I (3) Art of black and white photography. Field and studio shooting, history of photography, basic developing, and enlarging techniques.

235 Introduction to Cinematography as Art (3) Development of basic concepts and techniques for the creation of film as an art form. Prereq/Coreq: 231 or consent of instructor. (Same as Cinema Studies 235.)

236 Introduction to Video Art (3) Development of basic concepts and techniques for the creation of video works as an art form. (Same as Cinema Studies 236.)

239 Special Topics in Media Arts (3) Student or instructor-initiated course offered at convenience of department. May be repeated. Maximum 12 hours.

330 Media Arts Portfolio Review (0) Review of prior work in media arts. Successful completion required prior to registration for junior and senior courses. Prereq: Art History 172, 173 with a grade of C or better. Satisfactory/No Credit grading only.


342 Large Format Photography I (4) Studio course introducing theory and practice of photography using large format view camera. Prereq: 231, 331, 330, 331, and consent of instructor.


433 History of Modern Art and Film (3) Study of the development and interaction between the cinematic arts and the visual arts within the context of modern art history. Available for art history credit. (Same as Cinema Studies 433.)

435 Cinematography as Art (3) Continued development of concepts and techniques for the creation of film as an art form with an emphasis on individual projects. Prereq: 235, 330 or permission of instructor. May be repeated. Maximum 9 hours. (Same as Cinema Studies 435.)

436 Video Art (3) Continued development of concepts and techniques for the creation of video works as an art form with an emphasis on individual projects. Prereq: 236, 330 or permission of instructor. May be repeated. Maximum 9 hours. (Same as Cinema Studies 436.)

439 Special Topics in Media Arts (3) Student or instructor initiated course offered at convenience of department. May be repeated. Maximum 12 hours.

441 Digital Photography II (4) Continuation of exploration and implications of use of computer in photography. Prereq: 330, 341, and consent of instructor.

442 Large Format Photography II (4) Studio course that continues the exploration of the use of the large format camera in photography. Prereq: 330, 342, and consent of instructor.

493 Independent Study (1-15) Prereq: Consent of instructor.

494 Individual Problems (3) Prereq: Consent of instructor. May be repeated. Maximum 12 hours.

495 Visiting Artist Seminar (3) Study and discussion of contemporary art issues conducted by different visiting artists each semester. (Does not apply toward art history requirement.) May be repeated. Maximum 12 hours.

ART PAINTING (138)

191 Introduction to Studio Art: Various Media (3) Individual sections for various artistic disciplines. For non-majors only. Courses may be repeated, medium may not be repeated. Maximum 12 hours.

213 Painting I: Introduction (3) Capacities of oil and acrylic painting on canvas. Prereq: 101, 103 for art majors; none for non-art majors.

214 Painting II (3) Techniques of expression in oil and/or acrylic. Prereq: Painting 213. May be repeated. Maximum 6 hours.


216 Watercolor II (3) Capacities of transparent watercolor, with attention to individual exploration of surface, space, and concept. Prereq: Painting 215. May be repeated. Maximum 6 hours.

219 Special Topics in Drawing/Painting (3) Student or instructor-initiated course offered at convenience of department to enhance and expand the painting, drawing, and watercolor curriculum. Prereq: Consent of instructor. May be repeated. Maximum 12 hours.

313 Painting III (4) Individual expression with varied media on canvas. Prereq: 214, 314 or consent of instructor. May be repeated. Maximum 8 hours. Total of 8 hours required for students in the Painting concentration.
314 Painting Portfolio Review (0) Review of prior work in painting. Successful completion required prior to registration for junior and senior courses. Prereq: Art History 172, 173 with a grade of C or better. Satisfactory/No Credit grading only.

315 Watercolor III (4) Individual expression with varied water-based media on paper. Prereq: 216 and 316 or consent of instructor. May be repeated. Maximum 8 hours. Total of 8 hours required for students in the watercolor concentration.

316 Watercolor Portfolio Review (0) Review of prior work in watercolor. Successful completion required prior to registration for junior and senior courses. Prereq: Art History 172, 173 with a grade of C or better. Satisfactory/No Credit grading only.

413 Painting IV (6) Advanced painting stressing individual concepts and personal expression with varied media. Prereq: 315. May be repeated. Maximum 12 hours. Total of 12 hours required for undergraduate students in the painting concentration.

415 Watercolor IV (6) Advanced painting with water-based media on paper stressing individual concepts and personal approaches. Prereq: 315. May be repeated. Maximum 12 hours. Total of 12 hours required for undergraduate students in the watercolor concentration.

419 Special Topics in Drawing and Painting (3) Student or instructor-initiated course offered at convenience of department to enhance and expand the painting, drawing, and watercolor curriculum. Prereq: Consent of instructor. May be repeated. Maximum 12 hours.

493 Independent Study (1-15) Prereq: Consent of instructor.

494 Individual Problems (3) Prereq: Consent of instructor. May be repeated. Maximum 12 hours.

495 Visiting Artist Seminar (2) Study and discussion of contemporary art issues conducted by different visiting artists each semester. (Does not apply toward art history requirement.) May be repeated. Maximum 8 hours.

ART PRINTMAKING (132)

191 Introduction to Studio Art: Various Media (3) Individual sections for various artistic disciplines. For non-majors only. Courses may be repeated, medium may not be repeated. Maximum 12 hours.

262 Intaglio I (3) Metal plate intaglio printing in traditional and contemporary techniques of etching, softground, drypoint, aquatint, and color methods. Prereq: Art 101.

263 Lithography I (3) Stone and aluminum plate lithography applying traditional and contemporary techniques of crayon, tusche, transfer methods, state proofs and photolithography. Prereq: Art 101.

264 Screen Printing I (3) Screen printing as a fine art medium including development and application of various basic stencils in compositional printing. Prereq: Art 101. May be repeated. Maximum 6 hours.

265 Relief (3) Relief printing in traditional and contemporary techniques from wood, linoleum and plastics. Prereq: Art 101.

266 Monoprint and Monotype (3) Investigation of traditional and contemporary techniques. Prereq: Art 101.

269 Special Topics in Printmaking (3) Student or instructor-initiated course offered at convenience of department. Prereq: Art 101 and determined by department for individual topic. May be repeated. Maximum 12 hours.

291 Papermaking Workshop (3) Papermaking as a medium for two- and three-dimensional art. Includes sheet forming, imprinting, laminating, embossing, pulp dyeing, inlaying, casting, and other related techniques. Emphasis on development of a personal form.

360 Printmaking Portfolio Review (0) Review of prior work in printmaking. Successful completion required prior to registration for junior and senior courses. Prereq: Art History 172, 173 with a grade of C or better. Satisfactory/No Credit grading only.

361 Intermediate Print Workshop (1-6) Individual and collaborative studio work encompassing theory and practice in intaglio, lithography, relief printing, screenprinting, monoprint, papermaking, book arts and/or photo-print processes. Prereq: One of the following: 262, 263, 264, 265, 266, 269, 291 and 360 or consent of instructor. May be repeated. Maximum 12 hours.

461 Advanced Print Workshop (1-6) Individual and collaborative studio work encompassing theory and practice in intaglio, lithography, relief printing, screenprinting, monoprint, papermaking, book arts and/or photo-print processes. Prereq: 361 or consent of instructor. May be repeated. Maximum 12 hours.

469 Special Topics in Printmaking (3-6) Student or instructor-initiated course offered at convenience of department. Prereq: Determined by department for individual topic. May be repeated. Maximum 12 hours.

493 Independent Study (1-15) Prereq: Consent of instructor.

494 Individual Problems (3) Prereq: Consent of instructor. May be repeated. Maximum 12 hours.

495 Visiting Artist Seminar (2) Study and discussion of contemporary art issues conducted by different visiting artists each semester. (Does not apply toward art history requirement.) May be repeated. Maximum 8 hours.

ART SCULPTURE (143)

191 Introduction to Studio Art: Various Media (3) Individual sections for various artistic disciplines. For non-majors only. Courses may be repeated, medium may not be repeated. Maximum 12 hours.

240 Techniques and Tools (1) Introduction to the equipment in metal shop, wood shop, and foundry. Instruction includes shop safety, operation of tools, and handling of hazardous materials. All students must pass proficiency tests.

241 Beginning Sculpture (3) Introduction to the materials, concepts, technical processes, and history of sculpture. Materials include wood, plaster, steel and plastics. Prereq: Art 103.

242 Figuring the Body (3) Sculpture that involves the human figure, directly or indirectly. Issues relating to the body and personal identity will be explored through various media. Prereq: Art 101, 103; Art Sculpture 241, or consent of instructor.

243 Mold-Making and Casting (3) Examines possibilities and processes related to mold-making. A variety of casting materials will be explored including metals, wax, rubber, plaster, and ceramic shell. Prereq: Art 103; Art Sculpture 240, 241.

245 Metal Fabrication (3) Introduction to steel as a material for the creation of sculpture. Development of welding techniques, design of cold connections, and engineering of structural components. Prereq: Art 103; Art Sculpture 240, 241.

246 Mixed Media Sculpture (3) Includes installation art, performance, and conceptual art. Contemporary issues and materials related to sculpture are examined through research and studio projects. Prereq: Art 103; Art Sculpture 241.

249 Special Topics in Sculpture (3) Instructor initiated course offered at convenience of department. Prereq: Art 101, 103; and Art Sculpture 241 with a grade of C or better. May be repeated. Maximum 12 hours.

340 Sculpture Portfolio Review (0) Review of prior work in sculpture and development of new work. Successful completion required prior to registration for junior and senior courses. Prereq: Art 101, 103; Art History 172, 173, 162, 183 (choose two); Art Sculpture 240, 241, 245 and 246 with a grade of C or better. Satisfactory/No Credit grading only.

341 Intermediate Sculpture (3) Students begin defining and developing their visual vocabulary relative to contemporary sculptural issues. Emphasis on studio projects, research, and discussion. Prereq: Art 103; Art Sculpture 240, 241, 245, 246 and 340; or consent of instructor. May be repeated. Maximum 6 hours.

343 Advanced Mold-Making and Casting (3) Further exploration of casting methods with an emphasis on metals including bronze and aluminum. Prereq: 340 or consent of instructor.

345 Advanced Metal Fabrication (3) Advanced exploration of construction in steel and other metals through welding, design of cold connections, and engineering of structural components. Prereq: Art 103; Art Sculpture 240, 245 and 340, or consent of instructor.

346 Advanced Mixed Media Sculpture (3-6) Advanced investigation into the sculptural possibilities of installation art, performance, and multi-media. Contemporary issues are examined through research and studio projects. Prereq: Art 103; Art Sculpture 241, 246 and 340, or consent of instructor.

441 Advanced Sculpture (3-6) Individual development of sculptural problems and techniques. Students work independently while participating in group projects, critique, and discussion. Prereq: 6 hours of 300-level sculpture. May be repeated. Maximum 12 hours.

442 Senior Seminar (2) Investigation of professional practices and career opportunities in the field of sculpture. Includes portfolio development, preparation for exhibitions, and public commissions.

449 Special Topics in Sculpture (3) Student or instructor-initiated course offered at convenience of department. Prereq: Successful completion of any Portfolio Review (Art 300, or Art Ceramics 320, or Art Design/Graphic 350, or Art Drawing 312, or Art Media Arts 330, or Art Painting 314, or Art Painting 316, or Art Printmaking 360, or Art Sculpture 340); May be repeated. Maximum 12 hours.

493 Independent Study (1-15) Prereq: Consent of instructor.

494 Individual Problems (3) Prereq: Consent of instructor. May be repeated. Maximum 12 hours.
ASIAN LANGUAGES (144)
131-132 Elementary Chinese I, II (5,5) Must be taken in sequence. (Same as Chinese 131-132.)
151-152 Elementary Japanese I, II (5,5) Must be taken in sequence. (Same as Japanese 151-152.)
199 Chinese and Japanese Language and World Business (2) Examines the importance of foreign trade at the local, state, and national levels. Interdisciplinary faculty from the Colleges of Business Administration and Arts and Sciences provide an overview of the value of language and international cultural awareness in the program in Language and World Business. See Director for further information.

231-232 Intermediate Chinese I, II (5,5) Prereq: 131-132 or equivalent or consent of instructor. Must be taken in sequence. (Same as Chinese 231-232.) (CC)
251-252 Intermediate Japanese I, II (5,5) Prereq: 151-152 or consent of instructor. Must be taken in sequence. (Same as Japanese 251-252.) (CC)
311-312 Chinese Literature in English Translation (3,3) 311- Classical literature. 312- Vernacular and modern literature. Writing-emphasis course. (Same as Chinese 311-312.)
313-314 Japanese Literature in English Translation (3,3) 313- Classical/ traditional: masterpieces of poetry, fiction, and drama to 1868. 314- Modern: masterpieces of fiction since 1868. Writing-emphasis course. (Same as Japanese 313-314.)
315 Asian Film (3) An examination of Asian national cinemas in historical and cultural context. Taught in English. Writing-emphasis course. (Same as Cinema Studies 315.)
331-332 Advanced Chinese I, II (4,4) Prereq: 231-232 or equivalent or consent of instructor. Must be taken in sequence. (Same as Chinese 331-332.)
351-352 Advanced Japanese I, II (4,4) Includes conversation, drill, and composition practice with native speaker as well as reading and translation. Prereq: 251-252. Must be taken in sequence. (Same as Japanese 351-352.)
413 Topics in Japanese Literature (3) When content varies, may be repeated for credit. Writing-emphasis course. In English with readings in Japanese for minors. (Same as Japanese 413.)
431 Readings in Chinese Literature (3) Prereq: Mastery of intermediate-level of Chinese or consent of instructor. May be repeated. Maximum 9 hours. (Same as Chinese 431.)
451 Readings in Pre-Modern Japanese Literature (3) Prereq: Mastery of intermediate-level Japanese or consent of instructor. (Same as Japanese 451.)
452 Readings in Modern Japanese Literature (3) Prereq: Mastery of intermediate-level Japanese or consent of instructor. (Same as Japanese 452.)
490 Chinese and Japanese Internship (1-15) Career-related experiences in the United States or abroad with permission of the Language and World Business Director. For Language and World Business majors only. Satisfactory/No Credit grading only.
491 Chinese and Japanese Foreign Study (1-15)

ASIAN STUDIES (145)
101-102 Asian Civilization (3,3) Comparative study of development of religion, social institutions, and high culture in India, China, Japan, and the Islamic world. 101-India and the Islamic World. 102-China and Japan. Writing-emphasis course. (CC)
121-122 Elementary Modern Standard Arabic I, II (4,4) Taped language program. Must be taken in sequence. Enrollment by permission of instructor. (Same as Arabic 121-122.)
141-142 Elementary Modern Hebrew I, II (4,4) Taped language program. Must be taken in sequence. Enrollment by permission of instructor. (Same as Hebrew 141-142.)
161-162 Elementary Persian (4,4) Taped language program. Must be taken in sequence. Enrollment by permission of instructor. (Same as Persian 161-162.)
221-222 Intermediate Modern Standard Arabic I, II (4,4) Taped language program. Must be taken in sequence. Enrollment by permission of instructor. (Same as Arabic 221-222.) (CC)
241-242 Intermediate Modern Hebrew I, II (4,4) Taped language program. Prereq: 141-142 or equivalent or consent of instructor. Must be taken in sequence. (Same as Hebrew 241-242.) (CC)
261-262 Intermediate Persian (4,4) Taped language program. Prereq: 161-162 or equivalent or consent of instructor. Must be taken in sequence. (Same as Persian 261-262.) (CC)
332 Classical Islam (3) (Same as Religious Studies 332.)
333 Islam in the Modern World (3) (Same as Religious Studies 333.)
471 Selected Topics in Asian Studies (3) Content varies. May be repeated. Maximum 9 hours.
491 Foreign Study (1-15)
492 Off-Campus Study (1-15)
493 Independent Study (1-15)

ASTRONOMY (150)
151-152 Introductory Astronomy (4,4) Survey of the composition, structure, and dynamics of the universe which introduces the basic vocabulary of astronomy and scientific method. Components of the solar system including results from planetary exploration spacecraft; hypotheses and theories of the origin and evolution of our solar system in light of current knowledge and scientific reasoning; stellar birth, evolution and death as a chain of events; characteristics of galaxies and the origin of the universe examined in light of modern astrophysics and particle physics. A minimum of mathematical analysis. Must be taken in sequence. 4 hours lecture-demonstration and star chart field work. Only one of the three sequences 151-152, 161-162, or 217-218 may be taken for credit. (NS)
161-162 Introductory Astronomy with Laboratory (4,4) Survey course, with accompanying laboratory, treating the composition, structure and dynamics of the universe and introducing the basic vocabulary of astronomy and principles of scientific method. Components of the solar system including results from planetary exploration spacecraft; hypotheses and theories of the origin and evolution of the solar system in light of current knowledge and scientific reasoning; stellar birth, evolution, and death as a chain of events; characteristics of galaxies and of the beginning of the universe in light of modern astrophysics and particle physics. Principles for interpretation of astronomical observations are reinforced in laboratory. Must be taken in sequence. 3 hours lecture, 2 hours lab. Coreq: Physics 141 or 130 or equivalent. Credit given for only one sequence of lower division astronomy. This sequence satisfies the Arts and Sciences requirement for a natural science with laboratory. (NS)
411 Astrophysics (3) Development of analytical physical models of the galactic structure of the universe, stellar and interstellar matter, and planetary systems. Topical and interdisciplinary approach includes consideration of quasars, pulsars, black holes and current developments in the field. Acceptable for major credit in physics. Prereq: Physics 136 or 138 or 222 or 232 and consent of instructor.
490 Special Topics in Astronomy (1-3) Topics of current interest in Astronomy and Astrophysics. May be repeated for credit with consent of department. Maximum 9 hours.

AUDIOLOGY AND SPEECH PATHOLOGY (160)
300 Introduction to Communication Disorders (3) Nature, etiology, and incidence of speech, hearing and language disorders.
302 Acoustics and Perception (3) Basic acoustics. Introduction to psychoacoustics and speech perception.
305 Phonetics (3) Basic phonetics including recognition and production of spoken English sounds with analysis of their formation; phonetic transcription of speech; phonetic aspects of dialect variation.
306 Anatomy and Physiology of Speech (3) Anatomy, physiology and embryological development of the speech production mechanism. Prereq: 305.
320 Speech and Language Development (3) Speech and language development in the normal child.
431 Stuttering (3) Nature, appraisal and treatment. Prereq: 300 or consent of instructor.
433 Observation of Clinical Practice (1) Prereq: 320 or consent of instructor.

434 Clinical Practice in Speech-Language Pathology II (1-4) Prereq: 433 and consent of instructor. Enrollment for fewer than 2 semester hours must have prior departmental approval. May be repeated. Maximum 4 hours.

435 Introduction to Speech Sound Disorders (3) Etiology, diagnosis, and treatment of articulatory and phonological disorders. Prereq: 300, 305 or consent of instructor.


445 Clinical Practice in Audiology (1-4) Prereq: 473, 494. May be repeated. Maximum 6 hours.

455 Problems in Speech Pathology (1-3) Prereq: Consent of instructor.


473 Introduction to Audiologic Assessment (3) Basic principles of clinical audimetry; pure tone, speech, masking and overview of special auditory tests. Prereq: 303.

475 Appraisal of Speech and Language Disorders (3) Diagnostic procedures for children and adults with speech and language problems including observation and practice with diagnostic tests. Prereq: 300, consent of instructor, and senior standing.

491 Foreign Study (1-15)

492 Off-Campus Study (1-15)

493 Independent Study (1-15)

494 Aural Habilitation/Rehabilitation of the Hearing Impaired (3) Introduction to psychosocial aspects, amplification components/characteristics, assistive devices, speech acoustics, speech perception, speechreading, parent-infant, preschool school years of children, communication impairments/handicaps/ remediation of adults, effects of aging/remediation on the elderly, and case studies. Prereq: 305, 473 or equivalents or consent of instructor.

499 Senior Seminar in Communication Sciences and Disorders (3) Capstone Experience; A writing emphasis course exploring the forces shaping the profession of communication disorders in the past, present and future. Prereq: Consent of instructor and senior standing.

**BIOCHEMISTRY AND CELLULAR AND MOLECULAR BIOLOGY (188)**

230 Human Physiology (5) Fundamentals of human physiology, primarily from the perspective of cellular and organ-system interactions. Credit may not be applied toward BCMB major. 4 hours and one lab. Prereq: One year of college chemistry.

280 Modern Medicine and You (3) New biomedical advances in internal medicine, surgery, obstetrics and gynecology, infectious diseases, cancer treatment, genetic disorders, psychiatry, health promotion, and disease prevention. Team-taught by academic clinicians in their area of specialty. Class meets 2 hours a week. Each session will include: basic biological principles/processes; scientific advances and current status about new diagnostic and treatment procedures of the particular disease state. Prereq: Biology series for majors or non-majors.

310 Physiological Chemistry (4) Biochemical principles underlying physiological events in animals. Metabolism of carbohydrates, lipids, proteins, and nucleic acids. Role of vitamins and minerals as coenzyme and prosthetic groups. Action of drugs and hormones. Prereq: Chemistry 100-110 or 120-130; Biology 130-40 or BCMB 230. Not available for credit if credit has been previously received for BCMB 401 or 410 or 420. Credit cannot be counted toward BCMB concentration. (Same as Nutrition 310.)

320 Physiology of Reproduction and Lactation (3) (Same as Animal Science 320.)

330 Mechanisms of Development (3) A survey course on cellular and molecular basis of embryonic development; differentiation via transcription, RNA processing, and translation; sex determination in humans. Intended for Biology majors in BCMB concentration, but also open to other Biology majors. Prereq: Biology 140, 240 or consent of instructor.

331 Mechanisms of Development Laboratory (2) 2 labs. Coreq: 330.

401-402 Biochemistry-Molecular Biology I, II (4, 4) A two-course sequence providing in-depth coverage of biochemistry and molecular biology, intended for Biology majors concentrating in BCMB, but also open to Biology majors in other concentrations. First semester covers amino acid structure and chemistry, protein structure and chemistry, protein folding, enzyme behavior and function, reaction mechanisms, catalysis and energy transfer, synthetic metabolism including photosynthesis, and protein transport. Second semester covers structure of DNA and RNA, experimental methods of analyzing nucleic acids, mechanisms of RNA and protein synthesis, mechanisms of DNA replication, repair and recombination, chromosome structure and function, regulation of gene expression, genome structure and genomics, and mechanisms of biological regulation. Prerequisites: Biology 240, Chemistry 350-360-369.


405-406 Minicourse in Biochemistry and Cellular and Molecular Biology (2, 2) Select advanced topics in biochemistry, cell biology, genetics, neurosciences, or developmental biology concentrated in time and subject matter. Consult departmental listing for topics offered. Prereq: As announced. May be repeated. Maximum 4 hours may apply toward BCMB major.

409 Perspectives in Biochemistry and Cellular and Molecular Biology (3) Current issues in biochemistry, cell biology and molecular biology. Emphasis on current developments and their applications, societal and economic impacts and moral and ethical implications. An oral presentation and a referenced library research essay are required. A capstone course. Writing-emphasis course.

410 Cellular and Comparative Biochemistry (4) Electrolyte behavior, chemistry and structure of proteins; enzyme behavior and biological function; catalysis and energy capture; synthetic metabolism; nuclear acid function; protein synthesis, and biochemical genetics; regulation of biological processes. 3 hours and 1 discussion. Prereq: Chemistry 350-360-369; Biology 140-240. Not available for credit if credit has previously been received for BCMB 401. Credit may not be applied toward BCMB concentration.

411 Advanced Cellular Biology (3) Cellular structure and function at the molecular and supramolecular level. Topics include protein structure and function, membrane structure and function, signal transduction and cell regulation, mitosis and the cell cycle, cytoskeleton and cell motility, cell-cell interactions and tissues. Prereq: 401 or 410.

415 Foundations in Neurobiology (3) Basic nerve cell physiology, nervous system organization, sensory and motor systems, neural basis of behavior, and nervous system development and plasticity. Prereq/Coreq: Physics 221-222; Chemistry 120, 130; Biology 140.

416 Neurobiology Laboratory (2) Experiments designed to illustrate concepts of modern neurobiology using electrophysiological, historical, and behavioral neurobiological techniques. Prereq/Coreq: 415.

419 Cellular and Comparative Biochemistry Laboratory (2) Experiments with enzymes, nucleic acids, and membranes and organelles. Chromatography, kinetics, hybridization, sequencing, and immunological methods. Prereq/Coreq: 401 or 410.

420 Advanced Topics in Biochemistry and Cellular and Molecular Biology (3) Selected Topics of current research interest, e.g., allosteric theory and control of protein function, immunology, regulation of gene expression, bioenergetics, etc. Emphasis on original literature and the experimental basis of current knowledge. Historical background, societal impact, ethical and moral implications, and future development of technologies. Written reports required. Prereq: 410. Writing-emphasis course.

421 Cell and Tissue Structure and Function (4) Study of animal cells and tissues at light and electron microscope levels. 2 hours and 2 labs. Prereq: Biology 140.

429 Cell Biology Laboratory (3) A series of open-ended, discovery-based exercises will be developed to design and test new drugs using modern cell biology and computer technologies. Experimental modules include techniques used in cell isolation, purification, culturing, fluorescent microscopy, receptor binding and signal transduction, apoptosis, cell cycle analysis, protein and steroid secretion, computer modeling, and state-of-the-art electron microscopy. Students will actively participate in experiment design, execution, data analysis, and peer evaluation. Prereq/Coreq: 401 or 410.


452 Independent Research in Biochemistry (1-6) Special experimental problems under direction of a staff member. Limited to undergraduates and by consent of instructor. Prereq/Coreq: 410, 419. May be repeated. Maximum 12 hours.
457 Honors Thesis (1-3) Written preparation and oral presentation of faculty-supervised student research conducted in BCMB 452 or equivalent. Prereq: Admission to honors program in BCMB and BCMB 452 or equivalent. Cannot be repeated. Cannot be counted toward the requirements for the BCMB concentration.

465 Human Genetics (3) Genetic and molecular principles and problems of human inheritance. Prereq: Biology 240.

471-481 Biophysical Chemistry (3, 3) Physical-chemical principles with applications to biological systems. 471 Thermodynamics; chemical equilibrium; solution chemistry; transport; electrochemistry; kinetics; enzyme catalyzed reactions. 481—Elementary quantum chemistry; interactions of light with biological molecules; optical and magnetic spectroscopy; light scattering; case studies of selected macromolecules. Prereq: Calculus, Organic Chemistry, General Biology or consent of instructor. (Same as Chemistry 471-481.)

480 Physiology of Exercise (3) (Same as Exercise Science 480.)

492 Off-Campus Study (1-6) No more than two credits of 492 will count toward the Biological Sciences BCMB major. Satisfactory/No Credit grading only.

493 Independent Study (1-3) Independent study under the direction of a faculty member. Consent of instructor required. May be repeated. Maximum 12 hours. A maximum of 3 hours may be applied to the major.

BIOLOGY (190)

101-102 Humankind in the Biotic World (4,4) Introduction to the principles of biology from the perspective of the impacts of plants, animals, and microbes on human life, and the impact of humans on the biosphere, intended for students not majoring in the biological or pre-health sciences. 101 surveys life from the cell to topics in human health. Topics include: macromolecules and cells, energy flow in biological systems, genetics and information flow from generation to generation; reproduction; biotechnology and genetic engineering; sex and sexuality, human physiology, cancer, drugs—use and misuse. 102 focuses on the diversity of the Earth’s biota and the interdependence among components. Topics include: surveys of biodiversity from bacteria to higher plants and animals, genetics and evolutionary processes, population biology, ecology, ecosystems, environmental issues including world population, and global climate change. Each course is 3 hours lecture and 1 hour discussion/laboratory. Laboratories involve a mix of skills-oriented exercises and assignments focused on topics. Although not required, it is strongly recommended that 101-102 be taken in sequence. (NS)

130 Biodiversity (4) Unifying concepts and principles of biology, illustrated with diversity of life, intended for science majors. Properties of life, molecular basis of origin of life, cells, genetics, introduction to kingdoms, origins of multicellularity, multicellular plants and animals, ideas about evolution, man’s place in nature. Emphasis on common themes in living systems (e.g., metabolism, protein and nucleotide sequence similarities, morphology), phylogeny construction, fossils, and the major plant and animal groups. Writing and analysis of lab activities required. 3 hours lecture and 1 hour lab each week. Credit not available for students with credit for both 101 and 102. (NS)

140 Organization and Function of the Cell (4) Topics include: basic organic chemistry and biomolecules, cell structure—membranes, cell walls, and internal organelles; energetics—respiration and photosynthesis; cell division mitosis; and molecular biology. Labs will stress basic laboratory skills and procedures such as measuring pipetting and mixing solutions, as well as introduce modern methods for analysis of cell components such as electrophoresis and centrifugation. Prereq: 130, Chemistry 120; Coreq: Chemistry 130. (NS)

202-203 Inside the Biological Sciences (1,1) Presentations by faculty and other biology professionals emphasizing applied biological research. Familiarizes students with diverse nature and current applications of biology. Open to freshmen and sophomores. Satisfactory/No Credit grading only. May be repeated.

240 General Genetics (4) Classical and modern principles of heredity. Topics include: meiosis and transmission genetics; molecular genetics and gene expression; population and evolutionary genetics. Laboratories will alternate with problem-solving sessions and will include both computer based simulations and hands-on experience with model genetic systems. Emphasis on development of analytical skills. Prereq: 130-140 or Botany 110-120; Chemistry 120-130.

250 General Ecology (4) Relations between organisms and their environment, including human environmental problems. Topics include populations, communities, and ecosystems. 3 hours lecture, 1 hour discussion, field problems or computer simulations. A working knowledge of college algebra is required. Prereq: 130-140 or Botany 110-120; Chemistry 120-130.

307-308 Honors: Colloquy in Biological Research (1,1) Presentations by professional biologists emphasizing rewards of careers in different areas of biology. Nationally recognized speakers invited each term. Open to sophomores, juniors, and seniors. Selection of Honors: Threshold Biology Scholars. Prereq: 8 hours of 200 or above, admission to an honors program or permission of the instructor. May be repeated. Satisfactory/No Credit grading only.

397 Honors: Seminar on Research Skills (3) Technical and cognitive skills necessary for participation in biological research. Lecture/presentations and small team demonstrations and discussion. Required of (but not limited to) Threshold Biology Scholars. Prereq: 8 hours of 200 or above and 397. Permission of instructor required.

398 Honors Practicum in Biological Research (3-5) Rotation through 3-5 modules of required and elective experience in participating laboratories. Required of (but not limited to) Threshold Biology Scholars. Prereq: 8 hours of 200 or above and 397. Permission of instructor required.

401 Senior Thesis (3-12) Required research experience of Threshold Biology Scholars. Students design research projects, complete research data acquisition, organize thesis documents, and prepare presentations. May be repeated. Maximum of 12 hours. Prereq: 394-395.

BIOMEDICAL ENGINEERING

See Engineering Biomedical.

BIOSYSTEMS ENGINEERING (196)

104 Design Apprenticeship (1) Exposure to design in biosystems engineering, through apprenticeship with senior design teams in Biosystems Engineering 402. Apprentices will maintain a journal describing their activities in assisting the senior design engineers, and will make an oral presentation summarizing the design project with which they assisted. Grading will be based on journal submissions, contributions to the design team, and the final presentation. 2 hour lab. Prereq: Engineering Fundamentals 101.

201 Career Opportunities (1) Activities and opportunities in the fields of specialization; required training for each area; projected career activities. 1 hour.

221 Mass and Energy in Biosystems (3) Introduction to thermodynamic concepts for biological systems (energy, mass and energy balances, processes and cycles); psychrometrics and psychrometric processes; biological systems and the biosphere (bioenergetics, hydrologic cycle, global energy cycle). 2 hours lab and 1 lab. Prereq: Chemistry 120, Engineering Fundamentals 102.

321 Biothermodynamics, Heat and Mass Transfer (3) Application of thermodynamics to biological systems; heat transfer, with emphasis upon conduction and convection applications; introduction to diffusion mass transfer. 2 hours and 1 lab. Prereq: 221, Nuclear Engineering 203, Coreq: Mathematics 241.

401 Biosystems Engineering Design I (3) First course of a capstone design sequence. Review of fundamental engineering principles, time and project management, ethics, contemporary issues in biosystems engineering, portfolio review, and design proposal generation. Design proposals will include extensive documentation and preliminary analyses. Prereq: Senior standing and at least three of 411, 416, 431, 441, 451, or consent of instructor.

402 Biosystems Engineering Design II (6) Culmination of capstone design sequence. Intensive design experience on project chosen and approved in Biosystems Engineering 401. Analysis, construction, testing, evaluation and reporting required. Technical lectures on statistics, engineering software, and technical issues relevant to the chosen design project. Weekly oral and written reports. Submission of design to external engineering design competition or display required. 2 hour lecture, 2 hour recitation (weekly project reports) and 4 hour lab. Prereq: 401.

411 Mechanical Systems Engineering (3) Fundamentals of power delivery systems and simple mechanisms; selection and design of mechanical, hydraulic, and tractive power transmission systems. Emphasis on off-road vehicles and bioprocessing systems. 2 hours and 1 lab. Prereq: Mechanical Engineering 231, 321, Coreq: 321.

416 Hydrologic and Water Quality Engineering (3) An introduction to hydrology including: hydrologic variability, precipitation, evapotranspiration, infiltration, runoff, erosion, water quality and non-point pollution, energy dissipation, streamflow measurement, hydographs, routing, open channel flow, and urban hydrology. Prereq: Civil Engineering 390 or Aerospace Engineering 341. (Same as Civil Engineering 416.)

431 Bioprocessing Engineering (3) Application of basic engineering principles to processing and handling of biological materials: physical, chemical, biological properties; materials handling; material conversion operations; drying; heat processing; and bioprocessing. 2 hours and 1 lab. Coreq: 321.

441 Life Systems Engineering (3) Design of controlled environments to optimize conditions for organism growth and development: growth equations and population dynamics; plant growth systems; microbial growth systems; animal growth systems; biotechnological applications. 2 hours and 1 lab. Prereq: Mathematics 231, Coreq: 321.
444 Practicum (3) Applications of engineering theory and design in selecting, sizing, and fabricating engineering materials, and in developing processes and systems typically used in biosystems engineering. May be taken in same semester as 401. 1 hour and 2 labs.

451 Electronic Systems (4) Basic electronics with biological applications. Analog and digital electronics; sensing and controlling physical and environmental parameters; sensor selection and interfacing; signal conditioning; process control. Includes laboratory experiments and design projects. Design content: 1 hour. 2 hours and 1 lab. Prereq: Electrical Engineering 301.

470 Special Problems in Biosystems Engineering (1-3) Selection, analysis solution and report of problem. May be repeated.

480 Selected Topics in Biosystems Engineering (1-3) Current trends and problems in agricultural engineering. May be repeated.

BIOSYSTEMS ENGINEERING TECHNOLOGY (194)

202 Materials and Fabrication (3) Properties of materials including wood, metals, concrete, plastics and lubricants; drafting and plan reading; fabrication techniques and processes involving hand tools, power equipment, and arc and gas welding. 1 hour and 2 qlabs.

212 Surveying (3) Measurement of distances, angles, and areas; differential and profile leveling; topographic surveying and mapping; area computation. 1 hour and one 3-lab. Prereq: Mathematics 119 or consent of instructor.

226 GIS/GPS Applications in Agriculture and Environmental Science (3) Introduction to the application of Geographic Information Systems (GIS) and Global Positioning Systems (GPS) in agriculture and in environmental science. Topics covered will include GIS software and concepts, GPS receivers, data acquisition, and spatial analysis of data to solve problems. Case studies in agricultural demographics, precision agriculture, pasture management, water quality, watershed management, and waste pollution will be used to provide hands-on experience with these emerging technologies. Prereq: Agriculture and Natural Resources 290 or equivalent.

214 CAD Applications to Biosystems Engineering Technology (3) Computer Aided Drafting (CAD) applications in agriculture and environmental science. Essentials of CAD software to create drawings of components, systems, flow charts, and process diagrams. Applications in mechanical, structural, and biosystems. 2D applications with limited exposure to 3D applications. Computer intensive course. Hands-on experience. Prereq: Computer proficiency and admission to graduate program. Students cannot receive credit for both 214 and 514. Two 2 hour labs.

422 Food and Process Engineering Technology (3) Application of basic engineering principles to agricultural and food processes. Fluid handling, drying, evaporation, thermal processing, heating and cooling, refrigeration systems, and materials handling. 2 hours and 1 lab. Prereq: Physics 101 or 221.

432 Agricultural Machinery and Tractors (3) Functions, selection, matching, and management of agricultural machinery systems. Tractor power ratings, engine and transmission systems, hydraulic systems, hitching, and ballasting. Field and material capacity, field efficiency, cost analysis, and machinery replacement strategies. Functional analyses of tillage operations, planters and drills, no-tillage systems, hay harvest systems, forage and small grain harvesting, and cotton harvesting. Crop drying processes, off-road machinery safety considerations, and operator ergonomics. 2 hours and 1 lab. Prereq: Mathematics 123, 125 or consent of instructor.

434 Production Monitoring and Automation (3) Precision technologies for monitoring and control of agricultural systems. Applications include: yield monitoring; variable rate control and sensing systems for planters, sprayers, soil applied nutrients, water management, crop health, and pest pressure; electronic information transfer; and GPS-based vehicle guidance. 2 hours and 1 lab. Prereq: 326. Coreq: 432.

442 Agricultural Waste Management and Pollution Control (3) Waste renovation fundamentals; characteristics of animal manure, techniques for collecting, transporting, storing, and utilizing livestock waste. 2 hours and 1 lab. Prereq: Mathematics 125 or 123 or equivalent.

452 Small Internal Combustion Engines (3) Theory, concepts and mechanics of small internal combustion engines; theoretical cycles, selection, operation, adjustment, troubleshooting and repair of single-cylinder engines. 2 hours and 1 lab. Prereq: Mathematics 123 or 125 or consent of instructor.

462 Agricultural Chemical Application Technology (3) Equipment for application of liquid, solid, and gaseous agricultural chemicals; system components; operational characteristics; calibration; selection and management; safety considerations; and disposal methods. 2 hours and 1 lab. Prereq: Mathematics 123 or 125 or consent of instructor.

474 Environmental Instrumentation and Monitoring (3) Equipment and techniques commonly used to measure all aspects of hydrologic cycle: precipitation, runoff, streamflow, subsurface water movement. Sampling of all flows for contaminants. Design of monitoring systems. Analysis of data. 2 hours and 1 lab. Prereq: Environmental and Soil Sciences 324, Statistics 201, Mathematics 152, or consent of instructor. (Students cannot receive credit for both 474 and 574.)

BOTANY (198)

110-120 General Botany (4,4) 110 - Introduction to taxonomy through tree identification, basic organization and function of cells; respiration; photosynthesis; genetics (including meiosis, mitosis, Mendelian inheritance); survey of plant kingdom (bacteria, algae, fungi, mosses, ferns, conifers, and flowering plants). 120-Plant growth, anatomy, growth regulation; uptake and transport; origin of life and mechanism of evolution; ecology, importance to humans and environmental concerns. Students receiving credit for 110-120 may not receive credit for either Biology 130-140 or Biology 101-102. (NS)

305 Socio-Economic Impact of Plants (3) Significance of plants in origin and development of human cultures, evolution of cultivated plants, and role of plants in present civilization. Occasional field trips.

306 Genetics and Society (3) Introduction to genetics, anthropology and evolution with emphasis on their implications for human society. (Same as Anthropology 306.)

309 Biology of Human Affairs (3) Basic biological principles involved in deterioration and preservation of an environment in which humans and their cultures can survive.

310 Plant Morphology (4) Morphology, development, natural history, and evolution of non-vascular plants (mosses, algae, fungi, and bryophytes) and vascular plants (ferns, fern allies, gymnosperms, and flowering plants). Prereq: 110-120 or Biology 130-140 or equivalent.

313 Introductory Plant Pathology (3) (Same as Entomology and Plant Pathology 313.)

321 Introductory Plant Physiology (4) Organismal physiology of plants; water relations, mineral nutrition, morphogenesis, elements of metabolic processes, effects of age, light, natural rhythms, temperature, and other environmental factors. Lecture and lab. Prereq: One year general chemistry and one year biological science.

330 Field Botany (3) Principles of taxonomy, basic ecological concepts and the identification, recognition, collection and preservation of local, native and naturalized plants. Prereq: 8 hours in biological sciences.

371 Undergraduate Seminar (1) Principles and practice of preparing and delivering a seminar presentation, usually focused on a current topic in plant biology. Junior or senior standing recommended. May be repeated. Maximum 2 hours.

400 Tutorial in Botany (1-2) Individual, independent study under guidance of selected staff. By application only. May be repeated with consent of department. Maximum 4 hours.

401 Field Studies in Botany: (Specific Topic to be announced) (1-3) Field experience and taxonomy of special plant groups. Selected field topics will vary and may include: Bryology, Lichenology, Perriology, Agrostology, Mycology, Phycology, Aquatic Vascular plants, Synantherology, Woody Plants, and Botanical Photography. May be repeated, but no specific topic may be repeated for credit. Maximum 9 hours.

404 Plant Molecular Biology (4) Instructions to current research in plant molecular biology and to commonly used techniques and procedures. Lectures include genome structure, gene expression and regulation, transformation, transposable elements, plant development, etc. Labs include isolation of DNA and RNA, molecular hybridization, isolation and preparation of plasmids, PCR amplification of specific sequences, DNA sequencing and transformation. Prereq: Biology 140, 240 with grade of A or B and consent of instructor.

412 Plant Anatomy (3) Cells, tissues and organs; their development in vegetative and reproductive structures of vascular plants — emphasis on seed plants. Prereq: 110-120 or Biology 130-140 or equivalent.

419 Science as Method (3) (Same as Ecology and Evolutionary Biology 419; Philosophy 419.)

431 Plant Ecology (4) Interactions between individuals, species, communities and their environments. Circulation of energy and matter in ecosystems. Weekly field trips or laboratory periods, and at least two weekend field trips. Prereq: 330 or equivalent. (Same as Ecology and Evolutionary Biology 431.)

441-442 Undergraduate Research Participation (1-2,1-2) Experience in active research projects under supervision of staff members. Prereq: Junior or senior standing, minimum grade average 3.0, consent of instructor. May be repeated. Maximum 8 hours.
451 Plant Tissue Culture (3) (Same as Entomology and Plant Pathology 451; Plant Sciences 451.)

471 Senior Seminar (A) A capstone course conducted in seminar format dealing with topics of current interest in plant biology. Written reports and oral presentations are required. Prereq: Senior standing.

499 Evolutionary Ecology (3) Basic concepts in evolutionary and ecological genetics. Biogeography, climate, population genetics, evolution and natural selection, population growth and regulation, competition, niche, experimental ecology, phylogenetics in ecology, biodiversity and conservation. Prereq: General Biology and General Ecology. Students may not receive credit for both 499 and 599. (Same as Ecology and Evolutionary Biology 499.)

BUSINESS ADMINISTRATION (205)

100 Approaches to the College of Business Administration (1) Integration into the College of Business Administration with emphasis on academic advising, major exploration, career planning, University resources and services, and reinforcement of academic survival skills such as time management and study skills. Satisfactory/No Credit grading only.

101 Basic Business Applications (1) An online course with GTA consultation in which students learn operating systems basics, Lotus Notes GroupWare, and Microsoft Word, Excel, and PowerPoint. Exit testing is in the form of online performance tests in the applications on scheduled examination periods. Not available for credit if Management 203 or equivalent has been completed. Satisfactory/No Credit grading only.


320 Business Career Placement (1) Exploration of career opportunities in business. Process of making the career decision, preparing for and conducting a job campaign. Using the Placement Office. Satisfactory/No Credit grading only. Prereq: Satisfactory progression to upper-division level in Business or Liberal Arts Business.

331 CBM I: Supply Chain Management (2) Coordinating the end-to-end relationships between supply chain members, from inputs to delivery of product/services. Understanding impact of demand and supply information flows across the supply chain. Emphasis on integrating activities through improved processes and relationships to achieve and maintain competitive advantage. Prereq: Progression as a business major in the College of Business Administration and junior standing. Coreq: 332.

332 CBM I: Demand Management (2) Analysis of current and future markets opportunities. Translation of identified opportunities into strategies to select, acquire, and retain customers that are consistent with overall organizational objectives. Includes design, execution, and evaluation of strategies from the perspective of an organization within a channel of distribution context. Prereq: Progression as a business major in the College of Business Administration and junior standing. Coreq: 331.

341 CBM II: Lean Operations (2) Design of the product delivery system in manufacturing and service operations. The dynamics of the supply chain. Managing flows in manufacturing and service processes. Specific techniques for designing process design, such as pull replenishment, cellular layout, standard work, and mixed model sequencing. Prereq: Progression as a business major in the College of Business Administration and junior standing. Coreq: 342.

342 CBM II: Information Management (2) Emphasis on the concepts, structure, and components (input, processes, output, feedback and control) of information systems, and database design and management. Includes the role, function and integration of information systems and technology into business activities. Prereq: Progression as a business major in the College of Business Administration and junior standing. Coreq: 341.

351 CBM III: Business Management: The Marketplace (2) Integrative experiential learning experience to facilitate student learning of the interrelationships between the perspectives of supply chain management, demand management, operations management, and information management. Prereq: 331-332, 341-342. Must be admitted to a business major in the College of Business Administration and be of junior standing. Coreq: 352.

352 CBM III: Organizational Behavior (1) Behavioral processes in organizations; motivation, leadership, decision making, communication, behavioral consequences; group behavior, informal organizations, organizational structure, conflict, politics, change and development. Prereq: 331-332, 341-342. Must be admitted to a business major in the College of Business Administration and be of junior standing. Coreq: 351.

361 The Firm in a Global Context (3) Domestic and international factors that impact the decision-making process of the firm: domestic and international macroeconomics, regulation, trade policy, technological change, institutional and cultural systems. Emphasis on relationship between theoretical models and actual problems encountered in the conduct of business. Prereq: 201.


400 Special Topics (1-9) Topics of current interest in international business. Topics announced prior to offering. May be repeated for additional credit provided topic is different. Maximum of 9 hours. Prereq: 361.

467 Honors:: Corporate Executive in Residence Seminar (3) Interaction with top corporate executives from a wide spectrum of business disciplines. Domestic and international strategic planning as it is applied in major U.S. Corporations. Executive presentations and small group discussion on goods and services in consumer and industrial settings. Prereq: Senior standing, 332, 341, Finance 301, and consent of instructor.

491 Foreign Study (1-15) Prereq: Consent of instructor.

492 Off-Campus Study (1-15) Prereq: Consent of instructor. Satisfactory/No Credit grading only.

493 Independent Study (1-15) Prereq: Consent of instructor.

495 Seminar in International Business Policy (3) Capstone course for students in the Language and World Business Program designed to integrate concepts covered in other business courses. For students with major concentrations in International Business only.

BUSINESS LAW (216)

301 Legal Environment of Business (3) Survey of legal and ethical topics affecting business. Coverage includes legal and business ethics; dispute resolution mechanisms; and substantive and procedural law of regulation, torts, contracts, property, intellectual property, business associations, and employer/employee relations. Prereq: Junior standing. (Same as Legal Studies 301.)

401 Law of Business Organizations and Commercial Transactions (3) Introduction to legal implications of basic business transactions including contracts, property, negotiable instruments, secured transactions, bankruptcy, suretyship, insurance, and legal liability. Fundamentals of business law required for professional examination preparation (e.g. CPA exam). Major writing requirement. Prereq: 301.

CHEMICAL ENGINEERING

See Engineering Chemical.

CHEMISTRY (235)

100 Principles of Chemistry (4) Bonding and molecular structure, gas laws, liquid and solid state, solutions, colloids, acids and bases, oxidation and reduction, kinetics and equilibria. 3 hours and 1 lab. (NS)

110 Introduction to Organic and Biochemistry (4) Organic chemistry: alkanes, unsaturated and aromatic hydrocarbons, structures and reactions of various organic functional groups. Biochemistry: amino acids and proteins, carbohydrates, lipids, nucleic acids. 3 hours and 1 lab. Prereq: 100 or 130 or 138. (NS)

120-130 General Chemistry (4,4) A general course in theoretical and descriptive chemistry. 120 — Modern atomic theory, chemical bonding, stoichiometry, quantitative treatment of gas laws, quantitative aspects of solution chemistry, kinetics. 130 — Chemical equilibria, thermochemistry, descriptive chemistry of nonmetallic and metallic elements, electrochemistry, introduction to organic and biochemistry. 3 hours and 1 lab. Prereq for 130: 120 or 128. (NS)

128-138 Honors: General Chemistry (4,4) 3 hours and 1 lab. (NS)

150 Chemistry and Society (3) Food and agricultural chemistry; chemistry of life; chemistry in medicine; air and water pollution; energy and fuels. 3 hours lecture. Not a prerequisite for any other chemistry course.

160 Chemistry and the Home (3) Chemistry and the consumer; household products; chemistry in the kitchen and around the home. 3 hours lecture. Not a prerequisite for any other chemistry course.

200 Introduction to Chemical Research (1) Participation in an active research program in analytical, inorganic, organic, physical, or polymer chemistry. Students work with researchers to acquire expertise in planning experiments, interpreting results, and formulating hypotheses. Credits may not be applied toward a major or minor in chemistry. Not a substitute or prerequisite for 400. Prereq/Coreq: 200 or higher level course in chemistry and consent of instructor. May be repeated. Maximum 4 hours.
473-483 Physical Chemistry (3,3) Students may not receive credit for both 471 and 473 nor for both 481 and 483. 473—Properties of gases; first, second and third laws of thermodynamics; chemical equilibria; simple phase equilibria; properties of solutions. 483—Introduction to statistical thermodynamics; kinetics of chemical reactions; introduction to quantum mechanics and applications to electronic structure of atoms and molecules; molecular spectroscopy. Prereq: 130 or 138, Physics 136 or 138 or 222 or 231, and Mathematics 241 or 247.

479-489 Physical Chemistry Laboratory (2,2) Experiments on topics discussed in 471-481 or 473-483. I lab. Prereq/Coreq: Corresponding courses 471 or 473 for 479 and 481 or 483 for 489.

490 Introductory Polymer Chemistry (3) Fundamental principles stressing the role of chemistry in the interdisciplinary field of polymer science. Relation of molecular structure to bulk properties of polymers. Prereq: 360. Prereq/Coreq: 471 or 473.

CHILD AND FAMILY STUDIES (245)

101 Introduction to Child and Family Studies (2) Orientation to the Child and Family Studies Department, including requirements for the major, introduction to the faculty and their work, exposure to professional organizations, and learning about potential career possibilities. Includes observations.

102 Microcomputer Applications (3) (Same as Hotel, Restaurant, and Tourism 102; Nutrition 102; Retail and Consumer Sciences 102.)

105 Introduction to ECE: Seminar I (1) The seminar designed to introduce students to the field of early childhood education (ECE). Includes children’s development and behavior; integration of developmental characteristics into curriculum development; introductory experience with classroom observations; readings, observations, colloquy, and exposure to a broad spectrum of professionals in ECE.

106 Introduction to ECE: Seminar II (2) The second seminar designed to introduce students to the field of early childhood education (ECE). Includes history of ECE programs, practices, and policies; application of developmental theory to classroom methods; professional issues including ethics, career development, and building support networks; current ECE issues and research; impact of family, schools, and community on children’s learning; readings, observations, colloquy, and exposure to a broad spectrum of professionals in ECE. Prereq: completion of 105.

210 Human Development (3) Conception through adulthood in various social/ecological contexts; interrelationships among various aspects of development: physical, cognitive, emotional, social, normative, nonnormative development. SS


213 Development in Middle Childhood and Adolescence (3) Development during middle childhood and adolescence; interrelationships among cognitive, emotional, social, physical aspects of ontogeny, normative and nonnormative development. Includes observation. Prereq/Coreq: 215.

220 Marriage and Family: Roles and Relationships (3) Emerging, declining roles, changing relationships among family members across life cycle from various theoretical approaches; impact of gender roles on marital relationships, marital quality, power, decision-making, communications, conflict management, combining work-family roles. (Same as Women's Studies 230.) SS

240 Human Sexuality (3) Sexuality through cultural, social, familial, and psychological factors.

312 Families in Middle and Later Adulthood (3) Adult life in society from mid-life through elderly; adjustment to internal, environmental changes through adulthood; interrelationships among various aspects of development: physical, cognitive, emotional, social. Includes observation.

320 Family Interaction (3) Dynamics of family interactions and influences of diversity, including parent-child relations, development of parenting skills, and intrafamily verbal and nonverbal communication processes, patterns, and problems. Prereq: 101, 210, 220.

345 Family Resource Management (3) Theory and application of managerial functioning in family settings; analysis of goals, resource use, information systems, constraints within families. Observation and analysis of diverse family practices. Prereq: 220 or consent of instructor.

350 Early Childhood Education I: Environments for Children (4) Classroom management, behavior guidance, organization of day care environments, communication, interpersonal skills, interaction with children, child stress reduction and management in classroom. Laboratory participation included. Prereq: 110, 211, admission to the major or consent of instructor.
COURSES OF INSTRUCTION

351 Early Childhood Education II: Curricula and Program Development for Young Children (4) Planning effective early learning programs for young children relating knowledge of children’s growth and development to appropriate experiences in art, music, number, logic, media, physical knowledge; planning, implementing, evaluating curriculum activities. Laboratory participation included. Prereq: 350 and admission to the Child Development major or admission to the Early Childhood Education licensure program.

353 Reading, Language, and Literacy (3) Theory and methods for creating learning environments for the development of language, emergent literacy, and reading and writing skills from infancy through eight years. Prereq: 350 and admission to Early Childhood Education licensure program or consent of instructor.

360 Family Stress (3) Family’s response to stressful circumstances; skills for intervention into family systems; violence, abuse, divorce, illness, death. Prereq. 220 or consent of instructor.

395 Introduction to Research Methods and Statistics (3) Basic research methods and statistics for child/human development, family studies, early childhood education, and related fields; sampling, measurement, design, data analysis; quantitative and qualitative methods; natural and contrived settings; principles for understanding research that impact children and families. Prereq. 101, 210, 220.

405 Development of Professional Skills (3) Development of interpersonal and other professional skills along with ethical guidelines needed for working with children, families, and other professionals from diverse backgrounds. Prereq: must be taken after other Child and Family Studies core courses and before the Child and Family Studies internship course (470, 480, or 490).


440 Family Life and Parent Education (3) Emphasis on skills required to develop family life education programs implemented in community settings. Overview of current approaches to the process of parenting and parent education programs. Prereq: Family Studies majors only.

460 Directed Study in Child and Family Studies (1-3) Individual learning experience arranged for students under supervision of faculty. Prereq: 9 hours in Child and Family Studies and consent of instructor. May be repeated with different topics. Maximum 6 hours.

470 Practicum: Teaching (6-12) Responsibility for planning and guiding groups of infants, toddler, or preschoolers under supervision of classroom teacher and coordinator. Includes weekly seminar. Fall and Spring student teaching begins on first day of registration and ends on last day of final examination period (student teaching follows the CDL calendar and does not include Fall or Spring break). Summer student teaching begins the day following Spring commencement and ends on the day before Summer commencement. Prereq: 350, 351, completion of all progression requirements for the practicum. Satisfactory/No Credit grading only.

471 Practicum in Child Development (3-12) Supervised experiences working with children and families in early childhood settings. Prereq: Admission to the Child Development major or the Early Childhood Education licensure program and consent of the instructor. May be repeated. Maximum 12 hours. Satisfactory/No Credit grading only.

480 Practicum: Community Placement (9-12) Supervised experiences with an area agency serving the needs of children and families. Summer practicum placement begins the Monday after spring commencement and concludes the last day of the summer session. Prereq: Completion of all progression requirements for the practicum. Satisfactory/No Credit grading only.

481 Research in Child and Family Studies (3-6) Prereq: 9 hours in Child and Family Studies, completion of 395, cumulative GPA of 3.0 or above, junior standing.

485 Special Topics in Child and Family Studies (1-9) Personal or professional interest in human development or family studies. Prereq: 9 hours in Child and Family Studies, junior or senior standing, or consent of instructor. May be repeated. Maximum 5 hours.

490 Practicum: Research (12) A supervised research experience with emphasis on the identification and examination of key aspects of research methods: constructs, research questions and hypotheses, research design, measurement, and analysis. Prereq: completion of all progression requirements for the internship.

497 Honors: Child and Family Studies (3-6) Issues or topics affecting children and/or families, designed to meet particular interests of the student. Prereq: 15 hours in Child and Family Studies, overall GPA of 3.25 or greater, junior standing, or consent of instructor. May be repeated. Maximum of 6 hours.

CHINESE (249)

131-132 Elementary Chinese I, II (5,5) (Same as Asian Languages 131-132.)
231-232 Intermediate Chinese I, II (5,5) (Same as Asian Languages 231-232.) (CC)
311-312 Chinese Literature in English Translation (3,3) (Same as Asian Languages 311-312.)
331-332 Advanced Chinese I, II (4,4) (Same as Asian Languages 331-332.)
431 Readings in Chinese Literature (3) (Same as Asian Languages 431.)

CINEMA STUDIES (251)

235 Introduction to Cinematography as Art (3) (Same as Art Media Arts 225.)
236 Introduction to Video Art (3) (Same as Art Media Arts 236.)
281 Introduction to Film Studies (3) (Same as English 281.)
312 Popular Culture and American Politics (3) (Same as American Studies 312; Political Science 312.)
315 Asian Film (3) (Same as Asian Languages 315.)
316 Luso-Brazilian Cinema and Literature (3) (Same as Latin American Studies 316; Portuguese 316.)
323 German Film (3) (Same as German 323.)
325 Russian Film (3) (Same as Russian 325.)
334 Film and American Culture (3) (Same as American Studies 334; English 334.)
400 Special Topics (3) May be repeated. Maximum 6 hours.
420 French Cinema (3) (Same as French 420.)
421 Topics in Italian Literature and Cinema (3) (Same as Italian 421.)
433 Modern Art and Film (3) (Same as Art Media Arts 433.)
434 Hispanic Culture Through Film (3) (Same as Spanish 434.)
435 Cinematography as Art (3) (Same as Art Media Arts 435.)
436 Video as Art (3) (Same as Art Media Arts 436.)
465 Latin American Film and Culture (3) (Same as Latin American Studies 465; Spanish 465.)
469 Sexuality and Cinema (3) (Same as Women’s Studies 469.)
489 Special Topics in Film (3) (Same as English 489.)
491 Foreign Study (1-15)
492 Off-Campus Study (1-15)
493 Independent Study (1-15)

CIVIL ENGINEERING

See Engineering Civil.

CLASSICS (257)

111-112 Beginning Latin (3,3) Must be taken in sequence. Not available to students eligible for Latin 150.
121-122 Beginning Greek (3,3) Must be taken in sequence.

150 Latin Transition (3) This course is designed to prepare students for enrollment in Latin 251. Prereq: Two years of high school Latin and a score on the Latin placement exam below that required for admission to Latin 251. Since 150 is a review of elementary Latin, students who receive credit in this course may not also receive credit for any other 100-level Latin course and therefore also forfeit the six hours of elementary language credit awarded through placement examination.

201 Introduction to Classical Civilization (3) Introductory survey of civilization of ancient Greece and Rome. Includes aspects of history, literature, art and archaeology, philosophy and religion. Writing-emphasis course. (CC)

221 Early Greek Mythology (3) Archaic Greek religion through comprehensive study of Greek myths with emphasis on how they reflect the early Greek vision of the universe and humanity’s place in it. Origins and development of Greek myths and the rise of organized religion, from Bronze Age to about 450 B.C. Readings include Hesiod and Aeschylus. Writing-emphasis course.
222 Classical Greek and Roman Mythology (3) Use of myth in literature, history, religion and philosophy of Greece and Rome from about 450 B.C. to about 350 A.D. Two foci are the latter half of the fifth century B.C. and the last quarter of the first century B.C. Includes oriental intrusions into Greece and Rome, including early Christianity. Readings include Sophocles, Euripides, Roman poetry, and modern scholarship. Writing-emphasis course.

232 Archaelogical Art of Ancient Greece and Rome (3) Survey from the earliest human presence in the Mediterranean to the end of the Roman Empire (c. 200,000 B.C. — A. D. 476). For prehistoric times emphasis on material remains and anthropological theory used to recreate the cultures of the Minoans, Mycenaeans, Dark Age Greeks, and Etruscans. For the historical Greek and Roman periods emphasis on developments in architecture, sculpture, vase painting, wall painting, mosaics, and minor arts. Relationship of art to society. Writing-emphasis course. (AH)

251 Intermediate Latin: Grammar Review and Readings (3) Prereq: 112 or 150 or placement through the Latin placement examination. (CC)

252 Intermediate Latin: Vergil's Aeneid (3) Prereq: 251 or equivalent. (CC)

253 Greek and Roman Literature in English Translation (3) Major literature of ancient Greece from Homer to Tacitus. Writing-emphasis course. (AH)

261 Intermediate Greek: Grammar Review and Readings (3) Systematic review of Attic Greek and readings from selected authors. Prereq: 122. (CC)

264 Intermediate Readings in Greek (3) Content varies. Prereq: Classics 261. (CC)

273 Medical and Scientific Terminology (3) Greek and Latin roots from which medical and scientific terminology is derived. Extensive practice in analysis of terms. Practice in use of Latin nomenclature.

310 The Ancient World: Greece (3) Greek history from the end of the Dark Age to the beginning of the Punic Wars, with an emphasis on the 5th-4th centuries B.C.E. The evolution of the city-state; social tensions and the emergence of classical democracy; ideologies of militarism, empire, and civil strife; and the shifting hegemonies that led to the rise of Alexander the Great. Writing-emphasis course. (Same as History 310.)

311 The Ancient World: Rome (3) (Same as History 311.)

351 Cicero and Sallust (3) Prereq: 252 or equivalent.

352 Roman Lyric Poetry (3) Poetry of Catullus, Horace, and the elegists. Prereq: 252 or equivalent.

362 Roman Law (3) This course covers the historical development of Roman law in the Classical period (50 B.C.-250 A.D.) with particular attention to the analysis of case-law in the areas of contract, property, or delict. (Same as Legal Studies 362.)

381 Greek Civilization (3) Major aspects of ancient Greek civilization: religion, fine arts, political life, pan-Mediterranean relations, the prominence of Athens; the role of modern archaeology in interpretation; emphasis on the sixth and fifth centuries B.C. Writing-emphasis course.

382 Roman Civilization (3) Major aspects of ancient Roman civilization: political institutions, art and architecture, history, culture and daily life, emphasizing the late Republic and early Empire. Writing-emphasis course.

383 Women in the Greek and Roman World (3) The condition of women in the apparently male-dominated world of Classical Greece and Classical Rome. Evidence from literature, vase paintings, and other arts is examined from the age of Homer to the second century A.D. with emphasis on Athens in the fifth century B.C. and Roman Italy in the first and second centuries A.D. (Same as Women's Studies 383.)

401 Greek Poetry (3) Epic, lyric, drama. Authors vary. Prereq: 261.

402 Greek Prose (3) History, philosophy, and oratory. Authors vary. Prereq: 261.

405-406 Selected Readings from Greek Literature (3,3) For advanced students in Greek, the study of plays, the historical writings, the poetry of ancient Greece in the original Greek. Prereq: 401-402 or consent of instructor. May be repeated. Maximum 9 hours.

414 Cicero and Techniques of Latin Prose Composition (3) For advanced students in Latin. Practice in prose composition, the writings of Cicero the model. Prereq: 351-352 or consent of instructor.

431-432 Selected Readings from Latin Literature (3,3) For advanced students in Latin. Oratory, historical writings and poetry of ancient Rome, in the original Latin. May be repeated for credit. Maximum 9 hours. Prereq: 351-352 or consent of instructor.

435 Medieval Latin (3) Selected readings from the Latin prose and poetry of medieval Europe. Prereq: Consent of instructor.

436 Cities and Sanctuaries of the Greek and Roman World (3) Major cities and sanctuaries in Greece, the Greek colonies, and the Roman Empire. Approach is archaeological, focusing on physical evidence-landscape, architecture and artifacts—as well as description of ancient authors. Cities include various types: planned and unplanned, seaports, caravan centers, government and commercial centers. The sanctuaries also vary in function including prophetic centers, athletic centers, theater centers, and healing centers. Writing-emphasis course. (Same as Anthropology 436.)

441 Special Topics in Classical Civilization (3) Topics in art, literature, religion, and society of Greece and Rome. May be repeated up to three times with consent of department.

442 Intensive Survey of the Archaeology of the Prehistoric Aegean (3) Survey of archaeology and art of the Aegean from the earliest human to the rise of the Greek polis in the 8th century B.C. Highlights include Early Cycladic art, Minoan and Mycenaean complex societies, Thera, cultural interconnections with Egypt and the Near East, and the Trojan War. Emphasis on anthropological and modern art historical approaches. Writing-emphasis course. (Same as Anthropology 442.)

443 Intensive Survey of the Archaeology of Greece (3) Survey of the archaeology and art of Greece and the Greek-speaking areas from the Orientalizing through Hellenistic periods (c. 700 – 30 B.C.). Developments in architecture, sculpture, and vase painting seen in the context of changes in society. Archaeological evidence for daily life, economy, and political institutions. Writing-emphasis course. (Same as Anthropology 443.)

444 Intensive Survey of the Archaeology of Etruria and Rome (3) Survey of the archaeology of Italy and the Roman World from prehistoric times to the fall of the Roman Empire (1000 B.C. – A.D. 476). Highlights are the rise and decline of Etruscan culture, the development of Roman architecture, art, and urban planning, and architecture used for political propaganda, and Roman cosmopolitan culture during the Empire. Writing-emphasis course. (Same as Anthropology 444.)

491 Foreign Study (1-15)

492 Off-Campus Study (1-15)

493 Independent Study (1-15)

COLLEGE SCHOLARS HONORS (509)

317-318 College Scholars Seminar (1,1) Sequence (in any order) limited to and required of all College Scholars each year. May be repeated. Maximum 8 hours. Satisfactory/No Credit grading only.

491 College Honors: Foreign Study (1-15) Limited to College Scholar students.

492 College Honors: Off-Campus Study (1-15) Limited to College Scholar students.

493 College Honors: Independent Study (1-15) Limited to College Scholar students.

498 Honors: College Scholars Studies (2-12) Designed for College Scholars working on their senior thesis, project, or performance. May be repeated. Maximum 16 hours.

COMMUNICATION AND INFORMATION (248)

150 Communication in an Information Age (3) Overview of human, mass, and mediated communication. Introduction to finding, organizing, and evaluating information. Open to students interested in majoring or minoring in the College of Communication and Information.

COMMUNICATION STUDIES (250)

201 Introduction to Communication Studies (3) Fundamental theories and practices with particular reference to intrapersonal, group, organizational, and public communication.

210 Public Speaking (3) Preparation and delivery of informative and persuasive speeches. Topics include research, organization, adapting to an audience, topic selection, reasoning, and evaluating the discourse of others. (OC)

220 Interpersonal Communication (3) Process by which thoughts, feelings, and actions affect and are affected by the face-to-face communication situation.

240 Business and Professional Communication (3) Basic principles of communication within organizations. Topics and activities may include organizational/communication theory, group problem solving, case studies, interviewing, and formal presentations. (OC)
250 Advanced Public Speaking (3) Theory and practice of informative and persuasive speaking. Prereq: 210 or 240.

260 Communication and Society (3) Study of communication strategies and public opinion, with emphasis on communication media: posters, film, songs, demonstrations, drama, and public address.

270 Argumentation and Debate (3) Reasoned decision-making with emphasis on analysis, evidence, reasoning, constructing and refuting arguments.

271-272 Intercollegiate Forensics (1,1) For students actively participating in intercollegiate debate. May be repeated. Maximum 4 hours. Consent of instructor required.

300 Nonverbal Communication (3) Exploration of nonverbal communication from human communication perspective, origins and research, usage and coding of nonverbal behavior, research strategies, and theoretical approaches.

310 Persuasion (3) Methods which contribute to effective and ineffective persuasion. Topics include credibility, message construction, and receiver variables.

320 Interpersonal Communication Processes (3) Social dimensions of interpersonal communication and relationships. (Same as Sociology 320.)

330 Group Communication (3) Small group decision-making; evidence, argumentation, leadership, roles, and norms as they affect critical thinking in groups.


350 Communication Theory (3) Survey of social science approach to theorizing about communication. Prereq: 201.

371-372 Intercollegiate Forensics (1,1) For students actively participating in intercollegiate debate. May be repeated. Maximum 4 hours. Consent of instructor required.

397 Honors Seminar (1) Required of students enrolled in the honors program; admission with consent of department.

400 Topics in Communication Studies (3) Variable content course affording opportunity to offer subject matter not covered in an existing course. Topics, scope of subject matter, and prerequisites to be determined by department. May be repeated. Maximum 6 hours. Major credit limited to 3 hours.

407 Honors Seminar (3) In-depth survey of communication research topics. Topics rotate among health, interpersonal, organizational and team, and public communication. Open only to students currently enrolled in the honors program. May be repeated. Maximum 12 hours.

420 Communication and Conflict (3) Communication as a significant factor in the development, management, and resolution of conflict at the interpersonal, small group, organizational, or societal levels.

425 Interpersonal Health Communication (3) Interpersonal communication in healthcare settings. Topics include provider-client interactions, social support groups, stigma and disease, and contemporary models explaining the use of health-related information.

430 Family Communication (3) Dynamics of interactions within family systems, marriage, and parent-child relationships. Study of verbal and nonverbal communication processes, patterns, and problems.

440 Organizational Communication (3) Organizational setting and those variables of the communication process that affect the quality of human interaction both within and outside the organization.

445 Internship (1-3) Supervised career-related experiences using Communication Studies theories and techniques in government and for profit or nonprofit organizations, culminating in a written and oral report. Reserved for junior/senior level majors with at least a 3.0 GPA, or by special permission of Internship Director. May be repeated. Maximum 6 hours. Satisfactory/No Credit grading only.

450 Propaganda (3) Study of political, commercial, and social propaganda in United States, World War I to present. Writing-emphasis course.

455 Political Persuasion (3) Study of the communication processes utilized by political candidates, office holders, and social movement organizers.

466 Rhetoric of the Women’s Rights Movement to 1930 (3) Historical and critical study of public address in the campaign for women’s rights in the United States from the 1830s to the 1920s. Writing-emphasis course. (Same as Women’s Studies 466.)

469 Freedom of Speech (3) Historical and philosophical perspectives on freedom of expression; legal issues in free speech controversies in the U.S. Writing-emphasis course. (Same as American Studies 469; Legal Studies 469.)

476 Rhetoric of the Contemporary Feminist Movement (3) Historical and critical study of Rhetoric in the campaign for women’s rights in the United States from the 1940s to present. Writing-emphasis course. (Same as Women’s Studies 476.)

491 Foreign Study (1-15) See description of major concentration. Prereq: Junior/senior standing with at least a 3.0 GPA; consent of supervising faculty member and department prior to registration (see department for proposal deadline). May be repeated. Maximum 15 hours.

492 Off-Campus Study (1-15) See description of major concentration. Prereq: Junior/senior standing with at least a 3.0 GPA; consent of supervising faculty member and department prior to registration (see department for proposal deadlines). May be repeated. Maximum 15 hours.

493 Independent Study (1-15) See description of major concentration. Selected readings/research in an area of speech communication to be determined by the student in consultation with supervising faculty member and, ordinarily, in area of study not covered by departmental curriculum. Application forms available in department office. Prereq: Junior/senior standing with at least a 3.0 GPA; consent of supervising faculty member and department prior to registration (see department for proposal deadlines). May be repeated. Maximum 15 hours.

497-498 Senior Honors Thesis (3,3) Required of students enrolled in the honors program; admission with the consent of the department.

499 Proseminar in Communication Studies (3) Major theoretical perspectives in Communication Studies, their interrelationships and applications; consideration of the significance and ethical implications of speech communication in modern society. The course will cover two or more areas of the discipline. Prereq: Senior standing, completion of 100, 340, 350, and at least 12 hours of major requirements in communication. Writing-emphasis course.

COMPARATIVE LITERATURE (260)

202-203 Cross-Cultural Perspectives in World Literature (3,3) Literary perspectives and values in different time periods and cultures approached from an international context and including an introduction to the theory, methods, and objectives of comparative literature. Variable content. Writing-emphasis course.

401-402 Special Topics in Comparative Literature (3,3) Content varies. May be repeated. Maximum 9 hours.

452 Modern Drama, 1880-1945 (3) (Same as English 452.)

454 Twentieth-Century International Novel (3) (Same as English 454.)

491 Foreign Study (1-15)

492 Off-Campus Study (1-15)

493 Independent Study (1-15)

COMPARATIVE AND EXPERIMENTAL MEDICINE (262)

411 Undergraduate Research Participation (1-3) Experience in active biomedical research projects under supervision of faculty. Students in pre-medicine and other biology majors may conduct research projects within designated areas. Prereq: Junior or senior standing; prior consent of faculty member. May be repeated with consent. Maximum 9 hours. Satisfactory/No Credit grading only.

COMPUTER ENGINEERING

See Engineering Electrical and Computer.

COMPUTER SCIENCE (266)

100 Introduction to Computers and Computing (3) Basic concepts of computer hardware and software. Microcomputer systems and workstations. Networking and the Internet. The interdisciplinary science of computing. Does not satisfy any requirements for Computer Science major or minor. 2-hour lab required. (QR)

102 Introduction to Computer Science (4) Problem solving and algorithm development. Organizing and characterizing codes of modern digital computers with emphasis on developing good programming habits, building abstractions with procedures and data, and programming in a modern computer language. Students who have received credit for 140 or 160 may not also receive credit for 102 without consent of instructor. (QR)

140 Data Structures (4) Advanced problem solving and algorithm development, structured programming, data structures and applications, I/O techniques, lists, queues, trees, algorithms, files. Prereq: 102. 3 hour lab required.
160 Computer Organization (4) Number systems, Boolean algebra, combinational and sequential circuits, registers, processor functional units and control, pipelining, memory and caching, stored program computing, memory management, computer system organization, assembly language programming. 3 hour lab required. Prereq: 102.

291 Lower-Division Special Topics (1-3) Topics vary. Programming languages, operating systems and application software packages. May be repeated. Maximum 9 hours.

300 Scripts and Utilities (1) Practical tools available under Unix to enable students to become more efficient in performing lab and research projects. Topics to be covered include: sh, cat/grep/find/sort/at/ed/sed, awk, perl, python, make, rcs, jgraph, gcc/cpp/purify/quantify. Prereq: 140 or consent of instructor. Satisfactory/No Credit grading only.

302 Fundamental Algorithms (3) Design, analysis, and implementation of fundamental algorithms, such as sorting and searching, and their data structures. 3 hour lab required. Prereq: 140 and 160.


340 Foundations of Software Engineering (3) Principles of analysis and design of information systems. Principles of program design and verification, formal objects, formal specifications. 3 hour lab required. Prereq: 140, 160, 311.

360 Systems Programming (3) Introduction to user-level systems programming: file control, process control, memory management, system utilities, network programming. 3 hour lab required. Prereq: 302.

365 Programming Languages and Systems (3) Language paradigms (procedural, functional, object-oriented, logic), language design and implementation issues and language issues related to parallelism. Prereq: 302 and progression into the Computer Science major.

370 Introduction to Scientific Computing (3) The design, analysis, and implementation of numerical algorithms for solving problems in science and engineering. Emphasis on program design, including data structures, computational complexity, scientific computing environments, and high-performance software packages. 3 hour lab required. Prereq: 140, 160; Mathematics 241 and 251.


420 Advanced Topics in Machine Intelligence (3) Topics such as search, learning, expert systems, neural networks, pattern recognition and natural language processing. Emphasis on faculty research. Prereq: Completion of core curriculum or consent of instructor. May be repeated. Maximum 9 hours.

430 Advanced Topics in Hardware Systems (3) Topics such as architecture, parallel processors, microprogramming, networks and communications. Emphasis on faculty research. Prereq: Completion of core curriculum or consent of instructor. May be repeated. Maximum 9 hours.

460 Advanced Topics in Software Systems (3) Topics such as operating systems, compilers, parallel computation, software engineering, database systems and programming languages. Emphasis on faculty research. Prereq: Completion of core curriculum or consent of instructor. May be repeated. Maximum 9 hours.

470 Advanced Topics in Scientific Computation (3) Topics such as numerical methods, supercomputers and computer modeling and simulation of physical systems. Emphasis on faculty research. Prereq: Completion of core curriculum or consent of instructor. May be repeated. Maximum 9 hours.

471 Numerical Analysis (3) (Same as Mathematics 471.)

472 Numerical Algebra (3) (Same as Mathematics 472.)

480 Advanced Topics in Theoretical Computer Science (3) Topics such as theory of computation, complexity theory, formal languages and graph theory and its applications. Emphasis on faculty research. Prereq: Completion of core curriculum or consent of instructor. May be repeated. Maximum 9 hours.

493 Independent Study (1-15) Special project in area of student's primary interest. Directed by Computer Science faculty, perhaps jointly with student's faculty advisor. Intended for students with a specific project to pursue in conjunction with a faculty member. Project may be from a department other than Computer Science in which case a faculty member from the appropriate department will help oversee the project. Prereq: Consent of instructor. May be repeated. Maximum of 6 hours may be applied to the major.

494 Special Topics in Computer Science (1-3) May be repeated. Maximum 9 hours.

COUNSELOR EDUCATION (255)

205 Student Development (1-3) Practice in acquiring knowledge and skill in areas such as interpersonal relations, career decision-making, communication and self-awareness. Individual and small-group format. May be repeated. Maximum 6 hours. Satisfactory/No Credit grading only.

206 Facilitation of Technical Work Teams (3) Psychological and cultural dynamics of technical work team performance. Supervised experience in leading work teams. For engineering students sophomore level and above. Letter grade only.

212 Career and Personal Development (3) Systematic approaches to facilitating career development and life planning.

215 Learning Skills and Study Systems (3) Approaches to enhancing academic performance through study skills, efficient reading and understanding of personal factors.


380 Interviewing and Counseling Techniques (3) An introduction to basic helping skills necessary to the preparation of counselors, teachers, and others involved in human service delivery.

404 Special Topics (1-3) Instructor initiated course offered at convenience of the department on various topics of current interest. Contact department for listing of topics to be covered. May be repeated. Maximum 15 hours.


410 Sex Role Development: Implications for Education and Counseling (3) Theories and research concerning the development of sexual role and its relevance in educational and counseling settings. (Same as Women's Studies 410.)

431 Personality and Mental Health (3) Perspectives of mental health with applications to education and other social institutions. (Same as Educational Psychology 431.)

493 Independent Study (1-5) Independent investigation of problems in educational and counseling psychology. May be repeated. Maximum 15 hours.

CULTURAL STUDIES IN EDUCATION (271)

400 Professional Studies: Teachers, School, and Society (2) Focus on roles and responsibilities of teachers, on how schools are organized and the relationship between the schools and the broader society. Prereq/Coreq: Educational Psychology 210; Prereq: Admission to Teacher Education.

DANCE (274)

101 Practicum: Dance Production (1) Supervised technical and promotional production aspects of university dance company. May be repeated. Maximum 2 hours.

201 Practicum: Dance Performance (1-2) Preparation and presentation of university dance company performances. Participation through audition only. May be repeated. Maximum 16 hours.

210 Ballet: Level I (2) Instruction and practice in elementary classical ballet techniques. May be repeated. Maximum 4 hours.

220 Jazz: Level I (2) Instruction and practice in elementary jazz dance styles and techniques. May be repeated. Maximum 4 hours.

230 Modern: Level I (2) Instruction and practice in elementary modern dance techniques. May be repeated. Maximum 4 hours.

240 Tap: Level I (2) Instruction and practice in elementary tap dance techniques.

310 Ballet: Level II (2) Instruction and practice in intermediate classical ballet techniques. Available to minors or with consent of instructor. May be repeated. Maximum 12 hours.

320 Jazz: Level II (2) Instruction and practice in intermediate jazz dance styles and techniques. Available to minors or with consent of instructor. May be repeated. Maximum 12 hours.
330 Modern: Level II (2) Instruction and practice in intermediate modern dance styles and techniques. Available to minors or with consent of instructor. May be repeated. Maximum 12 hours.

340 Tap: Level II (2) Instruction and practice in intermediate tap dance techniques. Prereq: 240 or consent of instructor.

380 Special Topics (1-3) Selected disciplinary or professional areas of dance. May be repeated.

410 Ballet: Level III (2) Instruction and practice in advanced classical ballet techniques. Available to minors or with consent of instructor. May be repeated. Maximum 16 hours.

415 Teaching Creative Dance for Children (2) Theory, methods, materials and practical experience in the presentation and integration or creative dance in grades K-6. A mini-teaching experience is involved in this class.

420 Jazz: Level III (2) Instruction and practice in advanced jazz and musical theater dance styles and techniques. Available to minors or with consent of instructor. May be repeated. Maximum 16 hours.

430 Modern: Level III (2) Instruction and practice in advanced modern dance techniques. Available to minors or with consent of instructor. May be repeated. Maximum 16 hours.

440 Composition I (2) Choreographic skills emphasizing the basic techniques and concepts of dance composition. This course focuses on the choreography of solos and duets. Prereq: 4 hours credit in upper level modern dance technique (330 or 430) or approval of instructor.

445 Composition II (2) Choreographic skills emphasizing the advanced techniques and concepts of dance composition. This course will focus on the choreography of group works and the technical aspects of production. Prereq: 440 or approval of instructor.

480 Dance History through the 19th Century (3) Survey of the dance of various societies and cultures from prehistory through the nineteenth century. Senior standing or graduate status required for graduate credit. Different level of performance is expected of those registered for graduate credit.

490 Dance in the 20th Century (3) Survey of history and philosophy of dance in the 20th century. Senior standing or graduate status required for graduate credit. Different level of performance is expected of those registered for graduate credit.

493 Directed Independent Studies (1-3) Independent study in a specialized area with dance. Prereq: Consent of instructor. May be repeated. Maximum 9 hours.

495 Dance Pedagogy (3) Principles and methods of the teaching of dance with practical application in a mini-teaching experience. Prereq: Upperclass or graduate standing and approval of instructor. Senior standing or graduate status required for graduate credit. Different level of performance is expected of those registered for graduate credit.

ECOLOGY AND EVOLUTIONARY BIOLOGY (278)

202-203 Ecology and Evolutionary Biology Colloquium (1.1) Weekly discussions of current topics in ecology, behavior, and evolutionary biology including undergraduate research and career opportunities, for declared and potential departmental majors. Course familiarizes students with the contemporary research and with its applications and introduces them to departmental faculty and resources. Prereq: Biology 101-102 or equivalent. Satisfactory/No Credit grading only.

240 Human Anatomy (4) Gross and Microanatomy of the human. Credit may not be applied to Ecology and Evolutionary Biology major. 3 hours lecture, 3 hours lab. Prereq: Biology 101 or 102 or 130 or 140 or equivalent introductory biology course.

305 Evolution and Society (3) Issues and controversies surrounding the teaching and learning of evolution in America today. May not be applied to Ecology and Evolutionary Biology major. Prereq: General Biology or Anthropology 110 or consent of instructor. Writing-emphasis course. (Same as Anthropology 305.)

350 Comparative Vertebrate Biology (4) Origins, phylogeny, diversity and functional anatomy of vertebrates. Laboratory involves dissection of shark, cat, and selected other vertebrates. 2 hours and 2 labs.

360 Comparative Invertebrate Biology (4) Origins, phylogeny and functional anatomy of invertebrates with emphasis on diversity of life forms and adaptations to specific local environments. 2 hours and 2 labs.

370 Ethology and Sociobiology (3) Basic concepts in the evolutionary approach to behavior, including applications to psychology, the social sciences, and the humanities. (Same as Psychology 370.)

380 General Entomology (3) Introduction to insects: basic structure, physiology, behavior, evolution and classification of insect orders. 2 hours and 1 lab.

400 Undergraduate Research (1-2) Research projects under supervision of faculty. Prereq: prior consent of instructor. May be repeated for a maximum of 8 hours, but a maximum of 4 hours may be applied toward the Biology major.

402 Practicum in Ecology and Evolutionary Biology (2) Participation in individualized practical applications of ecology, behavior, and evolutionary biology in community, government, and industry. Prereq: Biology 140, 240, 250 and prior consent of instructor.

407 Senior Honors Thesis (3) Written preparation and oral presentation of faculty-supervised student research. Prereq: Admission to Honors program in Ecology and Evolutionary Biology and 400 or equivalent.

409 Perspectives in Ecology and Evolutionary Biology (3) Forefront considerations of ecology, behavior, and evolutionary biology. Emphasis on current developments for applications, including societal and economic impacts and moral and ethical implications. Writing-emphasis course. An oral presentation and a referenced library-research essay are required.

411-412 Minicourse in Ecology and Evolutionary Biology (2) Selected advanced topics in ecology, behavior, and evolutionary biology, concentrated in time and subject matter. Consult departmental listing for topics offered. Prereq: As announced. May be repeated for credit, but a maximum of 4 hours may be applied toward the departmental major.

419 Science as Method (3) The dynamic process of scientific discovery, as opposed to a static body of knowledge. Topics included will be comparisons of science, non-science, and pseudoscience, successful and unsuccessful science, the nature and scientific research, and the philosophical aspects of the scientific enterprise. Implications for teaching and writing about science will be covered. Prereq: An introductory science or philosophy course, or consent of instructor. (Same as Botany 419; Philosophy 419.)

421 Community Ecology (3) Interactions between individuals, species, communities and environments, including competition, coexistence, predation, herbivory, causes and consequences of biological diversity, biological invasions; application of advanced sampling and analysis techniques; local to global environmental change. Periodic field trips or laboratories. Prereq: Biology 250 or equivalent.

431 Plant Ecology (4) (Same as Botany 431.)

446 Introduction to Oceanography (4) Basic oceanography, including physical, chemical, geological and biological processes and patterns. Emphasis on oceanic subsystems such as upwellings, polar oceans, hydrothermal vents, gyres, coral reefs, estuaries, and coastal regions. Field trip to coast required. Prereq: General Biology and Chemistry 120, 130; Biology 250 recommended.

450 Comparative Animal Behavior (3) Principles and methods of ethology with emphasis on ecological, developmental, physiological and evolutionary aspects. (Same as Psychology 450.)

459 Comparative Animal Behavior Laboratory (3) Introduction to observational and experimental research in ethology. Coreq: 450. (Same as Psychology 459.)

460 Evolution (4) Principles, facts, and theories regarding biological evolution. Concepts, processes and product in development of organic diversity. Historical development of ideas concerning biological evolution. 3 hours lecture and 2 hours lab/discussion. Prereq: Biology 240 or consent of instructor.

461 Special Topics in Organismal Biology (3) Evolution, ecology, biogeography, classification, and anatomy of selected animal and plant taxa. Prereq: Biology 250 or consent of instructor. May be repeated if topic differs. Maximum 12 hours.

470 Aquatic Ecology (3) Introduction to the physio-chemical nature of inland waters with description of biotic communities and their interrelationships. 2 hours and 1 lab. Prereq: Chemistry 120-130 and Biology 250.

474 Ichthyology (4) Evolution, classification, collection and identification, distribution and biology of fishes with emphasis on freshwater fauna of Eastern North America. 2 hours and 2 labs. Prereq: Biology 250 or consent of instructor.

475 Field Ornithology (2) Intensive one week field course intended to introduce students to the behavior, ecology, and field identification of birds. Prereq: Biology 250 and consent of instructor.

484 Conservation Biology (3) Application of principles and techniques of ecological research to conservation of biological diversity at genetic, population, community, and ecosystem levels. Prereq: Biology 240, 250.

490 Undergraduate Seminar (1) Student oral presentations of topics related to developmental and working concepts of ecology and evolution. All majors are encouraged to enroll. May be repeated. Maximum 2 hours. Coreq: Upper-division standing in the Biology major.

493 Independent Study (1-15) Independent study under the direction of a faculty member. Consent of instructor required. May be repeated up to 15 hours. A maximum of 3 hours may be applied to major.

499 Evolutionary Ecology (3) (Same as Botany 499.)
ECONOMICS (283)

201 Introductory Economics: A Survey Course (4) Theory of consumer behavior, theory of firms, supply and demand, costs of production, market models, national income and employment theory, money and banking, monetary and fiscal policy, debt, and international economics. (SS)

207 Honors: Introductory Economics (4) Honors course for students of superior ability and interest. Students accepted on the basis of their records. (SS)

311 Intermediate Microeconomics (3) Theories of consumer behavior, of production and costs, of price and behavior of firms in perfectly competitive, monopolistic and imperfectly competitive markets, input prices, income distribution, welfare and general equilibrium. Prereq: 201.


321 International Economics (3) Balance of payments, exchange rate determination, monetary and fiscal policies, monetary arrangements, comparative advantage, tariff and nontariff trade distortions, protection arguments, regional integration. Prereq: 201. Students may not receive credit for both 321 and 329.

323 Economic Development (Third World) (3) Overview of the international economic issues facing developing countries and other emerging markets. Cases of growth and policies used to promote economic improvement. Prereq: 201 or permission of instructor. Writing-emphasis course.

329 International Economics for Business (3) For business majors in international business collateral or dual concentration only. Statement of international transactions, exchange rate determination, risk management strategies, currency crises, monetary arrangements, comparative advantage, tariff and non-tariff trade distortions, trade policies, protectionist arguments, regional integration. Prereq: Business Administration 361; students may not receive credit for both Economics 321 and 329.

331 Government and Business (3) Antitrust and regulatory economics, problems in regulation and social control of business organization, oligopoly models. Prereq: 201.

341 Survey of Labor Economics (3) Extension of economic principles to labor markets, public policy questions, demand and supply, theory of wage differentials, unemployment, unions in the private sector, investment in individuals, education and training, mobility. Prereq: 201.


361 Regional and Urban Economics (3) Overview of regional differences. Theory of industrial and agricultural location and human migration, economic basis for land use patterns, central places, and urban form, regional and urban structure, growth, and methods of analysis, examination of urban problems. Prereq: 201.

381 Information Management for Economists (3) Introductory probability, statistics, and econometrics from an economic perspective, with emphasis on skills related to gathering, managing, processing, presenting, and interpreting economic data. Includes the use of statistical software in hands-on research projects. Considers common econometric problems such as multicollinearity, heteroscedasticity, and autocorrelation. Prereq: 201. Statistics 201.

400 Special Topics (3) Topics vary. Prerequisites determined by department each time course is offered. Numerical grade is given to law students. Prereq: 201. May be repeated when topic varies. Minimum 9 hours.

413 Macroeconomic Fluctuations (3) Analysis of historical data, methods of analyzing macroeconomic fluctuations, theoretical explanations of cycles, and the role of monetary and fiscal policies in the aggregate economy. Prereq: 313 or consent of instructor. Writing-emphasis course.


436 Economics of Health and Health Care (3) Medical care and health status; demand for medical care and insurance; physician and hospital supplies; government provision of services and insurance; regulation of health care markets. Writing-emphasis course.

462 Economics of Resources and Environmental Policy (3) Economic analysis of environmental policy and allocation of resources. Benefits and costs of development of natural resources and impacts of growth on environment. Prereq: 201. Writing-emphasis course.

471 Public Finance: Optimal Government Functions and Expenditure Analysis (3) Problems of collective consumption, external effects, public investment, social decision making. Prereq: 201. Writing-emphasis course.

472 Public Finance: Taxation and Intergovernmental Relations (3) Individual taxes and tax system, non-tax sources of revenue, fiscal federalism. Prereq: 201. Writing-emphasis course.

482 Introduction to Mathematics Economics (3) Application of basic mathematical tools (e.g., calculus, matrix algebra, etc.) to major topics of economic theory. Prereq: Economics 311 with a grade of B or better, Mathematics 141-142 or 147-148.

492 Economics Off-Campus Study (1-6) Prereq: Consent of instructor. Satisfactory/No Credit grading only.

493 Independent Study (1-3) Opportunity for qualified students to pursue topics of special interest. Prereq: Senior standing, 3.0 GPA in economics courses, and consent of instructor. Maximum total credit 3 hours.

499 Analysis of Economic Problems (3) Study of the effects of economics on modern society and the practice of economics from a value-oriented perspective. Students will integrate learning from all fields of economics and other disciplines where appropriate, and work as teams to prepare economic analyses of selected economic problems facing modern society. Prereq: Senior standing and completion of 311, 313 and six other hours of upper-division Economics courses. Writing-emphasis course.

EDUCATION (289)

100 Special Topics (1-3) Study in selected disciplinary or professional areas represented in the College of Education. Topics to be determined as needs/issues are identified and as resources are available to support the course. May be repeated. Maximum 3 hours.

EDUCATION OF THE DEAF AND HARD OF HEARING (285)

410 Practicum With Deaf/Hard of Hearing (3) Supervised practicum with hearing impaired students in preschool, public school, and/or residential school setting.

415 Language Development of Deaf/Hard of Hearing I (3) Language problems of hearing impaired contrasted with scope and sequence of normal language development. Formal linguistic systems used to describe language development problems.


419 Speech Development of Deaf/Hard of Hearing (4) Theories of speech development, approaches in training perception and production of speech, and aural habilitation, Practicum experiences.

424 Nature of Hearing Impairments (3) Anatomy and physiology of hearing; nature and causes of hearing loss; methods and instrumentation for assessment of hearing level; interpretation of audiologic services to medical and other rehabilitative disciplines.

425 Introduction to the Psychology and Education of the Deaf/Hard of Hearing (3) Primarily for those planning to teach the hearing impaired. Research related to psychology, social adjustment, communication methodology, language development and education of the hearing impaired. Survey of literature. Visits to programs.

EDUCATIONAL ADMINISTRATION AND POLICY STUDIES (288)

200 Student Leadership Development (3) Designed to enhance the knowledge and skill of emerging student leaders and includes theoretical and experiential content related to leadership role, skill, and effectiveness. Satisfactory/No Credit grading only.

455 Seminar in Student Leadership (1) Topics to be assigned. To develop knowledge and skills in leadership roles for resident assistants, student government leaders, student activities, and other student organizations. May be repeated. Satisfactory/No Credit or letter grade.

EDUCATIONAL INTERPRETING (287)

223 American Sign Language I (3) Expressive and receptive skill development in sign communication. Video text and interactive teaching method used. Class conducted totally in sign. This course is a prerequisite for 226.
226 American Sign Language II (3) Expressive and receptive skill development in sign communication. Video text and interactive teaching method used. Class conducted totally in sign. Must be taken in sequence. Prereq: 223.

335 Interpreting Techniques (3) Introduces students to linguistic techniques to enhance interpreting performance. Introduction of translation techniques that form the basis for interpreting. Students will practice intralingual technique designs to improve English and ASL skills.


345 Interpreting in Educational Settings (4) Covers issues related to working with deaf and hard of hearing children in mainstream programs. Examines interpreter roles and responsibilities within the classroom setting. Practicum experiences.

350 Voice to Sign Interpretation (3) Interpreting from English to sign language in a variety of physical settings (one-to-one, classroom, assemblies) for students of all ages with varying communication styles; adjusting interpretation to accommodate different student needs. Cross-cultural communication issues interpreting in a manner appropriate to the context; techniques for reducing visual fatigue and overload.

355 Sign to Voice Interpretation (3) Interpreting from sign language to English in a variety of physical settings (one-to-one, classroom, assemblies) for students of all ages with varying communication styles. Selecting appropriate to the context. Attention is also given to cross-cultural communication issues.

431-432 American Sign Language III and IV (3,3) Sequence stresses fluency of expressive and receptive sign communication skills. Using language in context is emphasized. Grammatical structures of ASL and cultural implications of the deaf community. Must be taken in sequence. Prereq for 431: 226 or consent of instructor. Prereq for 432: 431 or consent of instructor.

435 Linguistics of American Sign Language (3) Introduction to grammatical and linguistic structures of ASL. Language variations, discourse, bilingualism and language contact also covered. Conducted in ASL. Prereq: 431 or consent of instructor.

440 Educational Interpreting Field Work (6) Practical field experience within approved and supervised mainstream settings. Develop specific interpreting skills. Provides a direct service experience in a supportive learning environment. For majors only. Prereq: progression to the major. Satisfactory/No Credit grading only.

EDUCATIONAL PSYCHOLOGY (310)

210 Psychoeducational Issues in Human Development (3) Understanding and application of the psychology of human development to teaching/learning process in educational settings. Primarily for students entering teaching or Human Services.

215 Learning Skills and Study Systems (3) Approaches to enhancing academic performance through study skills, efficient reading and understanding of personal factors.

401 Professional Studies: Applied Educational Psychology (2) Application of concepts, principles, techniques and models from Educational Psychology to facilitate student learning and creation of effective classroom environments. Prereq: Admission to Teacher Education.

404 Special Topics (1-3) Instructor initiated course offered at convenience of the department on various topics of current interest. Contact department for listing of topics to be covered. May be repeated. Maximum 15 hours.

431 Personality and Mental Health (3) Same as Counselor Education 431.)

432 The Disadvantaged Student: Psychosocial Perspectives (3) Theory and research regarding etiology, psychosocial behavior and appropriate interventions.

460 Self-Management in the Helping Professions (3) Applications of self-management strategies to career, social, emotional and health domains for both helping professionals and their clientele. Prereq: Introductory course in psychology or permission of instructor.

493 Independent Study (1-15) Independent investigation of problems in educational and counseling psychology. May be repeated. Maximum 15 hours.

ELECTRICAL AND COMPUTER ENGINEERING
See Engineering Electrical and Computer.

ELECTRONIC MEDIA
See Journalism and Electronic Media.

ELEMENTARY EDUCATION (322)

325 Teaching Science and Social Studies in Elementary and Middle Schools (3) Methods and materials for teaching science and social studies in elementary and middle schools. Teaching approaches common to both fields including inquiry, multisensory activities and group approaches. For Bachelor of Science Education students. Prereq: Admission to Teacher Education Program.

326 Teaching Language Arts/Reading in Elementary and Middle Schools (3) Language development as applied to teaching oral (listening-speaking) and certain aspects of literacy (reading process/readiness and writing). Includes methods and materials. For Bachelor of Science Education students only. Prereq: Admission to Teacher Education Program.

351 Laboratory and Field Studies in Elementary Education (1-2) Simulated and actual experiences in which students apply concepts and skills from professional methods courses in a variety of school settings and levels. Prereq: Admission to Teacher Education Program. Coreq: 422. May be repeated. Maximum 3 hours. Satisfactory/No Credit grading only.

356 Elementary and Middle School Teaching Laboratory Experience (1) Micro-teaching experiences to develop planning skills and give feedback to students relative to their ability to apply learning to school settings. Prereq: Admission to Teacher Education Program. Coreq: 422.

421 Elementary and Middle School Science and Social Studies Instruction (3) Methods and materials for teaching science and social studies. Development of functional relationships and individual entities of the two fields. Not open to students with recent course or background in The Teaching of Elementary School Science and/or Social Studies. Prereq: Admission to Teacher Education Program.

422 Elementary and Middle School Teaching Methods I (6) Methods and materials for teaching elementary and middle school reading, language arts, science, social studies and mathematics. Emphasis on planning, implementation and evaluation of integrative teaching experiences. Prereq: Admission to Teacher Education Program; must be taken prior to Professional Year Internship.

424 Studies in Elementary Education (1-3) Variable topics on teaching in Early Elementary (K-3), Middle Elementary (4-8); and Skills (K-8). Prereq: Admission to Teacher Education Program and permission of instructor. May be repeated. Maximum 8 hours.

429 Language Arts/Reading Instruction in Elementary and Middle Schools (3) Language and language development as applied to teaching oracy (listening-speaking) and aspects of literacy (reading process/readiness and writing). Not open to students who have had recent course in language arts methods. Prereq: Admission to Teacher Education Program.

445 Early Childhood Education: Program Development and Teaching in Kindergarten (3) Curriculum planning, classroom organization and management practices for teaching young children; relationship of kindergarten to total elementary school. Prereq: Admission to Teacher Education Program.

ENGINEERING AEROSPACE (018)

201 Aerospace Seminar (1) An overview of aerospace engineering with lectures, laboratory demonstrations, and field trips. Aerospace history, aircraft and space flight fundamentals, propulsion techniques, wind tunnel testing, biomedical issues in aviation and space flight. Prereq: Sophomore standing in Aerospace Engineering or consent of instructor. Satisfactory/No Credit grading only.

341 Fluid Mechanics I (3) Introduction to fluid flow concepts; hydrostatics; development of mass, momentum, and energy conservation laws in integral and differential form; dimensional analysis and similitude; viscous laminar and turbulent flows in pipes; introduction to boundary layers. Prereq: Mechanical Engineering 231, Mathematics 241.

345 Aerospace Engineering Instrumentation and Measurement (3) Fundamentals of measurement systems; standards; dynamic characteristics of instruments; statistical data treatment; transducers; signal conditioning; strain, pressure, temperature and flow measurements. Prereq: 341, Electrical and Computer Engineering 301. Coreq: Mechanical Engineering 363.

351 Compressible Flow (3) One-dimensional internal flow with shocks, friction and nonadiabatic conditions. Two-dimensional external flows. Prereq: 341, Mechanical Engineering 332.

401 Thesis (3) Problem investigation and report. Prereq: Senior standing.

422 Aerodynamics (3) Theory and design of aerodynamic bodies for desired characteristics. Potential flow theory, viscous effects, compressibility effects. Subsonic, transonic, and supersonic airfoils. Prereq: 351, 370.

424 Astronautics (3) Orbital mechanics, propulsion, atmospheric reentry of space vehicles including reentry thermal protection materials, human factors in space flight, the space environment, and current topics. Prereq: 351. Coreq: Mechanical Engineering 344.


429 Aerospace System Design (4) Synthesis and design of a complete aerospace system. Participation in team design effort including formal presentations and design report. Prereq: 422, 425, 426.

431 Mechanical Engineering/Aerospace Engineering Seminar (1) Topics related to engineering ethics. Formal oral presentations by students on engineering topics. Prereq: Senior standing.

449 Aerospace Engineering Laboratory (3) Designing, conducting, and reporting results of experimental exercises. Test standards and specifications. Analysis of data and formation of conclusions. 3 hours lab per week. Prereq: 345, 351, 425.

494-495 Selected Topics in Aerospace Engineering (1-4, 1-4) Problems and topics related to developments and practice in aerospace engineering. Prereq: Consent of instructor.

COURSES OF INSTRUCTION

ENGINEERING CHEMICAL (226)


230 Introduction to Chemical Engineering Thermodynamics (3) Introduction to the laws of thermodynamics, state functions, and their conceptual basis. Ideal systems, the gas law, Raoult’s law, and deviations from ideal behavior ( fugacity and activity). Introductory treatment of the principles of statistical mechanics and quantum mechanics. Prereq: Engineering Fundamentals 102, Chemistry 130. Coreq: 200, Mathematics 142.

240 Fluid Flow and Heat Transfer (4) Force, energy and mechanical energy balances; flow in tubes, piping systems, packed and fluidized beds; pumping and metering; steady and unsteady state heat conduction; heat transfer in tubes and heat exchangers; radiation. Prereq. 200. Coreq: Mathematics 231.

250 Application of Chemical Engineering Thermodynamics (3) Basic concepts related to chemical engineering applications of thermodynamics; emphasis on flow processes, real gases and temperatures, estimation of physical properties, phase equilibria of industrial mixtures, compressors, power cycles, and chemical reaction equilibria. Prereq. 200, 230.

301 Chemical Engineering Data Analysis (3) Analysis of experimental data; identification of system extremals; statistical properties of samples; empirical modeling of processes; statistical process control; optimization techniques. Prereq: Mathematics 200, 142. (Same as Materials Science and Engineering 301.)

310 Chemical Engineering Laboratory (3) Thermodynamics, fluid flow and heat transfer in chemical engineering. Prereq. 240. Coreq: 230, 301.

320 Mass Transfer and Separation Processes (3) Stage-wise operation; application of analytical, graphical and computer methods to design of stage-wise separatory operations. Differential operations application of analytical and computer methods to the design of diffusive processes. Applications include gas absorption, distillation, extraction, humidification, ion exchange and membrane separations. Prereq: 200, 230.


380 Seminar (1) Presentation and discussion of topics in the practice of chemical engineering. Satisfactory/No Credit grading only.

394 Chemical Engineering Co-op (1) Co-op experiences in Chemical Engineering. Technical report writing and presentations. Prereq: Permission of instructor. May be repeated.


407 Honors Seminar (1) Presentations and discussions on topics of importance to chemical engineers. Prereq: Consent of instructor. Satisfactory/No Credit grading only. May be repeated once.

408 Honors Seminar (1) Presentations and discussions on topics of importance to chemical engineers. Prereq: Consent of instructor. Satisfactory/No Credit grading only. May be repeated once.
410 Chemical Engineering Laboratory II (3) Laboratory investigations of mass transfer and chemical reaction phenomena in chemical engineering. Prereq: 310, 450, or permission of instructor.

415 Computer Applications in Chemical Engineering (3) Introduction to computer solution of chemical engineering problems. Primary focus on the application of personal computer programs. Includes flow sheet simulators, statistics, spreadsheets, graphics and process modeling. Prereq: 340.


445 Separation Process Technology (3) Multicomponent distillation, theory and computer simulations; humidification; specialized technologies, including membrane separation, crystallization, dialysis, adsorption, ion exchange, etc. Prereq: 340.

447 Honors: Transport Phenomena (3) Overview of momentum, heat and mass transfer processes, the analogies, differential and macroscopic balances, applications involving molecular diffusion, including simultaneous mass transfer and chemical reaction. Prereq: 340, consent of instructor.

450 Chemical Reactor Fundamentals (3) Homogeneous and heterogeneous reaction kinetics; idealized homogeneous reactor models, both for closed and flow systems; corrections for non-ideal residence time distributions; identification of scaling parameters; catalyst effectiveness factors and conversion in fixed bed catalytic reactors. Prereq: 240, 340, 301.

467 Honors: Engineering Internship in Process Control (4) Selected students work in small groups on industrial problems in process dynamics and control. Directed by faculty and engineers from host company. Prereq: 360, consent of instructor.

477 Honors: Applied Process Automation Laboratory (3) Interfacing flexible batch continuous processes to automation systems. Top down analysis with bottom up implementation, hierarchical structures and object-oriented concepts are used to design automation solutions including human-machine-interfaces. Workstations with modern industrial equipment provide an interactive graphics and visualization environment. Prereq: 360 and consent of instructor.

478 Honors: Applied Process Automation Design Projects (3) Industrial programmable logic controllers (PLCs) and industrial automation and human-machine-interface (HMI) design software are used on workstations to develop automation solutions by small teams of students. Advanced control strategies, networking and internet issues. Prereq: 477, consent of instructor.


483 Introduction to Reliability Engineering (3) (Same as Industrial Engineering 483; Mechanical Engineering 483; Nuclear Engineering 483.)

484 Introduction to Maintenance Engineering (3) (Same as Industrial Engineering 484; Materials Science and Engineering 484; Mechanical Engineering 484; Nuclear Engineering 484.)

485 Hydrocarbon Processing (3) Chemical and physical properties of selected petroleums and processes utilized in conversion of raw material into various fuels and selected chemical feedstocks. Prereq: 340, Chemistry 350.

488 Honors: Design Internship in Industrial Pollution Prevention (3) Selected students work in small groups to address the prevention of industrial pollution through improved process design. Directed by faculty and engineers from host company. May be substituted for 490 with departmental approval. Prereq: 480 and consent of instructor.


494 Special Problems in Chemical Engineering (3) Chemical engineering problems related to recent developments in industrial practice or engineering research. Prereq: Consent of instructor. May be repeated. Maximum credit 6 hours.

498 Honors Thesis (3) Research in problems related to recent developments in chemical engineering. Prereq: Consent of instructor.

ENGINEERING CIVIL (254)

205 Professional Development I (2) Introduction to civil engineering specialties, history, and achievements. Professional responsibility, communication, and organizations. Prereq: Sophomore standing. (OC) (WC)

210 Engineering Measurements (4) Mensuration through application of surveying techniques; theory of errors and their analysis; concepts of horizontal, vertical and angular measurements and control; construction surveys; route surveys through vertical and horizontal curves; and introduction to GIS and GPS. 3 hours, 1 lab. Prereq: Sophomore standing.

261 Structural Analysis I (3) Reactions; shear and moment diagrams; forces in trusses; uniaxial stress and strain; area moments of inertia; torsion. Prereq: 202 or Engineering Fundamentals 102.

305 Professional Development II (1) Legal and ethical responsibilities, continuous improvement, career planning, and leadership. Prereq: 205.


351 Transportation Engineering I (3) Transportation problems and perspectives, rural and urban; use of systematic planning processes; development of alternatives and the evaluation of civil engineering projects. Civil engineering decision making and applications of economic analysis. Design of transportation terminals, airports, parking, etc. Prereq: 210.

352 Transportation Engineering II (3) Introduction to design, construction, maintenance, and operation of various transportation modes, their guideways and terminals, primarily highways and railroads. Prereq: 351.

361 Structural Analysis II (3) Stress and strain in beams and columns; Mohr’s circle; influence lines; deflections and beams and trusses; analysis of indeterminate structures; moment distribution. Prereq: 261.

380 Water and Waste Treatment (3) Principles of unit operations employed in physical, chemical, and biological treatment of water, wastewater, and solid wastes. Prereq: Junior standing, 390.

390 Hydraulics (4) Basic laws and properties of incompressible fluids. Units and dimensional analysis; drag forces; continuity, energy, and momentum equations; pipe flow; flow measurement; open channel flow and culverts; pumping characteristics. 3 hours and 1 lab. Prereq: 205 or Biosystems Engineering 243; Engineering Fundamentals 102; Nuclear Engineering 203.

395 Hydrology (3) Concept of hydrologic cycle; weather patterns; precipitation measurement and distribution, abstractions, and runoff; storm hydrograph and peak flow analyses, including design floods; reservoir and channel routing; rainfall and streamflow frequency analyses; groundwater flow. Prereq: 390.

400 Senior Design Project (3) Open-ended, comprehensive project emphasizing team approach to design process. Includes problem formulation, site planning, project management, drawings and specifications, cost estimating, and various project components typical of those faced by practicing civil engineers. Prereq: Must be taken during the term of graduation. Summer graduates must take during their last preceding term.

401 Review of Engineering Fundamentals (1) Review of selected topics covered on the Fundamentals of Engineering exam. Emphasis is on those topics relating to Civil and Environmental Engineering. Letter grade only. Prereq: Must be taken during the last 15 hours of the curriculum.

409 Special Topics (1-3) Recent developments and current practice in civil and environmental engineering through field internship and/or self-study. Prereq: Consent of instructor and department head. May be repeated.

416 Hydrologic and Water Quality Engineering (3) (Same as Biosystems Engineering 416.)

421 Portland Cement Concrete Mix Design and Analysis (3) Aggregate properties and tests, tests of portland cement and concrete, mix design methods, admixtures, and nondestructive testing. 2 lectures and 1 lab. Prereq: 321.

431 Geological Engineering (3) Influence of geologic origin and history on the engineering characteristics of rocks and soils; applications of geology in the planning, design and construction of civil engineering projects. 2 hours lecture and 1 lab. Prereq: 330 or consent of instructor. (Same as Geology 431.)

435 Foundation Engineering (3) Fundamentals of geotechnics applied to design and analysis of soil-structure systems; subsurface investigation; design of shallow and deep foundations on rock. Lateral earth pressure and structures. Prereq: 330.

440 Civil Engineering Systems Design and Management (3) Methods of data analysis and modeling of civil engineering systems to enhance resource allocation for specific application to problems of transportation, environmental, water resources, structural analysis materials. Emphasis on microcomputer applications. Prereq: Senior standing, Statistics 251.
442 Construction Methods and Equipment (3) Fundamental operations in construction and equipment selection and productivity; concrete and steel construction; and construction contracts and economics. Prereq: 330.

451 Highway Engineering (3) Design, construction, operation, and maintenance of highway facilities; includes application of various engineering principles and techniques to process of planning, locating and design of highway facilities; covers both geometric and pavement design. Prereq: 210, 251, 352.

452 Traffic Engineering (3) Characteristics of driver, vehicle, and roadway and their interrelationships; traffic studies; basic considerations of traffic circulation and control, lighting, capacity analysis, roadway safety analysis and design. Prereq: 210, 251, 352.

453 Airport/Railroad Planning and Design (3) Airport master planning and railroad engineering. Runway configuration, airfield capacity, geometrics and terminal layout and design. Railroad capacity, geometrics and system layout and design. Prereq: 210, 251, 352.

462 Analysis of Framed Structures (3) Vertical and lateral force resisting systems; gravity loads due to dead, live, and snow loads; lateral loads due to earthquake and wind; use of computer in structural analysis; building modeling and analysis. Prereq: 361.

471 Introduction to Structural Design (3) Selection of rolled structural steel beams, design of structural steel members for axial tension and compression loads, reinforced concrete beams; use of standard specifications. Prereq: 361.

472 Steel Design (3) Design of plate girders and composite beams; consideration of members subjected to combined stresses; design of a typical framed building including connections. Prereq: 471.

474 Reinforced Concrete Design (3) Design of continuous beams, floor slabs, and columns with combined axial loads and bending, footings; and design for torsion. Prereq: 471.

480 Water and Waste Transport (3) Theory and design of water distribution systems, and wastewater collection systems. Prereq: 390.

485 Principles of Hydrogeology (3) (Same as Geology 485.)

486 Air and Waste Management (3) Principles of air quality management, solid waste management and hazardous waste management. Review of regulations, environmental quality, transport of pollutants, and control technologies including treatment and disposal. Prereq: 390 or Chemical Engineering 200 or Agricultural Engineering 243.

490 Water Resources Engineering (3) Application of hydrologic/hydraulic principles for development of water resource project design and management of water resources; assessment of environmental impacts to surface water and groundwater; regulatory framework for water supply and water quality. Prereq: 390, 395 or 416.

ENGINEERING ELECTRICAL AND COMPUTER (319)

206 Electrical Engineering Computations (4) Engineering problem solving and algorithm development by programming computers. Emphasis on software engineering, object-oriented design, building abstractions with procedures and data, and programming in a modern computer language. Includes Level 1 design projects which require laboratory work.

255 Introduction to Logic Design of Digital Systems (4) Standard codes, number systems, base conversions and computer arithmetic. Boolean algebra, minimization and synthesis techniques for combinational and sequential logic. Use of VHDL for logic synthesis. Introduction to structural organization of circuits using SSI, MSI and LSI components. Includes Level 1 design projects which require laboratory work.

300 Circuits (5) Fundamental laws of circuit analysis, Ohm’s Law, Kirchhoff’s current and voltage laws, the law of conservation of energy, circuits containing independent and dependent voltage and current sources, resistance, conductance, capacitance and inductance analyzed using mesh and nodal analysis, superposition and source transformations, and Norton’s and Thevenin’s Theorems. Steady state analysis of DC and AC circuits. Complete solution for transient analysis for circuits with one and two storage elements. Complex frequency, sinusoidal forcing functions, and natural response. Resonance: general case, special cases in series and parallel circuits. Scaling: magnitude and frequency. Admittance, impedance and stray parameters. Includes Level 1 design projects which require laboratory experiments. Prereq: All course work in the Freshman Engineering curriculum; grade of C or better in Mathematics 141, 142, 231; Physics 231.

301 Circuits and Electro Mechanical Components (3) DC and AC Circuits, Transistors, Transformers, Motors, Generators. For non-majors only. Prereq: Mathematics 231, Physics 231.


335 Electronic Devices (4) Semiconductor physics, theory of p-n junctions; diodes, field-effect transistors, and bipolar transistors; modeling of diode and transistor devices; analysis and design of diode switching and rectifier circuits; basic transistor switching circuits and single stage amplifiers; electronic circuit simulation using SPICE. Includes 1 credit laboratory work involving Level 1 design projects. Prereq: 300.

336 Electronic Circuits (3) Multistage transistor amplifier biasing; gain stages, and output stages; frequency and transient response of open loop linear amplifiers; fundamentals of integrated circuits, operational amplifier applications in basic feedback configurations; basic transistor switching circuits. Includes laboratory experiments and design projects. Prereq: 335, Coreq: 315.

341 Fields (3) Coulomb’s law, Gauss’ law, Ampere’s law, Maxwell’s equations for electrostatic and magnetostatic cases; Maxwell’s equations for dynamic case, dynamic potentials, uniform plane wave propagation. Transmission lines. Prereq: 300, Mathematics 241, Physics 232.

342 Analog Communication Amplitude and Frequency Modulation (3) Probability and random variables, signal-to-noise ratio, propagation models, band-limited signals, bandwidth, noise, modulation, frequency modulation, spread-spectrum. Includes Level 1 design projects which require laboratory experiments. Prereq: 315.

355 Computing System Fundamentals (3) Introduction to machine-level computer organization and programming. Basic microprocessor architectures; memory architectures; structured assembly language programming; intra- and inter-computer communication; I/O systems; device drivers; multi- and distributed processor systems; issues in computer security. Includes Level 1 design projects which require laboratory work. Prereq: 206, 255.

395 Junior Seminar (1) Presentations and discussions related to professional development, including registration, ethics and current topics in electrical engineering. Prereq: 300. Satisfactory/No Credit grading only.

400 Senior Design (5) A major design project that focuses the student’s attention on professional practice, accumulated background of curricular components, and recent developments in the field. This major design emphasis is directed to topics within the field of electrical engineering. Includes Level 3 design projects which require laboratory work. Prereq: 316, 325, 332, 342, 355.


421 Electric Energy Systems (3) Structure and operation of the electrical energy grid; load flow; economic loading; planning; control; reliability. Balanced and unbalanced faults; system protection; system stability. Includes Level 1 design projects. Prereq: 316, 325.


423 Electric Machines (3) Principles of electromechanical energy conversion. Design procedures for AC and DC machine windings; construction and performance constraints. Effects of machine parameters on steady state and dynamic performances; the d-q model, reference frames. Includes Level 1 design projects. Prereq: 316, 325.
431 Operational Amplifier Circuits (3) Linear and non-linear active circuits using commercial operational amplifiers. Includes operational, instrumentation, isolation, bridge, rms and logarithmic converters, multipliers and function generators, rectifiers, references, active filters, modulation and demodulation, sinusoidal generators. Noise fundamentals and calculations in op-amp circuits. Design for specified pole-zero functions. Emphasis on applications including transducer interfacing. Includes Level 1 design projects which require laboratory work. Prereq: 316, 336, 342.

432 Electronic Amplifiers (4) Feedback amplifier principles; wideband linear amplifier design; low-noise preamplifier design; audio power amplifier design; linear regulated power supply design and switching regulator principles. Introduction to radio frequency amplifier design; oscillator principles. Includes laboratory experiments and design projects. Includes Level 2 design projects which require laboratory work. Prereq: 533.

441 Digital Communications (3) Quantization and pulse code modulation. Binary and Mary signaling, spectra of line codes, link budget analysis, binary communication in the presence of noise, matched filtering and equalization, bandpass digital transmission, introduction to multiple access techniques. Includes Level 1 design projects.

442 Communication System Design (4) Application of communication theory to system design. Development of communication system specifications. System simulation utilizing a graphical programming language. Hardware and software design and simulation. Construction and performance evaluation of a complete analog or digital transmitter and receiver or significant subsystems. Includes Level 1 design projects. Prereq: 441.

443 Antennas and Propagation (3) Introduction to antenna theory including fundamental antenna concepts and parameters (directivity, gain, patterns, etc.) and signal propagation. Theory and design of linear and loop antennas, arrays, and other simple antennas. Includes Level 1 design projects. Prereq: 316, 341, 342.

446 Electromagnetic Compatibility (3) Principles and practices to avoid interference among and within electrical devices. Parameters and coupling for dipole, biconical, and log-periodic antennas. High frequency effects in circuit elements. Radiated and conducted emissions and susceptibility. Crosstalk, shielding, electrostatic discharge, and EMC regulations. Includes Level 1 design projects which require laboratory work. Prereq: 316, 341, 342.

451 Computer Systems Architecture (3) Architecture and design of microcomputer systems with microprocessors or microcontrollers. Instruction set architecture, software interfaces, processor structures, memory hierarchy, interfacing. Includes Level 1 design projects which require laboratory work. Prereq: 355.

453 Introduction to Computer Networks (4) Principles of computer networking and software design of network protocol with an emphasis on the internet and TCP/IP protocol suite. Includes Level 1 design projects which require laboratory work. Prereq: 206.

455 Embedded Systems Design (4) Design and development of embedded systems for data acquisition, process control, and special-purpose computing systems; peripheral interfacing, serial/parallel communications, and bus systems. Prereq: 355.

471 Introduction to Pattern Recognition (3) Introduction to statistical decision theory, adaptive classifiers, and supervised and unsupervised learning. Students will explore the application of these techniques in areas of current interest such as face recognition, speech processing, remote sensing, data mining and bioinformatics. Includes Level 1 design projects. Prereq: 316. Non-majors require consent of instructor.

472 Introduction to Digital Image Processing (4) Mathematical foundations and practical techniques for digital manipulation of images, including image enhancement, restoration, compression, segmentation, and color image processing. Includes Level 2 design projects. Prereq: 316. Non-majors require consent of instructor.

481 Power Electronics (3) Principles and characteristics of power semiconductor devices, single-phase and polyphase phase-controlled converters, converter control, ac voltage controller. Includes Level 1 design projects and laboratory work. Prereq: 316, 325, 332.

482 Power Electronics Circuits (4) Voltage-fed inverters, PWM principles, control of inverters, dc–dc converters, dc–machine drives, resonance converters, step motor drives, brushless dc machine principles. Includes Level 2 design projects which require laboratory work. Prereq: 481.

491 Special Topics (3) Topics relating to basic design and current practice. May not be repeated to satisfy senior requirements for graduation. Maximum three hours. Prereq: Completion of all junior Electrical Engineering courses or consent of instructor. Includes Level 1 or Level 2 design projects which may require laboratory work. Prereq: 491.

495 Senior Seminar (1) Current topics in electrical engineering. May not be repeated. Prereq: Completion of all junior Electrical Engineering courses or consent of instructor. Satisfactory/No Credit or letter grade.

ENGINEERING FUNDAMENTALS (323)

100 Engineering Skills Development (1-3) Exercises in the skills and tools essential to the practice of engineering. Credit cannot be used toward any engineering degree. May be repeated. Satisfactory/No Credit grading only.

101 Engineering Approaches to Physical Phenomena (6) Engineering problem solving emphasizing graphical and mathematical modeling software. Introduction to design with team projects and presentations, coverage of professionalism and engineering perspective. Introduction to physical phenomena common to many engineering problems. These may include measurements and estimation, force, free-body diagrams, vectors, static equilibrium, Newton’s laws, and conservation laws. A, B, C, No Credit grading. Coreq: Mathematics 130 or placement in Mathematics 141 or higher.


103 Review of Engineering Fundamentals (3) A review of statics and dynamics for students needing additional work after taking Engineering Fundamentals 102. Credit cannot be used towards any engineering degree. Prereq: Consent of instructor. Satisfactory/No Credit grading only.


201 Engineering Design Workshop (2) Introduction to the design process. Project experiences involving working in teams, oral presentations, and written reports. Prereq: Consent of instructor.

301 Engineering Career Planning and Placement (1) Fundamentals of professional development, including resume construction, interview preparation, contacting prospects, networking, business etiquette, and the entire job-seeking process. Intended for last-term juniors. Satisfactory/No Credit grading only.

ENGINEERING INDUSTRIAL (556)

202 Work Methods and Measurement (3) Productivity and work design. Techniques of work methods design including flow, activity, and worker machine charts as well as work methods improvement techniques and procedures. Human work design criteria for the improvement of work methods. Stopwatch time studies, predetermined time systems, and work sampling are used to establish, document, and maintain time standards, standard data, and allowances. Learning curves and wage payment systems. 2 hours lecture, 2 hours lab. Prereq: Completion of required freshman engineering curriculum. Coreq: Statistics 251.

300 Engineering Data Analysis and Process Improvement (3) Engineering statistical methods as applied to modern engineering and business environments, process improvement, inferences about process output and behavior, and measurement systems. An introduction to the use of designed experiments to improve process. Lab component emphasizes the use of teams to provide hands-on experiences, enhance learning, and develop skills in group dynamics. 2 hours lecture and 1 lab. Prereq: Statistics 251 or Mechanical Engineering 345 or consent of instructor.

301 Operations Research in Industrial Engineering (1) Integrated system modeling concepts; linear mathematical programming models including the original simplex procedure, transportation and assignment problems, revised simplex procedure, dual simplex procedure, parametric linear programming (sensitivity analysis), and integer linear programming. Prereq: Mathematics 200.

304 Introduction to Human Factors Engineering (3) Human capabilities and limitations affecting work, work place, and work environment design. Emphasis on human factors methodology, human input requirements, human outputs, the design of human-machine interfaces, the analysis of stress on performance, environmental factors such as noise, lighting, and atmospheric conditions. Focus on designing the task to fit the person. Prereq: Junior standing or consent of instructor.

306 Simulation (3) Simulation of complex production processes using current simulation software. Introduction to modeling concepts, flowcharting, random number generation, design of experiments, simulation logic, and computer animation. Utilization of statistical tools to analyze inputs and outputs to simulation models. Lab component provides hands-on experiences in developing simulation models for relevant industrial engineering case studies. 2 hours lecture and 1 lab. Prereq: 202, 310.
494-495 Special Topics in Industrial Engineering (1-3,1-3) Recent developments in Industrial Engineering including new areas of application, new research techniques and new methodologies. Prereq: Senior standing, consent of instructor. May be repeated once.

ENGINEERING MATERIALS SCIENCE (638)

201 Introduction to Materials Science and Engineering (3) Correlation of atomic structure, crystal structure and microstructure of solids with mechanical, physical and chemical properties of engineering significance. Prereq: Chemistry 130.

220 Selection and Use of Soft Goods Manufacture (3) Study of textile products for apparel and interior furnishings; emphasis on the selection of fibers, yarns, fabrics, finishes and construction details to optimize properties needed for particular end uses.

290-291 Materials Seminar (0.1) Professionalism, ethical considerations, safety, patents, product liability, field trips, industrial speakers, materials science in a global/societal context, teamwork, contemporary issues, life-long learning. May be repeated. Satisfactory/No Credit grading only. (Either 290 or 291 must be taken each semester by all Materials Science Engineering majors starting with the second year of residence.)

300 Materials Laboratory Procedures (1) Thermometry, sample preparation for microscopic examination; word processing and graphics usage, data analysis, report writing. Prereq: 201.

301 Materials Science and Engineering Data Analysis (3) (Same as Chemical Engineering 301.)

302 Mechanical Behavior of Materials I (3) Tensile testing of metals, ceramics and polymers; deformation mechanisms in the various materials, including crystalline and non-crystalline forms; rubber elasticity, viscoelastic behavior, creep, time-temperature superposition in polymers; fatigue. Prereq: 201, 303, or consent of instructor.


340 Principles of Polymeric Materials (3) Synthesis and molecular structure of polymers; polymerization kinetics; molecular characterization; crystalline and glass transitions; crystallization kinetics; mechanical properties; rheology and processing. Prereq: 201.

360 Principles of Ceramic Materials (3) Characterization of ceramic materials as to their crystal structure, their mechanical, electrical, and optical properties. Ceramic fabrication processes from the initial green body fabrication through the firing state. Prereq: 201.

370 Materials Processing (3) Application of fundamentals of mass and energy balances, mechanics, heat and mass transfer, chemical thermodynamics and kinetics to the processing of materials and manufacturing of products. A wide range of materials (metals, ceramics, polymers), geometries (bulk, fibers, films, coatings) and processes (casting, molding, extrusion, forging, powder processing, coating techniques, etc.) are studied as examples of processing technologies. Elementary ideas of process measurement and control. Prereq: 201, 320; Chemical Engineering 200, 240, or equivalent.

380 Materials Selection in Design (3) Systematic materials selection in design. Review of material properties; use of property selection charts and indices. Materials selection, with and without shape constraints; materials processing in design; case studies. Sources of material property data, utilization of material data in conceptual and industrial design, aesthetics, economics, regulations, forces for changes. Prereq: Junior standing.

402 Principles of Metallic Materials (3) Property control through composition, mechanical and thermal processing; ferrous and nonferrous alloys; alloy selection. Prereq: 201.

405 Structural Characterization of Materials (4) X-ray diffraction and fluorescence; scanning and transmission electron microscopy; microanalytical techniques.

421 Mechanical Behavior of Materials II (3) Description of stress and strain; linear elastic constitutive equations, isotropic and anisotropic moduli in various materials; yield criteria; brittle fracture; crazing; plastic strain constitutive equations, forming operations and limit criteria. Prereq: 302, Engineering Science 321, sophomore mathematics.

429 Introduction to Ceramic Matrix Composites (3) Characteristics of composites, including ceramic matrix composites; macromechanics and materials design; overview of fabrication techniques; microstructural characterization; physical and mechanical property evaluation; current and potential applications. Prereq: 201, Engineering Science 321, or equivalent.

433 Polymer Processing (3) Rheological measurements; flow through tubes and slits, including end effects and extrude swell; selected applications, including screw extrusion, injection molding, synthetic fibers, including structure development, properties.

444 Plastics Fabrication and Design (3) Lectures, laboratories and field trips; unit operations of plastics fabrication; plastics classification; design and selection criteria; processing techniques; characterization laboratory.

445 Polymer Engineering Processing and Characterization Laboratory (3) Polymer film casting, film blowing, mixing and extrusion are operated and studied. Flow rates, temperatures, pressures and velocity profiles are acquired and used in finite element modeling and simulation to correlate the polymeric material properties and morphology. Supporting instrumentation includes linear viscoelastic rheometry, capillary viscometry, SEM, OM, FTIR, etc. Coreq: 201 and/or consent of instructor.

470 Environmental Degradation of Materials (3) Mechanisms, measurement techniques and control of environmental degradation processes in metals, polymers, ceramics and composites; materials selection and design considerations. Prereq: 201. Recommended for chemical engineering, mechanical engineering, civil engineering, engineering science and mechanics majors.

472 Fundamental Principles of Composite Materials (3) Physical principles basic to the design, manufacture and application of fiber reinforced polymers, metals and ceramics. Prereq: 302 or equivalent.

474 Biomaterials (3) Metals, polymers and ceramics utilized in orthopedic, cardiovascular, and dental surgical implant devices; corrosion and degradation problems; material properties of primary importance; tissue response to synthetic materials. Prereq: 201. Recommended for engineering science and mechanics majors.

476 Overview of Intermetallic Compounds and Composites (3) Fabrication and processing, ultrafine-grained materials nanotechnology, thermodynamics and stability, microstructural characterizations, mechanical properties, corrosion and oxidation properties, theoretical modeling, and design and industrial applications of intermetallics and composites. Laboratory demonstrations and group projects. Prereq: 201.

484 Introduction to Maintenance Engineering (3) (Same as Industrial Engineering 484; Mechanical Engineering 484; Nuclear Engineering 484.)


494 Special Project Laboratory (1-3) Group or individual investigation of problems related to materials science and engineering. May be repeated to a maximum of 6 credits. Prereq: 201, consent of instructor.

495 Thesis (3) Research problems in materials science and engineering with prior approval of a professor. May be repeated once. Prereq: Senior standing or consent of instructor.

ENGINEERING MECHANICAL (650)

231 Dynamics (3) Kinematics of rigid bodies; center of mass; kinetics of systems of particles; mass moments of inertia; kinetics of rigid bodies; Newton's laws; work-energy, impulse-momentum. Prereq: Engineering Fundamentals 102. Mathematics 142.


331 Thermodynamics I (3) Energy and laws governing energy transformations; thermodynamic properties; thermodynamic cycles; applications to engineering problems. Prereq: Chemistry 130. Coreq: Mathematics 241.

332 Thermodynamics II (3) Properties of gases and mixtures; chemical reactions; equilibrium; compressible flow; applications to engineering problems. Prereq: 331.


345 Mechanical Engineering Instrumentation and Measurement (3) Fundamentals of measurement systems; standards; dynamic characteristics of instruments; statistical data treatment; transducers; signal conditioning; strain, pressure, temperature and flow measurements. Prereq: Aerospace Engineering 341, Electrical and Computer Engineering 301. Coreq: 363.

363 Mechanical Vibration (3) Free and forced vibrations of damped and undamped lumped parameter systems; energy methods; free vibration of continuous bodies. Prereq: 231, Mathematics 231.


401 Thesis (3) Research and design problems in mechanical engineering with prior approval of instructor. Prereq: Senior standing or consent of instructor.

402 Fundamentals of Engineering (1) The course reviews topics covered on the Fundamentals of Engineering exam. Prereq: Senior standing in Engineering. Letter grade only.

405 Microcomputer-Based Control of Electromechanical Systems (3) Application of microcomputers to control electromechanical devices. Application and theory; dynamics of machine control, assembly language programming, microcontroller architecture, stepping and DC motors, photoelectric devices, A/D, D/A, integrated circuits. Prereq: Electrical and Computer Engineering 201 or 301 and consent of instructor.

431 Seminar (1) Topics related to engineering including ethics. Formal oral presentation by students on engineering topics. Prereq: Senior standing.

449 Mechanical Engineering Laboratory (3) Designing, conducting and reporting results of experimental exercises. Test standards and specifications. Analysis of data and formation of conclusions. 3 hours lab per week. Prereq: 332, 344, 345. Coreq: 475.

451 Systems and Controls (3) Analytical models of physical systems; comprised of combinations of mechanical, fluid, electrical, and thermal systems. Analysis and design of feedback control systems using transient and frequency response techniques, stability analysis, sampled data systems. Prereq: 345, Electrical and Computer Engineering 301.

452 Finite Element Analysis (3) Conversion of fundamental conservation principles in mechanics to simulation form via finite element implementation; applications in heat transfer, solid mechanics, mechanical vibrations, fluid mechanics and heat/mass transport. Extensive computer lab experiments using Matlab-based and commercial software systems. Prereq: 321, 344, 363.

455 Introduction to Machine Design (2) Engineering economy, optimization, design for automation, reliability, patents and product liability; design of mechanical engineering solid mechanics systems. Participation in team design effort; requires design report. Prereq: 363.

456 Introduction to Thermal Design (2) Engineering economy, optimization, design for automation, reliability, patents and product liability; design of mechanical engineering thermal-fluid systems. Participation in team design effort; requires design report. Prereq: 332, 344.


469 Machine Design (4) Design of complete machine; documentation including complete specifications, design calculations, working drawings, and cost analysis. Written and oral report. Prereq: 366, 455, 466.

471 Refrigeration and Air Conditioning (3) Vapor compression and absorption cycles; heat pump systems; psychrometric processes; air washers; cooling towers; solar radiation; building heat transmission. Prereq: 332, 344.

475 Thermal Engineering (3) Thermal systems with emphasis on turbomachinery, heat exchangers, combustion and system analysis and design including second law and economic analysis. Prereq: 332, 344.

479 Thermal Engineering Design (4) Design of a complete thermal-fluid system including economic, technical and optimization aspects. Participation in team design effort including formal presentations and design report. Prereq: 456, 475.
ENGINEERING NUCLEAR (716)

200 Introduction to Nuclear and Radiological Engineering (1) Topics related to nuclear and radiological engineering. Satisfactory/No Credit grading only.
203 Thermodynamics I (3) First law analysis of open and closed systems. Properties of ideal gases and real fluids. Introduction to second law and concept of entropy, Rankine cycle. Prereq: Mathematics 142.
304 Nuclear and Radiological Engineering Laboratory I (3) Radiation detection and counting instrumentation, counting statistics, half-life and decay schemes, gamma spectrometry, heat transfer experiments. Prereq: 342. Coreq: 470. (WC)
342 Thermal Science (3) Fluid statics; conservation equations of mass, momentum, and energy; applications to fluid machinery; heat transfer processes, heat conduction, thermal radiation, free and forced convection. Prereq: 203 or Mechanical Engineering 231.
360 Reactor Systems and Safety (3) Safety and operating limits of nuclear steam supply system components; NRC regulations; accident analysis and mitigation. Prereq: 342.
400 Senior Seminar (1) Current topics related to nuclear and radiological engineering including ethics, contemporary issues, and commitment to life-long learning. Prereq: Senior standing. Satisfactory/No Credit grading only.
403 Nuclear and Radiological Engineering Laboratory II (3) Cross section measurements, diffusion properties of neutrons, shielding, dynamics and controls, alpha and beta spectroscopy, radiation fields and dosimetry. Prereq: 304. (WC)
404 Nuclear Fuel Cycle (3) Topics related to nuclear fuel cycle including, mining, milling, fabrication, in-core management, reprocessing, waste disposal, regulatory and radiation health issues and requirements. Prereq: 470 or equivalent.
406 Radiation Shielding (3) Types of radiation sources, fundamentals of gamma ray and neutron attenuation, biological effects, approximate methods of shield design, discrete ordinates, and Monte Carlo. Prereq: Physics 232.
421 Introduction to Nuclear Criticality Safety (3) Fundamentals of nuclear criticality safety; criticality accidents; safety standards; overview of experiments, computational methods, and applications. Prereq: 301.
431 Radiation Protection (3) External and internal dosimetry, biological effects of radiation, radiation detection, radiation risk assessment. Prereq: 301.
470 Nuclear Reactor Theory I (3) Fundamentals of reactor physics relative to cross sections, kinematics of elastic scattering, reactor kinetics, reactor systems and nuclear data. Analytical and numerical methods applicable to general criticality problems, eigenvalue searches, perturbation theory, and the multigroup diffusion equations. Prereq: 301.
472 Nuclear System Design (4) First order design and analysis of a nuclear system, interface with nonnuclear aspects of system design including system reliability and economics, class project. Prereq: 470.
483 Introduction to Reliability Engineering (3) Probabilistic failure models, parameter estimation (maximum likelihood, Bayes techniques), Model identification and comparison, accelerated life tests, failure prediction, system reliability, preventive maintenance and warranties. Prereq: Senior standing or consent of instructor. (Same as Chemical Engineering 483; Industrial Engineering 483; Mechanical Engineering 483.)
484 Introduction to Maintenance Engineering (3) Principles of maintenance and reliability engineering, and maintenance management. Topics include information extraction from machinery measurements, rotating machinery diagnostics, predictive testing, life prediction, failure models, lubrication, oil analysis, establishing a predictive maintenance program, and computerized maintenance management systems. Prereq: Senior standing in engineering and consent of instructor. (Same as Chemical Engineering 484; Industrial Engineering 484; Materials Science and Engineering 484; Mechanical Engineering 484.)
207 Honors: British Literature I (3) Enriched section of 201 designed for students with a 3.25 or higher GPA. (AH)
208 Honors: British Literature II (3) Enriched section of 202 designed for students with a 3.25 or higher GPA. (AH)
221 Literature of the Western World I: Ancient, Medieval, and Renaissance (3) Writing-emphasis course. (AH)
222 Literature of the Western World II: Enlightenment, Romantic, and Modern (3) Writing-emphasis course. (AH)
231 American Literature I: Colonial Era to the Civil War (3) Development of American literature from its beginnings to the Civil War. Writing-emphasis course. (AH)
232 American Literature II: Civil War to the Present (3) Development of American literature from Civil War to the present. Writing-emphasis course. (AH)
233 Major Black Writers (3) Black American literature as a literary tradition. Writing-emphasis course. (Same as African and African-American Studies 233.) (AH)
237 Honors: American Literature I: Colonial Era to the Civil War (3) Enriched section of 231 designed for students with a 3.25 or higher GPA. (AH)
238 Honors: American Literature II: Civil War to the Present (3) Enriched section of 232 designed for students with a 3.25 or higher GPA. (AH)
251 Introduction to Poetry (3) Poetry as a distinct mode of artistic expression. Critical tools for perceptive reading of poems. Writing-emphasis course. (AH)
252 Introduction to Drama (3) Critical tools for perceptive reading of play texts. Writing-emphasis course. (AH)
253 Introduction to Fiction (3) Fiction from the eighteenth through the twentieth centuries, emphasis on the novel. Critical tools necessary for judging varieties of fiction. Writing-emphasis course. (AH)
254 Themes in Literature (3) Study of important themes in English, American, and World literatures. Some sample themes are religion, crime, law, ecology, science, exploration, revolution, colonization initiation, education. Multi-genre focus. Writing-emphasis course. See Timetable for topic. (AH) (WC)
255 Public Writing (3) Rhetorical strategies for effective communication about public issues. Students will learn to write for multiple audiences and may be asked to participate in collaborative writing projects with business, academic, or political organizations. (WC)
263 Introduction to Creative Writing (3) Practice in writing poetry and fiction, combined with study of models and techniques. Writing-emphasis course.
281 Introduction to Film Studies (3) Selected world cinema feature films. Critical techniques necessary for understanding and analysis of narrative cinema. Basic elements of film expression and contours of film history. Writing assignments. (Same as Cinema Studies 281.)
295 Business and Technical Writing (3) Principles of written communication in science and business. (WC)
301 British Culture to 1600 (3) English literature in the context of parallel developments in art, architecture, music, and social and intellectual history. Writing-emphasis course.
302 British Culture: 1600 to present (3) English literature in the context of parallel developments in art, architecture, music, and social and intellectual history. Writing-emphasis course.
306 Introduction to Shakespeare (3) May not be used by English majors to fulfill the pre-1800 literature course requirement.
321 Introduction to Old English (3) Language and literature of England from c. 700 to c. 1100. Reading of prose works and shorter poetry in Old English. Cultural context of Anglo-Saxon England explored through critical essays, histories, and primary texts in translation. Focus on manuscript evidence and medieval and modern textual practices. Writing-emphasis course. (Same as Linguistics 321.)
331 Race and Ethnicity in American Literature (3) Examines the role of ethnic and racial identity in the literature of the United States. (Same as African and African-American Studies 331.)
332 Women in American Literature (3) Women as writers and as subjects in American literature from its beginnings to the present. Writing-emphasis course. (Same as Women's Studies 332.)
333 Black American Literature and Aesthetics (3) Black American literature and aesthetics since 1899, with emphasis on cultural evaluations and the principles of being "American." Writing-emphasis course. (Same as African and African-American Studies 333.)
334 Film and American Culture (3) American films as both works of art and social documents. Relationship between the medium of film and American culture in the twentieth century. Writing-emphasis course. (Same as American Studies 334; Cinema Studies 334.)
355 Rhetoric and Writing (3) Strategies of writing on personal and academic subjects. Discussion of student and professional writing. Open to sophomores with instructor's consent. (WC)
360 Technical and Professional Writing (3) For students who need to sharpen their technical communication skills. Writing of definitions, process descriptions, proposals, abstracts, executive summaries, and major reports. Prereq: Junior standing in student's major or consent of instructor. (WC)
363 Writing Poetry (3) Introduction to writing poetry. (WC)
364 Writing Fiction (3) Introduction to writing novels and short stories. (WC)
365 Writing Drama and the Screenplay (3) Introduction to writing one-act and full-length plays, as well as screenplays.
371 Foundations of the English Language (3) Phonology, morphology, and syntax of English. History of the English language to 1800. (Same as Linguistics 371.)
372 The Structure of Modern English (3) Survey of approaches — traditional, descriptive, and generative-transformational — to the structure of modern English. (Same as Linguistics 372.)
376 Colloquium in Literature (3) Methods and objectives of literary study; conferences to plan student's program in major. Prereq: Sophomore literature package or consent of instructor.
381 Introduction to Folklore (3) Essential terms and concepts in modern folklore-folk-life studies. Emphasis on North American materials: folklore, folksong, myth, legend, proverbs, riddles, superstitions, dance, games, and architecture. (Same as American Studies 381.)
389 Literature of the English Bible (3) Types of literature in the Bible: legend, folklore, history, biography, poetry, prophecy, apocalyptic. (Same as Religious Studies 389.)
398 Junior-Senior Honors Seminar (3) Seminar for students admitted to English honors program. Variable content determined by instructor, but usually focused on a particular literary period, genre, or issue. Enrollment limited to 15. See Director of Undergraduate Studies in English for details. (WC)
401 Medieval Literature (3) Reading and analysis of selected medieval literary masterpieces in modern English. Writing-emphasis course. (Same as Medieval Studies 405.)
402 Chaucer (3) Reading and analysis of the Canterbury Tales and Troilus and Criseyde in Middle English. (Same as Medieval Studies 406.)
404 Shakespeare I: Early Plays (3) Shakespeare's dramatic achievement before 1601. Selected plays from the romantic comedies (e.g., Twelfth Night), the English histories (e.g., 1 Henry IV) and early tragedy (e.g., Hamlet).
405 Shakespeare II: Later Plays (3) Shakespeare's dramatic achievement between 1601 and 1613. Selected plays from the great tragedies (e.g., Othello), the problem plays (e.g., Measure for Measure), and the dramatic romances (e.g., The Tempest).
406 Renaissance Drama (3) English theatre between 1590 and 1640. Representative plays by Shakespeare's contemporaries (e.g., Marlowe, Webster, Jonson).
409 Spenser and his Contemporaries (3) Principal achievements in prose and poetry of sixteenth-century authors such as Spenser, Wyatt, Marlowe, More, Sidney and Bacon.
410 Milton, Donne and their Contemporaries (3) Principal achievements in prose and poetry of the first two-thirds of the seventeenth century (such as the poetry of Milton, Donne, Marvell; and the prose of Browne, Bacon, Walton).
411 Literature of the Restoration and Early Eighteenth Century: Dryden to Pope (3) Survey of English literature and culture from 1660 to 1745. (WC)
412 Literature of the Later Eighteenth Century: Johnson to Burns (3) Survey of English literature and culture from 1745 to 1800.
413 Restoration and Eighteenth-Century Genres and Modes (3) Study of one major genre or literary mode such as drama, novel, poetry, nonfiction, prose, satire, romance, or epic written between 1660 and 1800. May be repeated.
414 Romantic Poetry and Prose I (3) Emphasis on Wordsworth, Coleridge, and Blake, with readings from Lamb, De Quincey, and other prose writers.
415 Romantic Poetry and Prose II (3) Emphasis on Keats, Shelley and Byron, with readings from Hazlitt, Peacock, and other prose writers.
416 Early Victorian Literature (3) May include poetry by Tennyson and the Brownings; prose by Carlyle, Newman, and Mill.

419 Later Victorian Literature (3) May include poetry by the Pre-Raphaelites, Arnold, Hopkins, and Hardy; prose by Arnold, Ruskin, and Carroll; plays by Gilbert and Wilde.

420 The Nineteenth-Century British Novel (3) Major novelists from Scott to Hardy.

421 Modern British Novel (3) Authors such as Joyce and Woolf through contemporary British fiction writers.

422 Women Writers in Britain (3) Emphasis on the literary consciousness and works of women writers in Britain. Course content will vary. Authors covered may include Marie de France, Margery Kempe, Aemilia Lanyer, Elizabeth Cary, Aphra Behn, Frances Burney, Mary Wollstonecraft, Mary Shelley, George Eliot, Virginia Woolf, and Doris Lessing. May be repeated. Maximum 6 hours. (Same as Women's Studies 422.)

423 Colonial and Postcolonial Literature (3) Emphasis on historical and theoretical methodologies for reading colonial and postcolonial literature. May be repeated once with instructor's consent.

431 Early American Literature (3) From the earliest texts to 1830, including exploration and discovery, Native American, colonial, revolutionary, and early national works.

432 American Romanticism and Transcendentalism (3) Prose and poetry of the American Renaissance, from c. 1830 to the end of the Civil War. Includes writers such as Cooper, Poe, Hawthorne, Melville, Emerson, Thoreau, Stowe, Douglass, Whitman, Dickinson.

433 American Realism and Naturalism (3) Literature from the time of the Civil War to World War I, including such writers as Twain, Howells, James, Jewett, Freeman, Crane, Norris.

434 Modern American Literature (3) World War I to the present.

435 American Novel Before 1900 (3) From earliest sentimental novels through Brown and Cooper, and major figures to 1900, including Hawthorne, Melville, Stowe, Clemens, and James.

436 Modern American Novel (3) Authors such as Faulkner, Steinbeck, Welty.

441 Southern Literature (3) Southern writing from colonial period into the twentieth century, including frontier humorists, local color writers, and southern literary renaissance.

442 American Humor (3) Development of American humor from the early nineteenth century into the twentieth century, with particular emphasis on Mark Twain. (Same as American Studies 442.)

443 Topics in Black Literature (3) Contents vary according to particular genres, authors, or theories from 1845 to the present, including Langston Hughes and the Harlem Renaissance, Richard Wright and Gwendolyn Brooks, writing by Black women, international Black literature in English, and Black American autobiography. (Same as African and African-American Studies 443.)

451 Modern British and American Poetry (3) From Yeats and Frost to Auden, Stevens, and more recent poets.

452 Modern Drama, 1880-1945 (3) Survey of British, American, and international drama from the advent of modern drama to the end of World War II. (Same as Comparative Literature 452.)

453 Contemporary Drama (3) Survey of British, American, and international drama since World War II.

454 Twentieth-Century International Novel (3) Fiction in English translation from such writers as Kafka and Camus through contemporary authors. (Same as Comparative Literature 454.)

455 Persuasive Writing (3) Focuses on writing and analyzing persuasive texts in public, private, and academic contexts. Prereq: 355 or consent of instructor. (WC)

456 Contemporary/Postmodern Literature (3) Studies in literature written after World War II. Content will vary. May be repeated once with permission of instructor.

460 Technical Editing (3) Editing technical material for publication. Principles of style, format, graphics, layout, and production management. Prereq: 360 or consent of instructor.

462 Writing for Publication (3) Principles and practices of writing for publication. Dissertations, theses, articles, and reports in science and technology. Prereq: 360 or consent of instructor.

463 Advanced Poetry Writing (3) Development of skills acquired in basic Writing Poetry course. Prereq: 363 or consent of instructor.

464 Advanced Fiction Writing (3) Development of skills acquired in basic Writing Fiction course. Prereq: 364 or consent of instructor.

466 Writing, Layout, and Production of Technical Documents (3) Principles of design for desktop publishing. Production of various documents to be incorporated into a professional portfolio. Prereq: 360 or consent of instructor.

470 Special Topics in Rhetoric (3) Topics vary. May be repeated with consent of department. Maximum 6 hours. Prereq: 355 or consent of instructor.

471 Sociolinguistics (3) Language in relation to society. Empirical and theoretical focus. Emphasis on large-scale units: tribes, nations, social groups. Prereq: 371 or 372 or Linguistics 200 or consent of instructor. (Same as Linguistics 471; Sociology 471.)

472 American English (3) Phonological, morphological, and syntactic characteristics of major social and regional varieties of American English, with attention to their origins, functions, and implications for cultural pluralism. Prereq: 371 or 372 or Linguistics 200 or consent of instructor. (Same as Linguistics 472.)

474 Teaching English as a Second or Foreign Language I (3) Introduces major issues surrounding teaching ESL/EFL, including political implications of teaching ESL/EFL; introduction to second language acquisition; learner variables in language learning; traditional and innovative approaches to ESL/EFL; basic features of American English grammar necessary for teaching ESL. Prereq: Second year of a foreign language or consent of instructor. (Same as Linguistics 474.)

475 Teaching English as a Second or Foreign Language II (3) Covers issues, principles, and techniques in teaching grammar, speaking, pronunciation, reading, and writing in ESL/EFL. Includes observations and teaching practice in ESL classes and development of ESL materials and tests. Prereq: 474. (Same as Linguistics 475.)

476 Second Language Acquisition (3) How humans learn second languages. Examines theoretical models and research on such issues as differences between first and second language acquisition; the effect of age; cognitive factors in second language acquisition; learner variables; sociocultural factors; and implications for second/foreign language instruction. (Same as Linguistics 476.)

477 Pedagogical Grammar for ESL Teachers (3) Aspects of English syntax and morphology presenting difficulties for non-native learners of English. Basic and complex sentence structures; the noun and article system; and verb tense, aspect, modality, and complementation. (Same as Linguistics 477.)

479 Literary Criticism (3) Historical survey of major works of literary criticism.


481 Studies in Folklore (3) Topic varies. May be repeated with different topic. Maximum 6 hours.

482 Major Authors (3) Content varies. Concentrated study of at least one of the most influential writers in British or American literary history: e.g., Donne, Pope, Austen, Tennyson, Whitman, Faulkner, Lawrence, Baldwin, or Morrison. May be repeated. Maximum 6 hours.

483 Special Topics in Literature (3) Topics vary. May be repeated. Maximum 6 hours.

484 Special Topics in Writing (3) Original writing integrated with reading, usually taught by a professional author. Topics vary. May be repeated. Maximum 6 hours.

485 Special Topics in Language (3) May be repeated. Maximum 6 hours with consent. (Same as Linguistics 485.)

486 Special Topics in Criticism (3) Content varies. Special topics in theoretical and practical approaches to British and American literature. May be repeated with consent of department. Maximum 6 hours.

489 Special Topics in Film (3) Content varies. Particular directors, film genres, national cinema movements, or other topics. May be repeated with consent of department. Maximum 6 hours. (Same as Cinema Studies 489.)

490 Language and Law (3) Language in the Anglo-American legal process: focus on differences between spoken and written language; lexical and syntactic ambiguity; pragmatics; speech act analysis; and the language rights of linguistic minorities. Prereq: 371 or 372 or consent of instructor. (Same as Legal Studies 490; Linguistics 490.)

491 Foreign Study: Drama in Stratford and London (3-4) Seeing, studying, and writing about drama as performed in London and Stratford-upon-Avon during the summer.

492 Off-Campus Study: Drama in New York (3) Seeing, studying, and writing about drama as performed in New York City.

493 Independent Study (1-6) Tutorial in subjects not adequately covered in regular courses. May be repeated. Maximum 6 hours.
COURSES OF INSTRUCTION

244 Introduction to Rhetoric and Composition (3) Introduction to the historical, theoretical, and empirical modes of inquiry in rhetoric and composition and their implications for the teaching of composition. Prereq: 355 or consent of instructor.

246 The Rhetoric of Legal Discourse (3) Applying basic principles of persuasive writing to legal materials. Writing position papers, briefs, and memoranda, students learn issue identification and argument. Critical reading and discussion of both professional and student writing. Introductory legal research techniques. No prior legal knowledge necessary. Prereq: 355 or consent of instructor. (Same as Legal Studies 496.)

248 Senior Honors Thesis (3) Second semester of English honors program. Working individually, the student produces a substantial critical or creative project under the direction of two members of the professorial staff. Prereq: 398.

249 Senior Seminar (3) Intensive study in an author, period, genre, or of problems in language, literary history, or theory. Content varies, but all sections address problems of value from an interdisciplinary perspective. Substantial research paper required. Restricted to majors who have completed 15 upper-division hours in English. Writing-emphasis course. Capstone experience. (WC)

ENGLISH EDUCATION (340)

141 Efficient Reading and Study Skills (2) Improvement of reading comprehension and rate, intensive vocabulary enrichment, study skills as they relate to content area subjects. Satisfactory/No Credit grading only.

456 Teaching Speech and Drama, Grades 7-12 (3) Purposes, techniques, materials and evaluation for teaching Speech and Drama in secondary schools. Required for certification in Speech. Prereq: Admission to Teacher Education Program.

459 Teaching English in the Secondary School (3) Techniques of teaching composition, language, and literature. Prereq: Admission to Teacher Education Program.

460 Teaching Reading and Literature in the Secondary School (3) Teaching basic reading skills and literature.

ENTOMOLOGY AND PLANT PATHOLOGY (341)

201 Impact of Insects and Plant Diseases on Human Societies (3) Insects and plant diseases have had a significant influence on human history, culture, and lifestyles. The science of entomology and plant pathology help humankind understand the impact of insects and plant pathogens on these dimensions of human existence. The development of strategies to capitalize on the beneficial aspects of these organisms will also be explored. 3 hours. (NS)

306 Forest Protection (3) Biological, economic and legal consideration of fire, pathogens, insects, vertebrates, wind, and pollutants in the forest ecosystem. One or more all day or overnight field trips may be required. Prereq: Forestry, Wildlife and Fisheries 311, or consent of instructors. 2 hours and 1 lab. (Same as Forestry 306.)

313 Plant Pathology (3) Introduction to the microorganisms and environmental conditions causing disease in plants. Biology of pathogens, Host-pathogen interactions, disease development and principles of control. 2 hours and 1 lab. Prereq: 6 hours of Biological Science. (Same as Botany 313.)

321 Economic Entomology (3) Structure, life history, habits and principles of control of important insect pests of farm, garden, orchard and household. 2 hours and 1 lab. Prereq: 6 hours of Biological Science.

325 Veterinary Entomology (3) Identification, biology and control of arthropods that attack major livestock species. Introduction to entomology, methods of insect control, major pest species groups and problems associated with specific host production operations. 2 hours and 1 lab. Prereq: Biology 122 or equivalent.

410 Diseases and Insects of Ornamental Plants (3) Symptoms, identification and management of diseases and insect pests that affect plants in greenhouse, nursery, and landscape environments. 4 hours. Prereq: 313 or 321 (or consent of the instructor).

451 Plant Tissue Culture (3) Methods for the culture of cells, tissues, and organs including media preparation and maintenance of cultures. Lecture and lab. Prereq: 110-120 or Biology 130-140 or equivalent and Chemistry 120-130 or equivalent. Recommended: 310, 321, 412; Microbiology 310 or 319; Plant Sciences 330. (Same as Botany 451; Plant Sciences 451.)

ENVIRONMENTAL AND SOIL SCIENCES (345)

110 Introduction to Environmental and Soil Sciences (1) Invited speakers on current topics; career opportunities in the environmental sciences; field trip with departmental faculty. Satisfactory/No Credit grading only.

210 Introduction to Soil Science (4) Differences in soils; soil genesis; physical, chemical, and biological properties of soil; relation of soil to land use and pollution; soil management relative to tillage, erosion, moisture supply, temperature, aeration, fertility and plant nutrition. 3 hours lecture and one 2-hour lab.

242 Soil Morphology (1) Intensive course involving describing, classifying and interpreting soils in preparation for regional and national soil judging contests. 1 hour and 1 lab. Prereq: Consent of instructor. May be repeated.

301 Professional Development (1) Techniques of effective professional communications; professional ethics; interviewing and the job search. Prereq: Junior standing. (OC)

324 Soil and Water Conservation (3) Investigation of hydrologic principles regarding soil and water conservation. Topics include: hydrologic cycle, water quality, soil properties, erosion prediction and control, and techniques to protect natural resources. 2 hours lecture and one 2-hour lab. Prereq: 210.

334 Soil Nutrient Management and Fertilizers (3) Influence of soil properties on nutrient availability to plants. Management of inorganic and organic fertilizer materials and the determination of their fate in the soil-plant system. Nutrient management as it relates to agricultural sustainability and soil quality. 2 hours and 1 lab. Prereq: 210.

355 Environmental Soil Biology (3) Biology and biochemistry of the soil environment as it applies to environmental and agricultural processes. Topics include microbial ecology, biogeochemical cycling of soil elements, soil quality and bioremediation. Prereq: 210, Microbiology 210.

434 Environmental Soil Chemistry (3) Composition and chemical properties of soils and processes that govern fate and behavior of chemicals in the soil environment. Topics include: clay mineralogy; soil organic matter; mineral weathering and stability; aqueous speciation; surface chemistry; ion exchange, adsorption, and molecular retention; oxidation-reduction; and soil acidity, alkalinity, and salinity. Prereq: 210 and Chemistry 110 or 350.

442 Soil Genesis and Classification (3) Soil genesis and formation; observing and describing morphologic of agricultural and forest soils; chemical and physical properties, classification. 3 weekend field trips. 2 hours and 1 lab. Prereq: 210.

444 Transport Processes in Soil (3) Basic understanding of soil physical properties and processes; influence of soil physical properties on water and chemical movement in soil; practical experience in the measurement and analysis of physical properties, water flow, and chemical movement in soil. Prereq: 210. Physics 221 or equivalent.

462 Environmental Climatology (3). Study of atmosphere as environment. Physical, chemical and biological factors affecting climates of various earth environments; meteorological process affecting biosystems. Climatic change and the human impact on the atmosphere, consequences of climatic change and mitigation policies, microclimates and urban climates, atmospheric pollution, extreme events and ozone depletion. Design and operation of weather information systems; automated weather stations. Prereq: Agriculture and Natural Resources 290 or equivalent.

481 Capstone in Environmental and Soil Sciences (3) Integrative course in which students work individually and collaboratively to develop solutions for soil and water-related environmental problems. Writing and oral communication emphasis course. Prereq: 434 and senior standing.

492 Internship (1-6) Supervised experience with a departmentally-approved employer. Student is responsible for making arrangements. Requirements include maintaining a daily log, supervisor evaluations, and a final report. Prereq: Junior standing. Satisfactory/No Credit grading only. May be repeated. Maximum 6 hours.

493 Problems in Environmental and Soil Sciences (1-3) Special research problems in environmental sciences. Prereq: Approval of Department and junior standing. May be repeated. Maximum 6 hours.

EXERCISE SCIENCE (347)

100 Orientation to Exercise Science (1) Overview of discipline and professional areas for incoming Exercise Science majors. Must be taken prior to admission to the Exercise Science major.

260 Exercise Science Practicum (1) First practicum experience to support and clarify career goals. Satisfactory/No Credit grading only. Prereq: 100.

Executive Leadership (2) Methods of instructing and leading fitness activities, including jogging, exercise to music, water activities, and fitness games. 1 hour lecture and 3 hour lab. Prereq: At least junior standing and progression to the major.

325 Athletic Training Techniques (3) Prevention of athletic injuries through sound conditioning programs and practices; recognition and immediate treatment of injuries. Prereq: 332, progression to the Exercise Science major or consent of instructor.
332 Applied Anatomy (3) Structure and roles of bones, joints and muscles in human movement and exercise; related biomechanical principles. Prereq: Junior standing.

350 Disease and Injury: Epidemiologic and Demographic Perspectives (3) Disease and injury mortality and morbidity patterns, trends, differentials and causes are examined from perspectives of population-based sciences of epidemiology and demography. Completion of college course in statistics or mathematics is recommended.

380 Special Topics (1-3) Study in selected disciplinary or professional areas of Exercise Science. Prereq: Progression to the major. May be repeated. Maximum 6 hours.

411 Physical Activity for Special Populations (3) Nature of various disabilities and implications for physical activity programming. Course requirements include out-of-class practicum working with individuals who have disabilities. Prereq: 332 or consent of instructor, Exercise Science majors, minimum cumulative 2.5 GPA.

414 Fitness Testing and Exercise Prescription (3) Relationship of exercise to cardiorespiratory function, body composition, strength and flexibility. Measurement and evaluation of fitness in normal populations. Prereq: Biochemistry and Cellular and Molecular Biology 230; Exercise Science majors, minimum cumulative 2.5 GPA.

422 biomechanics of Human Movement (3) Study of biomechanics and its application to the analysis of human movement. Emphasis on quantitative and qualitative analysis of human movement. Prereq: 332, Physics 221, Exercise Science majors minimum cumulative 2.5 GPA.

426 Exercise Science Practicum II (1-6) Supervised experience in exercise/fitness areas. Prereq: Progression to the major and consent of instructor. Satisfactory/No Credit grading only. Maximum 10 hours.

480 Physiology of Exercise (3) Lecture and class dealing with functions of the body in muscular work. Topics include physiological aspects of fatigue, training, and adaptation to environment. 2 lectures and 1 lab. Prereq: Biochemistry and Cellular and Molecular Biology 230 or 440, Exercise Science majors, minimum cumulative 2.5 GPA. (Same as Biochemistry and Cellular and Molecular Biology 480.)

490 Exercise Physiology/fitness Internship (12-15) Full-time practicum in exercise/fitness at approved agency. Prereq: 414, 442, 426, 480, progression to major, and consent of instructor. Satisfactory/No Credit grading only.

493 Directed Independent Studies (1-3) Independent study in a specialized area with Exercise Science. Prereq: Consent of advisor, progression to the major. May be repeated. Maximum 9 hours.

497 Honors Research Project (3-6) Senior research project done under supervision of a faculty member. Includes design of research project, writing proposal for institutional review board approval, data collection and analysis, and presentation of results. Project should be approved with two semesters of study remaining. Prereq: Senior standing.

FINANCE (349)
Accounting 202, Business Administration 201, and Finance 301 are prerequisite to all 400-level Finance courses.

201 Personal Finance (3) Financial planning, investing, managing assets, insurance, and retirement planning for nonbusiness majors. May not be used to satisfy Finance elective requirements. Offered as faculty resources allow.

280 Introduction to Real Estate (3) This course is designed to provide a detailed survey of the real estate market and its analysis. In particular, the course focuses on developing an understanding of the unique legal, institutional, and economic environment of the real estate market. In addition, the basics of real estate financing, and investment analysis will be considered. This course may not be used to satisfy Finance elective requirements. (Same as Urban Studies 280.)


402 Special Topics in Finance (3) Junior and senior level finance seminar. Topics to be announced prior to offering. Prereq: 301, Accounting 202, Business Administration 210.

425 Investment and Portfolio Management (3) Rigorous introduction to the fundamental principles and concepts of the valuation of stocks and bonds (financial assets) in competitive and efficient financial markets. Risk and return analysis of portfolios of financial assets, capital market theory, security market theory, and financial market microstructure. Prereq: 301.

435 Financial Markets and Institutions (3) Examine the process of capital formation and allocation, including an evaluation of money and capital markets. Study the theories and mathematics of interest rate determination and characterize the financial services firms, which participate in these markets. Review the corporate policies and practices of financial service firms, including management of interest-rate, default, technology, and regulatory risks. Prereq: 301.


475 Insurance and Financial Planning Management (3) Course will cover the basic principles of risk management and insurance; and the basic principles of financial, estate, and retirement planning. Prereq: 301.

485 Real Estate Finance and Investment Analysis (3) Explores the utilization of cash flow models to evaluate the financing of and investment in real property. In addition to examining financial feasibility analysis in detail, emphasis is also placed on understanding the factors influencing the dynamics of urban land markets and the government policy issues that must be addressed in urban areas. Prereq: 301. (Same as Urban Studies 485.)

492 Off-Campus Study (1-3) Professional internship with practicing professionals under the direction of a faculty member. Available for free electives only and must be taken on a satisfactory/no credit basis only. Prereq: Approval of instructor.

493 Independent Study (1-3) Letter grade only. Prereq: Consent of instructor and department head.

495 Investment Fund Management (1-3) Members of this class (or investment team) manage over a half-million dollar portfolio of common stocks on behalf of the Tennessee Valley Authority (TVA). This team also engages in a 25 university investment performance competition sponsored by TVA. Maximum 3 hours. Prereq: Minimum GPA of 3.0 in all upper division business courses attempted, 455, and consent of instructor.

FIRST YEAR STUDIES (355)

101 First Year Studies (1) Integration into the academic community, including the nature and purpose of a college education, expectations for academic success, organization of university disciplines, and special emphasis on academic and career planning. Meets once a week. A, B, C, No Credit grading.

401 Peer Mentor Techniques (1) Training of upperclass students as mentors and advisors for freshmen. Includes cognitive and developmental theories of the college-age student, teaching and learning styles, group communication and listening techniques, mentoring and advising skills. Prereq: Consent of instructor.

402 Peer Mentor Practicum (1) Peer mentoring of First Year Studies Students. Prereq: 401 and consent of instructor. May be repeated. Maximum 3 hours. Satisfactory/No Credit grading only.

FOOD SCIENCE AND TECHNOLOGY (390)

140 The Food Industry (3) Introduction to the food industry and the production of an adequate, safe food supply for national and international markets.

240 Field Observations in Food Processing (2) Introduction to, observation of and familiarization with processing, packaging, quality control and distribution of different types of foods. 1 hour and 1 lab. Prereq: 140; non-majors must obtain permission of instructor.

269 Meat Evaluation and Grading (2) Grading standards for quality and yield; principles for evaluating beef, pork and lamb, and application of standards for institutional meat cuts. Practice grading, judging carcasses and cuts, and application of purchase specifications.

301 Professional Development (1) Professional development requirements, resources and opportunities. Individual written and oral report and group discussion on careers and food companies. Prerequisite: Junior standing or consent of instructor.

340 Food Preservation and Packaging (3) Principles, methods and equipment used for preservation of foods. 2 hours lecture and 1 lab. Prereq: 140 and 240 or consent of instructor.

401 Professional Food Science Communication (1) Individual reports and group discussion on current topics. Prereq: Senior standing or consent of instructor. May be repeated. Maximum 3 hours.

410 Food Chemistry (4) Reactions of water, proteins, lipids, carbohydrates, minerals, enzymes, vitamins, and additives in foods. 3 hours lecture and 1 lab. Prereq: Chemistry 110 or equivalent. Coreq: Biochemistry 310.

420 Food Microbiology (2) Physical, chemical and environmental factors moderating growth and survival of foodborne microorganisms; pathogenic and spoilage microorganisms affecting quality of foods and their control. Prereq: Microbiology 210. Coreq: 429.

430 Sensory Evaluation of Food (3) Principles and methods of sensory evaluation of foods. 2 hours and 1 lab. Prereq: Basic statistics.

442 Special Topics In Food Science and Technology (1-3) Topics of current concern to the food industry. May be repeated. Prereq: Consent of instructor. Maximum 9 hours.

445 Application of Food Chemistry and Processing Principles (4) Interactions and functions of dairy, egg, cereal and other plant based ingredients during the production and storage of processed food products. 3 hours lecture and 1 lab. Prereq: 340 and 410 or consent of instructor.

460 Meat Science (3) Carcass characteristics of meat animals, muscle structure and composition, cut identification, curing, freezing, and cooking. Prereq: 140 or consent of instructor.

469 Meat Science Lab (1) Slaughter and processing methods for beef, pork, lamb and poultry. 1 lab. Coreq: 460.

490 Food Laws and Regulations (3) A comprehensive examination of the laws and regulations designed to preserve the safety, wholesomeness, and nutritional quality of the United States food supply with an in-depth analysis and discussion of precedent case studies and their impacts on laws and regulations. Core courses in Food Science and Technology will serve as an essential basis for understanding of material covered in this course. Prereq: 140. Non-majors must obtain consent of instructor.

493 Practical Experience in Food Science and Technology (1-12) Specialized research in areas of interest under faculty direction. Field experience in supervised internship in the food industry. Prereq: Consent of instructor. May be repeated. Maximum 12 hours.

495 Quality Assurance and Sanitation Practices (3) Design and evaluation of a food processing operation to produce a safe and acceptable quality food product. Prereq: 310, 320, 340 or consent of instructor.

FOREIGN LANGUAGE/ESL EDUCATION (394)

455 Teaching of Foreign Language, Grades 7-12 (3) Instructional methods, lesson planning, peer-teaching; materials for teaching Foreign Language and culture, evaluation techniques. Required for certification in modern foreign languages and Latin. Prereq: Completion or near completion of foreign language hours for certification and admission to Teacher Education Program.

FORESTRY (396)

100 Forests and Forestry in American Society (3) Introductory course examining the role of forests in shaping American culture and society and exploring the evolution of the forestry profession in the North America.


306 Forest Protection (3) (Same as Entomology and Plant Pathology 306.)

314 Economics of Forest and Wildland Resources (2) Basic principles of forest resource economics; microeconomic applications in forestry; non-market valuation and analysis; financial analyses of private and public forest resource management decisions. Prereq: Economics 201 or consent of instructor.


321 Wildland Recreation (3) Philosophical foundation of recreation; planning, development, and management of forest recreation resources; interpretation of forest resources. Overnight weekend field trips may be required. Prereq: English 102, Communication Studies 210 or 240 or consent of instructor.


323 People and Forest Practices (2) Examination of how people, institutions and society at large affect and are affected by forest management practices. Case studies and field applications will concentrate on the wide variety of linkages that exist in society among people and forests. Application of basic skills of collaborative problem solving will be emphasized. Overnight field trips required. Coreq: 305, 306, 325, 329, 330. Letter grade only.


331 Wood Properties and Uses (2) Wood as a biological material; detailed examination of the woody cell wall; influence of environmental and site conditions on wood formation; physical and mechanical properties of wood and the relationship of the woody cell wall to these properties; wood use in important commercial products; day field trip may be required. Prereq: Botany 110 or consent of instructor. Coreq: 332 for Forestry majors.

332 Wood Identification (1) Cell structure and arrangement as a tool for species identification; microscopic and hand lens identification of important commercial softwoods, hardwoods and foreign woods; laboratory procedures for making temporary slides for microscopic examination; student use of reference collection of wood samples; day field trip may be required. Prereq: Forestry, Wildlife and Fisheries 311 or consent of instructor. Coreq: 331 for Forestry majors.

415 Forest Conservation Workshop (1-3) How forest biology, ecology and management relate to conservation issues, how current conservation issues can be integrated into classroom work and student projects, environmental education strategies. Prereq: Consent of instructor. May not be taken by forestry or wildlife and fisheries majors. May be repeated. Maximum 3 hours.

420 Forest Resource Management (3) Introduction to forest-level management concepts from an economic perspective. Harvest determination; goal setting under multiple-use concepts; taxes; classical approaches to regulation, linear programming and harvest scheduling; goal programming. Prereq: 314 and 324, or consent of instructor.

421 Forest and Wildland Resource Economics (3) Production functions, supply-demand and market analysis; non-market programs and projects; economic analysis and decision models; investment and financial analysis; managerial economics; taxes; forest products marketing. Prereq: 324 or consent of instructor.

422 Forest and Wildland Resource Policy (3) Policy formulation; criteria for policy determination; forest and wildland law and regulation; theory of conflict resolution; formal and informal resolution. Prereq: Senior standing or consent of instructor.

423 Wildland Recreation Planning and Management (3) Planning processes, master and site planning, site design projects; management strategies, methods of visitor and recreation site management; case studies. Weekend field trips may be required. 2 hours and 1 lab. Prereq: 321 and Junior standing in Wildland Recreation concentration, or consent of instructor.

433 Wood Adhesives and Glued Wood Products (2) Theory and practice of adhesive bonding; study of the wood substrate-adhesive interface for bonding; principles of adhesion; wood moisture; gluing of solid wood and composite wood manufacturing practices; laboratory manufacture and/or testing of adhesives, adhesive bond strength and glued-wood product performance; day field trips may be required. 1 hour lecture and 2 hour lab. Prereq: 331 and 332, or consent of instructor.

492 Practicum in Forestry (1-6) Supervised experience at departmental-approved, employment location. Prereq: Junior standing. Satisfactory/No Credit grading only.

493 Independent Study in Forestry (1-15) Special research or individual problem in forestry. Letter grade or Satisfactory/No Credit grading only.

495 Internship in Wildland Recreation (1-6) A highly structured field experience guided by specific learning objectives pre-approved by the instructor and the field supervisor. The student is responsible for field placement. One credit per two weeks of full-time field experience. Prereq: Junior standing, consent of instructor. May be repeated. Maximum 6 hours.

496 Internship in Forestry (1-6) Supervised experience at departmental-approved, employment location arranged by the student. Internship learning objectives must be pre-approved by the advisor/instructor and the field supervisor. Daily log, supervisor evaluations, and final report required. One credit per two weeks of full-time supervised field experience maximum. Prereq: Junior standing, consent of instructor. May be repeated. Maximum 6 hours.

FORESTY, WILDLIFE AND FISHERIES (398)

211 Introduction to Forestry, Wildlife and Fisheries (3) History of natural resources policies and practices; social perspectives and attitudes concerning natural resources and their use; techniques of integrated natural resources management, ecological principles, current policies, social trends, and forest and wildland resource use.
250 Conservation (3) Use and abuse of wildland resources. Historical perspectives and current management of forests, wildlife, and fish of North America including aspects of outdoor recreation and pollution problems. (NS)

311 Dendrology and Silvics of North American Trees (3) Identification, classification and nomenclature of important North American trees and woody scrubs; forest associations; silvical characteristics of trees and stands as the basis for the practice of silviculture. Day-long field trips may be required. 2 hours and 1 lab. Prereq: 1 year of Botany or Biology.

312 Principles of Silviculture (3) Principles for treating forest stands to achieve selected objectives. 2 hours and 1 lab. Prereq: Chemistry 100. Coreq: PSS 210, 311, and (for Forestry majors) 313.

313 Measurements and Sampling (2) Measurement techniques and sampling methods for vegetation; estimation of animal populations; map and aerial photo use. 1 hour and 1 lab. Prereq: Statistics 201, Agriculture and Natural Resources 290, Mathematics 125. Coreq: Forestry, Wildlife and Fisheries 312.

317 Principles of Wildlife and Fisheries Management (3) Ecological relationships of wild animals with other animals and their habitats. Biological, social and economic aspects of their management. Prereq: 211 or 250, Statistics 201, Agriculture and Natural Resources 290, Mathematics 125, Chemistry 100, Biology 230.

410 Wildlife Habitat Evaluation and Management (3) Ecological relationships between wildlife and their habitat. Evaluation, modeling, and management of wildlife habitat. Effects of land-use practices on wildlife habitat. Weekend field trips required. 2 hours and 1 lab. Prereq: 317 or consent of instructor.

412 Managing Natural Resource Organizations (2) Human, bureaucratic and managerial factors influencing the effectiveness of natural resource organizations. Alternative stakeholder and public involvement objectives, strategies and mechanisms including client-customer, partnership and adversarial. Conflict resolution, proactive collaborative problem solving and alliance building. 2 hours and 1 lab. Prereq: 317 or consent of instructor.

416 Planning and Management of Forest, Wildlife and Fisheries Resources (3) Integrated forest and wildland resource management through developing land management plans and analyzing case studies including conflict resolution, 1 hour and 2 labs. Prereq: Senior standing.

420 International Natural Resource Issues (2) Identification and analyses of issues regarding forestry, wildlife, fisheries, and associated natural resources beyond U.S. borders. Biophysical, economic, and cultural elements impacting natural resources at the international level. Cases: Northern Europe, Latin America, Indonesia, and Africa.

FRENCH (405)

111-112 Elementary French (3,3) Language Laboratory required. Must be taken in sequence. Not available to students eligible for French 150.

150 Intermediate French Transition (3) Prereq: Two years of high school French. Minimum score below the level required for admittance to French 211. Since 150 is a review of elementary French, students who receive credit in this course may not also receive credit for any other 100 level French course and therefore also forfeit the six hours of elementary language credit awarded through placement examination. For elective credit only.

199 French Language and World Business (2) The course will examine the importance of foreign trade at the local, state, and national levels. An interdisciplinary team of faculty from the colleges of Business and Arts and Sciences will provide an overview of the value of language study and international cultural awareness in world business. Restricted to students majoring in the Language and World Business major concentration. See the Director for further information.

211-212 Intermediate French (3,3) Prereq: 150 or 112 or Departmental Placement Exam. Must be taken in sequence. Students who place in 200 level courses from high school will receive six hours of elementary French credit. (CC)

217-218 Honors: Intermediate French (3,3) For students of superior ability in French. Incoming freshmen admitted on basis of diagnostic test, high school average, and performance on ACT. Class held to a maximum of 15 for individual attention. Students follow enriched program with emphasis on speaking ability and reading, including literary selections. Students with a grade of A in 211 may enter 218 with permission of instructor. Credit for 300 given to students receiving a grade of A or B in 218.

300 Transitional Grammar Review and Reading (3) For students who have completed the intermediate level sequence and who need additional preparation in reading comprehension, vocabulary acquisition, and key areas of grammar. Prereq: French 212 or equivalent or appropriate score on French placement test. May not be counted toward the major or minor.

301-302 Elements of French for Upper Division and Graduate Students (3,3) Elements of language, elementary and advanced readings. Open to graduate students preparing for language examinations, and upper division students desiring reading knowledge of the language. Undergraduate credit only. Not for credit for those having had 111-112 or equivalent. No auditors.

333 Intermediate Composition and Grammar (3) Emphasizes writing skills. Review of major grammatical points in French. Prereq: 212, 218, 300 or permission of instructor.

334 Intermediate Conversation (3) Emphasizes speaking skills. Further review of French grammar. Required of all majors. Prereq: 212, 218, 300 or permission of instructor.

345 French for Business (3) Contemporary French language as it applies to business transactions. Understanding and composing business letters; oral communication and elements of French culture related to good business practices. Either 334 or 345 may be applied toward the major but not both. Prereq: 333 or consent of instructor.

351-352 History of French Literature (3,3) Chronological view of French literature in relation to the specific historical developments that have influenced it. Prereq: 333 or 334 or 345 or permission of department.

400 Consecutive and Simultaneous French-English and English-French Translation (3) Consecutive Translation to and from English. Introduction to simultaneous translation to English. Prereq: 334, 345 or equivalent.

410 Medieval French Literature (3) Major representative works of Medieval French literature. Texts in modern French. Prereq: a 300-level literature course. Writing-emphasis course. (Same as Medieval Studies 410.)

411 French Literature of the 16th Century (3) Highlights of 16th-century French literature. Excerpts from Rabelais and Montaigne; readings of poems from the writers from Lyon and members of the Pleiade. Prereq: 300-level literature course. Writing-emphasis course.


413 French Literature of the 18th Century (3) Major works of the Enlightenment. Prereq: 300-level literature course. Writing-emphasis course.


420 French Cinema (3) The French cinema from its earliest days through the New Wave directors. Prereq: 300 level literature course. Can be applied to major. Writing-emphasis course. (Same as Cinema Studies 420.)

421 Phonetics (3) Foundation in the science of phonetics. Practical exercises and individual performance. Graduate credit not offered to students majoring in a Romance language. Prereq: French 333 or 334 or 345 or permission of department.

422 Advanced Grammar (3) Improving one’s written French by studying basic and more refined structures of the French language. Writing creative free-style compositions. Prereq: French 333 or 334 or 345. Wchr 333 or 345. Writing-emphasis course.

423-424 Advanced Conversation (1,1) Informal conversation with native speaker on contemporary topics. Stresses in class contact rather than outside preparation. Meets two hours a week for one semester credit. Prereq: French 333 or 334 or 345.

425 Introduction to Descriptive Linguistics (3) Initiation into the theory and practice of techniques of linguistic analysis in the subfields of phonetics, morphology, syntax, semantics, pragmatics and historical linguistics; discussion of their relevance to the learning and teaching of foreign languages and to the study of literary texts. (Linguistics 200 is strongly recommended.) Writing-emphasis course. (Same as German 425; Linguistics 425; Russian 425; Spanish 425.)

426 Methods of Historical Linguistics (3) (Same as German 426; Linguistics 426; Russian 426; Spanish 426.)

429 Romance Linguistics (3) Development of Classical Latin through Vulgar Latin into major Romance Languages. Writing-emphasis course. (Same as Linguistics 429; Spanish 429.)

430 Theatrical French (4) Comprehensive introduction to theatrical production and performance in French. Students collaborate in the creative staging of a French play and they actively participate in its public performance. Prereq: 300-level literature course. May apply toward major.

431 Highlights of French Civilization (3) Survey of French civilization from the Gauls to World War II. Historical events, daily life, all forms of arts. Prereq: a 300 level literature course. Writing-emphasis course.
COURSES OF INSTRUCTION

432 Contemporary French Culture (3) Current French cultural issues placed in historical perspective with a comparative emphasis. In English; readings in French for majors. May apply toward French major. Writing-emphasis course.

433 French and Francophone Women Writers (3) Works by women writing in French considered in cultural context. In English; readings in French for majors. May apply toward French major. Writing-emphasis course. (Same as Women's Studies 433.)

434 Literature of Quebec (3) Survey of literature of Quebec as well as French literature connected with North America. Readings include explorers and missionary works, such as the Voyages of Champlain and the Journals of the Jesuits, as well as the literature of contemporary Quebec. Prereq: 300-level literature course. Writing-emphasis course.

440 Capstone Experience in French (3) Synthesizing senior colloquium and tutorial in which students reflect on the raison d'être of the discipline from a multidimensional point of view. Prereq: 400-level literature course. Writing-emphasis course.

445 Advanced French for Business (3) Study of advanced contemporory French language and culture as they relate to business transactions. A comparative approach is used to explore differences and similarities between Francophone business culture(s) and those of North America and Japan. Students build upon their knowledge of business terminology while being sensitized to culture differences and the dangers of simplistic stereotyping. Prereq: 345 or consent of instructor. Writing-emphasis course.

450 Special Topics (3) If content varies, may be repeated for credit. Maximum 6 hours.

490 Internship (1-15) Career-related experiences in the United States or abroad with permission of the Language and World Business Director. For Language and World Business majors only. Satisfactory/No Credit grading only.

491 Foreign Study (1-15)

492 Off-Campus Study (1-15)

493 Independent Study (1-15)

GEOGRAPHY (415)

101-102 World Geography (3,3) Selected topics and world regions, especially those with problems or situations of contemporary interest, to illustrate geographical points of view, concepts, and techniques. May be taken in either order. (CC)

108 Honors: World Geography (4) For freshmen and sophomores of superior ability who are interested in the geographical approach to important world problems and issues. Open to students who have received an "A" in Geography 101. Students may not receive credit for both 102 and 108.

131-132 Geography of the Natural Environment (4,4) Characteristics and processes of the earth's surface and lower atmosphere; their interaction to produce a world pattern of distinctive environments significant to humanity. Must be taken in sequence. 3 hours lecture and 2 hours lab per week. Prereq: 131 is prerequisite to 132. (NS)

210 Introductory Technical Geography (1) Covers basic concepts required in 310, 410, 411, and 413. Recommended to be taken prior to or concurrently with these courses. The shape of the Earth, map scales, coordinate systems, and projections. Self-paced, online course with written (offline) final exam.

310 Introduction to Cartography (3) Properties, sources, uses, design and production of maps as tools for geographical analysis. Introduction to desktop mapping techniques and data display using basic thematic map styles. 2 hours lecture and 2 hours lab per week.

320 Cultural Geography: Core Concepts (3) Background and method of cultural geography; basic concepts and theories focusing on cultural landscape, culture regions, cultural ecology, innovation and diffusion, cultural integration, and world patterns of cultural phenomena.

323 Behavioral Geography (3) Types of human behavior, such as shopping, territoriality, commuting, residential mobility, and regional consciousness as they relate to distance, natural environment, and culture. (Same as Urban Studies 233.)

334 Meteorology (3) Dynamic atmosphere and resulting weather events. Nature of individual weather elements, their measurement and analysis over time and space.


345 Population and Environment (3) Global and local patterns of population distribution and change as they relate to culture, economic development, technology, and the environment and the future. Prereq: 101-102 or consent of instructor. Writing-emphasis course.


361 Regional Geography of the United States and Canada (3) Physical, economic, and social distributions as they interrelate to and give distinctive character to regions of the United States and Canada. Writing-emphasis course.

363 Geography of the American South (3) Geographical appraisal of the southeastern United States, including physical environment and human resources. Origin and development of contemporary economic and cultural traits of the area. Writing-emphasis course.

365 Geography of Appalachia (3) Interrelation of physical, economic, and social patterns that give distinctive character to the region and its parts, especially in southern Appalachia. Appalachia in perspective in the current American scene. Writing-emphasis course.

366 Geography of Tennessee (3) Survey of the geography of the State of Tennessee including its cultural, economic, and physical resources, as well as an examination of the state's diversity, development, and its geographic connections within the Southeast region and beyond. Writing-emphasis course.

371 Geography of Europe (3) Physical, cultural, and economic characteristics of Europe. Emphasis on the geographical dimensions of change in contemporary Europe. Writing-emphasis course.

372 Geography of Middle America (3) Physical, cultural, and economic characteristics of Mexico, Central America, and the West Indies. Writing-emphasis course. (Same as Latin American Studies 372.)

373 Geography of South America (3) Physical, cultural, and economic characteristics of the countries of South America. Writing-emphasis course. (Same as Latin American Studies 373.)

379 Geography of Africa (3) Physical, cultural, and economic characteristics of Africa, with particular emphasis on the area to the south of the Sahara. Writing-emphasis course. (Same as African and African-American Studies 379.)

410 Global Positioning Systems and Geographic Data (3) Theory and laboratory use of Global Positioning Systems for capturing digital geographic data; management of geographic data, including coordinate systems, datum issues, scanning digitizing, map standards, and uncertainty in Geographic Information Systems. 2 hours lecture and 2 hours lab per week.

411 Computer Mapping and Geographic Information Systems (3) Concepts, management, and presentation of digital data for spatial analysis, with emphasis on cartographic data structures. 2 hours lecture and 2 hours lab per week. Prereq: 310 or consent of instructor. (Same as Information Management 431.)

412 Advanced Cartography Techniques (3) Cartographic design and data display techniques for reference and thematic maps. Basic principles and methods of map reproduction. 2 hours lecture and 2 hours lab per week. Prereq: 310 or consent of instructor.

413 Remote Sensing: Types and Applications (3) Principles and uses of remote sensing imagery, digital data, and spectral data, with particular emphasis on geographic interpretation and mapping techniques. Prereq: 310 or consent of instructor.

415 Quantitative Methods in Geography (3) Geographic application of statistical techniques, point pattern analysis, and analysis of areal units. Prereq: Mathmatics 115 or Statistics 201 or consent of instructor.

419 Practicum in Cartography/Remote Sensing (2-6) Supervised practice in design and production of maps and other graphic materials in the Cartographic Services Laboratory or a similar organization. Prereq: Written consent of department prior to registration. Satisfactory/No Credit or letter grade.

421 Geography of Folk Societies (3) Geographical study of folk culture, emphasizing traditional material culture and rural settlement, with examples drawn from eastern North America and selected foreign areas.

423 Geography of American Popular Culture (3) Geographical study of regional variation in popular cultures, especially focused on youth cultures in the United States. Writing-emphasis course. (Same as American Studies 423.)

424 Dendrochronology (4) Principles, techniques, and interpretation in tree-ringscience. Applications in geography, climate, ecology, forestry, archaeology, and earth sciences. 3 hours lecture and 2 hours lab per week. Prereq: 131-132 or consent of instructor.

433 The Land-Surface System (3) Characteristics of surface form, water, vegetation, and surface materials, and their regional interrelationships. People as evaluators and agents of change. Prereq: 131-132 or consent of instructor.

434 Climatology (3) General circulation system leading to world pattern of climates. Climatic change and modification, and interrelationships of climate and human activity. Prereq: 131 or consent of instructor.
435 Biogeography (3) Study of the changing distribution patterns of plants and animals on a variety of spatial and temporal scales. The effects of continental drift, Pleistocene climatic change, and human activity on world biota are emphasized. Prereq: 131-132 or consent of instructor.

436 Water Resources (3) Global water resources and hydrologic processes, including water availability, flooding, and water quality issues examined from physical and economic geographic perspectives. Prereq: 131-132 or consent of instructor.

437 Plant Geography of North America (3) Characteristics and distribution of major plant communities of Canada, the U.S., Mexico, and Central America. Relationships to climate, soil, fire, and human disturbance. Long-term history and future prospects. Prereq: 131-132 or course work in botany or consent of instructor.

441 Urban Geography of the United States (3) Concepts and theories concerning development and significance of systems of cities and internal morphology of cities in the United States. Writing-emphasis course. (Same as Urban Studies 441.)

443 Rural Geography of the United States (3) Geographical appraisal of rural areas of the United States, including small towns and urban fringes. Problems and potentials of rural America. Writing-emphasis course.

449 Geography of Transportation (3) Examination of transportation systems, emphasizing their effects on trade patterns, land use, location problems, and development.

450 Process Geomorphology (3) (Same as Geology 450.)

466 Teaching and Learning Geography (3) Preparing prospective teachers in the content, skills, strategies, and understandings needed for the effective teaching and assessment of geography in the K-12 schools. Course organization and content based largely on that of the National Geography Standards.

490 Internship (3) Career-related experience with business, nonprofit, and government organizations. For geography majors. Prereq: Prior written permission of geography department head or authorized internship director. May be repeated. Maximum 6 hours. Satisfactory/No Credit grading only.

491 Foreign Study (1-15) Prereq: Written consent of department required prior to registration.

492 Off-Campus Study (1-15) Prereq: Written consent of department required prior to registration.

493 Independent Study (1-15) Prereq: Written consent of department required prior to registration. Satisfactory/No Credit or letter grade.

494 Undergraduate Research Experience (1-3) Supervised participation in active research projects. Prereq: Consent of department head. May be repeated once. Maximum 6 hours.

495 Special Topics in Geography (1-4) Topics vary. Prereq: Consent of instructor. May be repeated with consent of instructor. Maximum 8 hours.

497 Honors: Senior Thesis (3) Students develop undergraduate thesis topic under the guidance of a faculty advisor. Prereq: Open to second semester juniors and first semester seniors who have a 3.2 or better overall GPA and permission of the thesis advisor.


499 Proseminar in Geography (3) Major themes in geography, especially trends over the past 40 years. Required for majors. Not open to graduate students. Prereq: Senior standing and completion of at least 12 hours of major or minor requirements in geography. Writing-emphasis course.

GEOLOGY (424)

101 The Dynamic Earth (4) Physical processes within and upon the Earth’s surface, including the formation of rocks, plate tectonics and earthquakes, and landscapes. Must be taken in sequence. 3 hours lecture and one 2-hour lab or field period. (NS)

102 Earth, Life, and Time (4) Fossils, evolution and ancient environments, plus a review of 4.5 billion years of earth history. Must be taken in sequence. 3 hours lecture and one 2-hour lab or field period. (NS)

103 The Earth’s Environments (4) Contemporary problems and solutions related to human disturbance of the environment; topics include: global climate change, pollution, resource depletion. 3 hours lecture and one 2-hour lab or field period. Prereq: 101. Fulfills laboratory science sequence requirement for College of Arts and Sciences. (NS)

107 Honors: The Dynamic Earth (4) Laboratory and field emphasis to understanding physical processes, including the formation of rocks, plate tectonics, earthquakes, and landscapes. 3 hours lecture, One 2-hour lab, and 2 field trips. Consult current College of Arts and Sciences guidelines. Students may not receive credit for both Geology 101 and 107. (NS)

108 Honors: Earth, Life and Time (4) Laboratory and field emphasis to understanding fossils, evolution, and ancient environments throughout 4.5 billion years of Earth history. 3 hours lecture, One 2-hour lab, and 2 field trips. Prereq: Grade of B or better in Geology 107, grade of A in Geology 101, or permission of the instructor. Students may not receive credit for both Geology 102 and 108. (NS)

101 Biodiversity: Past, Present, and Future (3) Introduction to how biodiversity has changed through time, especially past mass extinctions and current extinctions from human activities. Topics include measurement of biodiversity, how biodiversity originates, and the dynamics of extinction. May not be applied toward the Geology major. (NS)

202 Earth as an Ecosystem: Modern Problems and Solutions (3) Study of the earth as an integrated system between physical and biospheric processes. Focus is on human disturbances such as habitat destruction and pollution. No prerequisite. May not be applied toward Geology major. (NS)

203 Geology of National Parks (3) Geologic principles, processes, and earth materials responsible for the spectacular landscapes of national parks. Focus on interactions among internal earth processes, surficial earth processes, and human interactions. 3 lecture hours, plus an optional field trip. May not be applied toward the Geology major. Writing-emphasis course. (NS)

310 Mineralogy (4) Introduction to the concepts of crystal chemistry, x-ray diffraction, optical mineralogy, and geochemical analysis of the important rock-forming minerals. Laboratory includes hand-specimen, x-ray diffraction, and microscopic identification of minerals. 3 lecture hours and one 2-hour lab. Prereq: two 100-level geology courses and Chemistry 120, or consent of the instructor.

320 Paleobiology (4) Critical analysis of the preserved record of ancient life, with emphases on recognition of evolutionary patterns, processes, and extinctions; interpretation of ancient environments; and the integrated use of fossils and other geological features in solving problems of geologic correlation and age determination. Statistical and qualitative approaches applied to field and laboratory data. 3 hours lecture and one 2-hour lab. Prereq: two 100-level geology courses or consent of instructor.

330 Igneous and Metamorphic Petrology (4) Study of the properties of crystalline rocks, the processes that produce them, and the tectonic environments in which they form. Topics include interpretation of rock textures, phase diagrams, geochemical and isotopic compositions, magma generation and differentiation, effects of temperature, pressure, and fluids on mineral equilibria and kinetics. 3 hours lecture and one 2-hour lab. Prereq: 310.

340 Earth Sedimentary Processes (4) Earth surface processes, including weathering and soil formation, the hydrologic cycle, physical sediment transport, biological and chemical sedimentation, and sediment diagenesis, applied to interpretation of the stratigraphic record. 3 hours lecture and one 2-hour lab. Prereq: two 100-level geology courses and 310, or consent of instructor.

345 Geology of East Tennessee (1) Geology of the Southern Appalachians in Tennessee. 1 hour lecture plus field trips. Prereq: Completion of major core courses or consent of instructor.

370 Earth Structure and Geophysics (4) Stress and strain; mechanics and recognition of geologic structures (faults, joints, folds, foliations, lineations, microstructures); introductory plate tectonics; introductory earthquake and seismology. Laboratory: geologic map interpretation, cross-section construction, fabric diagrams, fault-plate solutions, strain analysis, seismic interpretation. Field work: field observation and measurement, recording data, regional geology. 3 hours lecture and one 2-hour lab. Prereq: two 100-level geology courses, Mathematics 141-142, and Physics 135, or consent of instructor. Coreq: 310.

380 Planetary Geoscience (4) Geologic, geophysical, and geochemical systems and processes at planetary scales. Topics include accretion, differentiation, outgassing, seismology, magnetism, geochronology, remote sensing, processes modifying surface morphology and materials, geochemical cycles, planetary exploration. 3 hours lecture and one 2-hour lab. Prereq: 330 and 370 or consent of instructor.

381 Minerals and Energy Resources: Geologic Constraints and Environmental Impacts (3) Distribution and estimates of mineral and energy resources. Environmental impact of exploitation and utilization of conventional and alternate resources. Writing-emphasis course.

401 Quantitative Methods in Geology (3) Applications of calculus and differential equations to problems in the earth sciences. Examples of the difference equation in hydrogeology; the wave equation in geophysics; -mechanical modeling and boundary conditions in structural geology and tectonics. 3 hours lecture. Prereq: two 100-level geology courses and Mathematics 141, or consent of instructor.