INTERPRETATION OF THE COURSE LISTINGS

1. Subject area and course number.
2. Course title.
3. Credit hours
   a. When only one number is printed it is a fixed credit hour course.
   b. When two numbers are printed it is a variable credit hour course.

   The lower number is the minimum number of credits that a student may take in a section of this course in a semester. The higher is the maximum number of credits that a student may take in this course in a semester. A department may choose to offer a variable credit hour course as fixed in a particular semester, as long as the number of credit hours is within the range of the minimum and maximum for the course.

4. Grade types:
   a. When blank the course is a letter graded course.
   b. Course for which the grade is either pass or fail.
   c. R, RP - Not for baccalaureate credit.
   d. NR - No grade required.
5. Brief description of the course.
6. Prerequisites may be satisfied by the course or courses indicated or by equivalent preparation.
7. Corequisite course or courses should be taken in the same semester as the course.
8. Special requirements for the course. Some courses only offered during specific semesters have those semesters indentified here. Questions about when a course will be offered should be directed to the department.

Interpretation of course numbers:
001-099 Below baccalaureate degree.
100-199 Introductory-level courses.
200-299 Introductory and intermediate courses, usually requiring some previous knowledge or experience in the discipline.
300-399 Courses with a more concentrated focus on the subject matter in a particular discipline.
400-499 Advanced courses for majors and other qualified students.
500-599 Graduate-level courses for the nonspecialist.
600-699 Graduate-level courses, also open to advanced undergraduates.
800-899 Graduate-level courses.
900-999 Ph.D.-level courses.
X66 Special problems and independent study.
X67 Experimental course (may be offered twice).

Courses numbered 500 to 599 may not be taken for graduate credit in a student's major. With the approval of the graduate student's major department, 500-level courses taken outside the student's major may be counted toward graduate degree requirements.

Courses numbered 600 to 699 are graduate-level courses also open to qualified advanced undergraduates with the consent of the instructor. There should be a single standard of expectation and grading for all students registered at this level.

In those few cases where the number of either undergraduate students or graduate students does not permit adequate offerings of both a 400-level and a 600-level course, a graduate 600-level course may be combined with a separately numbered 400-level undergraduate course in the same section. The graduate component must then be offered with a graduate standard of expectation and grading.

The appropriateness of 600-numbered courses for undergraduate credit is subject to review by the Committee on Undergraduate Studies.
<table>
<thead>
<tr>
<th>CODES FOR SUBJECT AREAS</th>
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<tbody>
<tr>
<td>ACCT</td>
<td>Accounting</td>
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<td>AFSC</td>
<td>Air Force Science</td>
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<td>AGED</td>
<td>Agricultural Education</td>
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<td>Biological Sciences</td>
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<td>Business: Multidisciplinary Business Administration</td>
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<td>BMSC</td>
<td>Biomechanics and Movement Science</td>
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ACCOUNTING

ACCT 160  INTRODUCTION TO BUSINESS INFORMATION SYSTEMS I 3
Introduction to computers: components and operations. Introduction to management information/decision support systems and the system development process. Emphasis on microcomputers and software packages used in business.

ACCT 200  SURVEY OF ACCOUNTING 4
Survey of financial and managerial accounting concepts for the non-business major. Students learn about financial statements for merchandising, manufacturing, and service companies. Topics include: accounting cycle, budgeting, standard costing, contribution margins, cost-volume-profit analysis, and decision making.

ACCT 207  ACCOUNTING I 3
Introduction to financial accounting. Topics: the accounting cycle, merchandising accounting, accounting procedures for cash, receivables, payables, inventories, plant and equipment, stocks and bonds.

ACCT 208  ACCOUNTING II 3
Introduction to managerial accounting. Topics: manufacturing accounting, cost-volume-profit analysis, job-order accounting, budgeting, standard costs and variance analysis, contribution approach to decision analysis, absorption and variable costing.

ACCT 302  ACCOUNTING INFORMATION SYSTEMS 3
Accounting information and its place within an organization’s overall management information system. Emphasis on information and document flow, internal control, data organization, and the analysis, design, development, and audit of computer-based accounting systems. Includes some computer work.

ACCT 315  INTERMEDIATE ACCOUNTING I 3
In-depth coverage of financial accounting. Topics include: environment and conceptual framework of financial accounting, review of the accounting process, preparation of financial statements, recognition and measurement of current assets, property, plant and equipment and current liabilities.

ACCT 316  INTERMEDIATE ACCOUNTING II 3
Continuation of ACCT315. Topics include: recognition and measurement of investments, long-term liabilities and stockholders’ equity, dilutive securities and earning per share calculations; revenue recognition; accounting for income taxes, pensions and leases; accounting changes and error analysis; financial reporting and changing prices; preparation of the statement of cash flows; and disclosure requirements in financial reporting.

ACCT 327  COST ACCOUNTING 3
Process, job order and standard costing; variable and absorption costing; budgeting, decentralization, and transfer pricing; and cost analysis for managerial applications.

ACCT 350  BUSINESS LAW I 3
Formation, use and performance of contracts, including both Common Law and Uniform Commercial Code (Article 2, Sales). Other topics covered include product liability, negotiable instruments and accountants’ legal liability.

ACCT 351  BUSINESS LAW II 3
Covers a variety of areas of the law, including agency, partnerships, corporations, unfair competition, debtor-creditor relationships, bankruptcy, secured transactions, real and personal property, wills and trusts.

ACCT 352  LAW AND SOCIAL ISSUES IN BUSINESS 3
Focuses on the legal environment of business, including objectives of the law, sources of the law, the regulatory and judicial process, and the effect of government and society on the formation and evolution of the law.

ACCT 363  SERVICE LEARNING AND EARNED INCOME TAX CREDIT 3
Requires 8 hours of training in tax preparation for taxpayers with incomes low enough to qualify for the EITC (Earned Income Tax Credit). In addition, at least 34 hours of service preparing returns for this type of taxpayer is expected.

ACCT 364  ACCOUNTING IN PRACTICE 3
Requires at least 120 hours of accounting-related internship with verification by the hiring company. A term paper relating the real-world duties and experiences of the internship to principles learned in traditional accounting classes also required.

ACCT 366  INDEPENDENT STUDY 1-6
Seminar on selected topics in international accounting. Combines lectures and visits to local organizations.

ACCT 395  SEMINAR: INTERNATIONAL ACCOUNTING 3
Introduction to financial accounting. Topics: the accounting cycle, merchandising accounting, accounting procedures for cash, receivables, payables, inventories, plant and equipment, stocks and bonds.

ACCT 410  THEORY OF EXTERNAL REPORTING 3
Covers the traditional model of accounting for information users external to the firm as well as modern descriptive research. Examines the institutional environment and the impact of the organization on the development of accounting theory and practice.

ACCT 411  INCOME TAX ACCOUNTING 3
Analysis of recent revenue acts; use of federal law and regulations to determine tax liability.

ACCT 414  FEDERAL INCOME TAXATION: RESEARCH AND PLANNING 3
Introduction to tax research and corporate and partnership tax laws. Introduces research tools useful for analyzing tax issues. Student uses acquired skills to explore corporate and partnership taxation concepts.

ACCT 415  ADVANCED ACCOUNTING 3
Introduction to branch accounting, consolidations, partnerships, fund accounting for state and local governments, and accounting for international transactions. Other relevant topics may also be covered.

ACCT 416  ACCOUNTING IN PRACTICE 3
Introduction to branch accounting, consolidations, partnerships, fund accounting for state and local governments, and accounting for international transactions. Other relevant topics may also be covered.

ACCT 417  AUDITING 3
Introduction to the standards and procedures underlying contemporary auditing.

ACCT 425  STRATEGIC INFORMATION SYSTEMS AND ACCOUNTING 3
Examines the institutional environment and the impact of the organization on the development of accounting theory and practice.

ACCT 466  INDEPENDENT STUDY 1-6
Covers a variety of areas of the law, including agency, partnerships, corporations, unfair competition, debtor-creditor relationships, bankruptcy, secured transactions, real and personal property, wills and trusts.

ACCT 483  INTRODUCTION TO INTERNATIONAL ACCOUNTING 3
Covers a variety of areas of the law, including agency, partnerships, corporations, unfair competition, debtor-creditor relationships, bankruptcy, secured transactions, real and personal property, wills and trusts.

ACCT 490  FEDERAL INCOME TAXATION: RESEARCH AND PLANNING 3
Introduction to tax research and corporate and partnership tax laws. Introduces research tools useful for analyzing tax issues. Student uses acquired skills to explore corporate and partnership taxation concepts.

ACCT 491  ADVANCED ACCOUNTING 3
Introduction to branch accounting, consolidations, partnerships, fund accounting for state and local governments, and accounting for international transactions. Other relevant topics may also be covered.

ACCT 492  STRATEGIC INFORMATION SYSTEMS AND ACCOUNTING 3
Examines the institutional environment and the impact of the organization on the development of accounting theory and practice.

ACCT 563  SERVICE LEARNING AND EARNED INCOME TAX CREDIT 3
Requires 8 hours of training in tax preparation for taxpayers with incomes low enough to qualify for the EITC (Earned Income Tax Credit). In addition, at least 34 hours of service preparing returns for this type of taxpayer is expected.

ACCT 564  ACCOUNTING IN PRACTICE 3
Requires at least 120 hours of accounting-related internship with verification by the hiring company. A term paper relating the real-world duties and experiences of the internship to principles learned in traditional accounting classes also required.

ACCT 566  INDEPENDENT STUDY 1-6
Seminar on selected topics in international accounting. Combines lectures and visits to local organizations.

ACCT 595  SEMINAR: INTERNATIONAL ACCOUNTING 3
Introduction to financial accounting. Topics: the accounting cycle, merchandising accounting, accounting procedures for cash, receivables, payables, inventories, plant and equipment, stocks and bonds.

ACCT 614  FEDERAL INCOME TAXATION: RESEARCH AND PLANNING 3
Introduction to tax research and corporate and partnership tax laws. Introduces research tools useful for analyzing tax issues. Student uses acquired skills to explore corporate and partnership taxation concepts.

ACCT 800  FINANCIAL REPORTING AND ANALYSIS 3
Surveys concepts underlying financial accounting and external reporting. Provides an understanding of accounting methods, standards, and terminology so that students can interpret and evaluate financial statements. Students are encouraged to participate in class and group discussions involving contemporary investment issues and decisions.

RESTRICTIONS: Not open to M.S. in Accounting students.
ACCT 801 Management Control Systems and Information Technology 3
Examines the use of management control systems to influence and direct managerial behavior in accomplishing strategic objectives. The impact of information technology on their design and implementation is considered as well as the strategic use of technology to transform the organization and maintain competitive advantage.
PREREQ: ACCT800 or equivalent.
RESTRICTIONS: Not open to M.S. in Accounting students.
ACCT 804 Database Design, Networks and Implementation 3
Covers the design and implementation of enterprise databases in a business environment. Special consideration will be placed on issues related to systems in a networked setting, including current topics related to the management and implementation of databases in such systems.
RESTRICTIONS: Open to business and accounting graduate students only.
ACCT 805 Current Issues In Management Information Systems 3
Addresses current information technology challenges facing today’s corporate management. Although content will constantly change to reflect current technology and emerging issues, topics include: ethics, management of the impact of new information systems on corporate environments, implementation issues, and changing systems in a global environment.
RESTRICTIONS: Open to business and accounting graduate students only.
ACCT 806 Systems Analysis, Design and Implementation 3
Explores the management, organizational and technical challenges of developing systems. Analyzes business processes within a data-driven development methodology. Students will elicit requirements, weigh alternatives and design and implement solutions. Data, process and object modeling will be covered.
PREREQ: ACCT804.
RESTRICTIONS: Open to MS: Information Systems & Technology Management, MIS: Accounting, and MBA majors with a concentration in Information Technology.
ACCT 810 Theory of External Reporting 3
Study of contemporary models of accounting for information users external to the firm. Includes an examination of the institutional environment and the impact of the institutions on the development of accounting theory and practices.
PREREQ: ACCT316.
ACCT 811 Advanced Management Accounting 3
Examination of concepts and rationale underlying managerial accounting methods. Advanced topics in decision analysis, standard costing and performance measurement.
PREREQ: ACCT327.
ACCT 812 Corporate Tax Planning and Decision Making 3
Topics include gross income; business deductions and credits, taxable entities; special limitations on business and passive activity losses; compensation planning; tax factors in the acquisition, use of the disposition of fixed assets, non-taxable transaction; and family tax planning.
RESTRICTIONS: Not open to students with prior tax courses.
ACCT 817 Information Technologies Audit 3
Analysis of current and prospective developments in professional auditing. Topics include auditing computerized systems and the use of statistical sampling by the auditor.
PREREQ: ACCT417.
ACCT 820 Financial Statement Analysis 3
Examines contemporary aspects of financial statement analysis such as the supply and demand for accounting information, statistical properties of accounting numbers and the impact of information on securities prices.
PREREQ: ACCT800.
ACCT 840 Contemporary Issues in Accounting 3
Selected problems of current interest to the accounting profession.
PREREQ: ACCT316 and ACCT327.
RESTRICTIONS: Requires permission of instructor.
ACCT 868 Research 1-6
ACCT 883 International Accounting 3
Describes the functions of international accounting: foreign currency transactions, financial statement translation, inflation, auditing, and taxation. A comparative approach is stressed. Current issues are covered as appropriate.
PREREQ: ACCT800 or equivalent.

Air Force Science

AFSC 110 Foundations of the United States Air Force I 1
Introduces role in society of Department of Defense and Air Force. Emphasis placed on Air Force doctrine, mission and organization, as well as United States strategic offensive forces. Introduces concept of professionalism and assesses oral and written communication skills.
AFSC 111 Foundations of the United States Air Force II 1
Continuation of AFSC110. Emphasis on mission, organization and function of United States Air Force strategic, defensive, general purpose and aerospace support forces. Includes understanding use of army, naval and reserve forces in achieving national security objectives. Assesses oral and written communication skills.
AFSC 150 Initial Military Training I 0 PF
Provides instruction on ROTC program and overview to Air Force skills and life.
COREQ: AFSC110.
RESTRICTIONS: Open to freshmen and sophomores.
AFSC 151 Initial Military Training II 0 PF
Continuation of AFSC150. Provides instruction on ROTC program and overview to Air Force skills and life.
COREQ: AFSC111.
RESTRICTIONS: Open to freshmen and sophomores.
AFSC 210 Evolution of United States Air and Space Power I 1
Focuses on development of air power from its beginning through two world wars; evaluates air power concepts, doctrine and role of technology in growth of air power; considers air power development in military and non-military operations in support of national objectives. Assesses oral and written communication skills.
AFSC 211 Evolution of United States Air and Space Power II 1
Continuation of AFSC210. Focuses on growth and development of air and space power since 1945 in response to Korea, the Cold War, Southeast Asia, Persian Gulf and Space Age. Also includes peaceful employment of air and space forces for relief and civic action programs. Assesses oral and written communication skills.
AFSC 250 Field Training Preparation I 0 PF
Prepares cadets to attend the summer training program required for all those wishing to earn a commission through the ROTC program.
RESTRICTIONS: Open to sophomores and juniors. Required for all cadets planning to attend field training in the next year.
AFSC 251 Field Training Preparation II 0 PF
Continuation of AFSC250. Prepares cadets to attend summer training program required for all those wishing to earn commission through Air Force ROTC program.
RESTRICTIONS: Open to sophomores and juniors. Required for all cadets planning to attend field training in the next year.
AFSC 310 Leadership Studies I 3
Focuses on applying concepts in leadership and management by comprehending leadership styles and managerial functions, concepts of individual motivation and organizational/group dynamics, and decision-making processes. Emphasizes oral and written communication skills, leadership research and behavior.
AFSC 311 Leadership Studies II 3
Continuation of AFSC310. Emphasis on understanding and applying management concepts, principles and functions in relation to the organization and work environment. Continued emphasis on oral and written communication skills, leadership research and behavior.
AFSC 350 Intermediate Cadet Leader Training I 0 PF
Allows cadets to practice leadership skills and Air Force specific skills.
COREQ: AFSC310.
RESTRICTIONS: Restricted to those cadets who have completed Field Training.
AFSC 351 Intermediate Cadet Leader Training II 0 PF
Continuation of AFSC350. Allows cadets to practice leadership skills and Air Force specific skills.
COREQ: AFSC311.
RESTRICTIONS: Restricted to those cadets who have completed Field Training.
AFSC 410 National Security Affairs I 3
Focuses on political, economic and social constraints in international environment and their effects on formulation of United States defense policy. Also includes impact of technology, doctrine, alliances, arms control and terrorism on national security policy. Emphasizes oral and written communication skills.
Agricultural Education

AGED 180 Introduction to Agricultural Education 3
Provides foundation for planning activities necessary for agricultural education program. Historical foundations, purposes and roles of schools, contemporary issues and careers in agricultural education discussed. Early field-based experience and portfolio development included.
RESTRICTIONS: Freshman or sophomore classification or approval of instructor.
AGED 228 Special Problem 1-3
AGED 220 FFA and Supervised Agricultural Experience 3
Acquaints students with activities necessary for agricultural education program, specifically history and structure of FFA chapter and development of individualized supervised agricultural experiences for high school students.
RESTRICTIONS: Freshman or sophomore classification or approval of instructor.
AGED 366 Independent Study 1-6
AGED 425 Agricultural Leadership: Tools and Techniques 3
Topics include leadership theories, team work, facilitation, internet research, problem solving and facilitating team activities focused on agricultural industries and professions.
AGED 448 Student Teaching Seminar 3
Provides support to undergraduates during their student teaching experience. Covers various aspects of professional development, portfolio development, and classroom management.
RESTRICTIONS: Open to majors only.
AGED 466 Independent Study 1-6
AGED 480 Career and Technical Education Materials and Approaches I 3
Teaching methods, treatment of aims, materials, unit organization, evaluation and teaching techniques. Participation in career and technical student organization activities required.
PREREQ: Students must show evidence of passing Praxis I.
RESTRICTIONS: School practicum of 12 hours required.
AGED 481 Career and Technical Education Materials and Approaches II 3
Methods of teaching and organization in supervised career and technical programs, applied technical skills and adult education and community activities. Participation in career and technical student organization activities required.
AGED 600 Internship in Teaching 9
Fourteen week teaching internship experience in 7th-12th grade schools under guidance and supervision of cooperating teacher in the classroom and University of Delaware supervisor.
PREREQ: Students must show evidence of passing Praxis I.
AGED 625 Agricultural Leadership: Tools and Techniques 3
Topics include leadership theories, team work, facilitation, internet research, problem solving and facilitating team activities focused on agricultural industries and professions.
AGED 648 Student Teaching Seminar 3
Use of multiple assessment indicators in formative evaluation of improvement of candidate’s teaching effectiveness.
PREREQ: Completion of at least 21 graduate credits toward master’s degree and evidence of passing Praxis II content area as specified by the State of Delaware.
RESTRICTIONS: Restricted to those cadets who have completed Field Training.
AGED 666 Special Problem 1-12
AGED 680 Career and Technical Education Materials and Approaches I 3
Teaching methods, treatment of aims, materials, unit organization, evaluation and teaching techniques. Participation in career and technical student organization activities required.
AGED 681 Career and Technical Education Materials and Approaches II 3
Methods of teaching and organization in supervised career and technical programs; applied technical skills and adult education and community activities. Participation in student career and technical activities required.
PREREQ: Students must show evidence of passing Praxis I.
RESTRICTIONS: School practicum of 12 hours required.

Agriculture

AGRI 164 Practical Teamwork Experience 1-3
Examines roles of leaders, strategies for working in teams, and principles of event planning. Final project is planning and execution of Ag Day, a college-wide community event.
RESTRICTIONS: Limited to majors in College of Agriculture and Natural Resources.
AGRI 165 Mastering the Freshman Year 1 PF
Focuses on academic services, career exploration and preparation, campus resources, and practical skills helpful in mastering freshman year.
RESTRICTIONS: Limited to freshmen in College of Agriculture and Natural Resources.
AGRI 211 Literature of the Agricultural and Life Sciences 1
Promotes familiarity with arrangement of card catalog, guides to literature, indexes to periodical literature, abstracting services, bibliographic form, and scientific papers and reports. Aids students in scientific writing and reporting.
RESTRICTIONS: Not open to freshmen.
AGRI 212 Oral Communication in Agriculture and Natural Resources 3
Introduces basic communication principles and provides series of experiences designed to develop skills needed for oral presentations and other forms of public and interpersonal communication.
RESTRICTIONS: Open to majors only.
AGRI 399 Teaching Assistant 1-4 PF
Practical teaching experience. Students participate and assist in instruction of undergraduate course.
PREREQ: Must have taken the course for which assisting, or have equivalent experience.
RESTRICTIONS: An overall gpa of 2.5 or better is required. Maximum of 4 credits may count toward graduation.

American Material Culture Studies

AMCS 216 Introduction to Material Culture Studies 3
See ANTH216 for course description.
AMCS 243 American Decorative Arts, 1700-1900 3
See ARTH243 for course description.
AMCS 402 American Material Culture Research Seminar 3
Balanced emphasis on writing skills, research strategies and interpretation related to study of American material culture. Students develop research projects drawing on collections of local and regional museums, libraries and historical agencies.
PREREQ: ANTH216.
RESTRICTIONS: Open to majors only.
AMCS 425 Seminar in American Art 3
See ARTH425 for course description.
RESTRICTIONS: May be repeated for credit when topics vary.
<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMCS 464</td>
<td>American Material Culture Studies Internship</td>
<td>3</td>
<td>Internship practicum supplementing theoretical and methodological background in administration, collections management, exhibition, research, interpretation, and public programming and services of museums. Students intern at University Gallery or other acceptable museum, related institution or organization in United States. PREREQ: ANTH216. RESTRICTIONS: Open to majors only.</td>
</tr>
<tr>
<td>ANSC 101</td>
<td>Introduction to Animal Science</td>
<td>3</td>
<td>Introduction to understanding of how animals function - genetics, nutrition, reproductive physiology, behavior and animal health. Begins with dialogue about human-animal bond and role of animals in society, and ends with discussion of how agricultural animals managed to produce safe and healthy food. COREQ: ANSC 111. RESTRICTIONS: Corequisite mandatory for majors, optional for nonmajors. Offered in Fall only.</td>
</tr>
<tr>
<td>ANSC 111</td>
<td>Animal Science Laboratory</td>
<td>1</td>
<td>Laboratory providing opportunity to handle animals and to become familiar with common management practices. COREQ: ANSC 101. RESTRICTIONS: Corequisite mandatory for majors, optional for nonmajors. Offered in Fall only.</td>
</tr>
<tr>
<td>ANSC 140</td>
<td>Functional Anatomy of Domestic Animals</td>
<td>4</td>
<td>Identification of relationship between form and function in domestic farm animals. Comparative examination of body systems in order to better understand various management practices employed in animal agriculture. Serves as prerequisite for advanced departmental courses. RESTRICTIONS: Offered in Spring only.</td>
</tr>
<tr>
<td>ANSC 165</td>
<td>Freshman First Year Experience</td>
<td>1 PF</td>
<td>Provides practical skills that foster academic and social competencies necessary for success in college. Focuses on academic services, campus resources, career exploration and preparation. RESTRICTIONS: Limited to freshmen majors.</td>
</tr>
<tr>
<td>ANSC 166</td>
<td>Special Problem</td>
<td>1-3</td>
<td>RESTRICTIONS: Contract must have department chair signature. Independent study to involve library or lab research.</td>
</tr>
<tr>
<td>ANSC 220</td>
<td>Introduction to Equine Science</td>
<td>4</td>
<td>Study of equine science and husbandry. Instruction focuses on physiology, anatomy, genetics, behavior, reproduction and nutrition. Complement labs stress: systems care, safety, handling; feed identification and basic equipment and use. Accentuates unique equine biology and science foundational to understanding function and husbandry. PREREQ: ANSC 101 or permission of instructor.</td>
</tr>
<tr>
<td>ANSC 230</td>
<td>Foodborne Diseases: Investigating Outbreaks</td>
<td>3</td>
<td>See FOSC 230 for course description.</td>
</tr>
<tr>
<td>ANSC 251</td>
<td>Animal Nutrition</td>
<td>3</td>
<td>Comparative study of digestive anatomy, nutrients, their metabolism and physiological function in animals of agricultural importance. Examines factors affecting nutrient requirements of animals. Emphasis on effects of plane of nutrition on productivity, health and well-being of animals. PREREQ: ANSC 101 and ANSC 140.</td>
</tr>
<tr>
<td>ANSC 252</td>
<td>Animal Nutrition Laboratory</td>
<td>1</td>
<td>Application of nutritional principles to animal feeding, nutritional value of feed ingredients and methods of assessment. Principles of ration formulation. PREREQ: ANSC 251 may be prerequisite or corequisite.</td>
</tr>
<tr>
<td>ANSC 261</td>
<td>Principles of Companion Animal Nutrition</td>
<td>3</td>
<td>Overview of principles of nutrition as applied to companion animals with emphasis on canine and feline nutrition.</td>
</tr>
<tr>
<td>ANSC 262</td>
<td>Practical Veterinary Experience</td>
<td>1-3 PF</td>
<td>Opportunity to gain experience by working with a veterinarian. Student responsible for making contact with veterinarian. RESTRICTIONS: Not for major credit. Offered in Winter only.</td>
</tr>
<tr>
<td>ANSC 265</td>
<td>Sophomore Seminar</td>
<td>1</td>
<td>Emphasis on career development. Preparation for veterinary medicine and other careers in light of current and future trends in field. RESTRICTIONS: Open only to sophomore animal science majors.</td>
</tr>
<tr>
<td>ANSC 266</td>
<td>Special Problem</td>
<td>1-3</td>
<td>RESTRICTIONS: Contract must have department chair signature. Independent study to involve library or lab research.</td>
</tr>
<tr>
<td>ANSC 270</td>
<td>Biotechnology: Science and Socioeconomic Issues</td>
<td>3</td>
<td>Introduction to agricultural biotechnology and socio-economic issues. Introduces genetic engineering and basic scientific theory and applications of biotechnology in agriculture production and research. Presents issues surrounding biotechnology-risk and technology assessment, animal rights, public and private research interface, media and environmental perspectives, consumer acceptance, regulation and economic development. May be cross-listed with FREC 270 and/or PLSC 270.</td>
</tr>
<tr>
<td>ANSC 300</td>
<td>Principles of Animal and Plant Genetics</td>
<td>3</td>
<td>Introduction to theory and application of genetics as related to improvement of plants and animals. May be cross-listed with ENWC 300 and/or PLSC 300. PREREQ: ANSC 101 and ANSC 140, or PLSC 101 or BISC 208.</td>
</tr>
<tr>
<td>ANSC 305</td>
<td>Food Science</td>
<td>3</td>
<td>See FOSC 305 for course description.</td>
</tr>
<tr>
<td>ANSC 310</td>
<td>Animal and Plant Genetics Laboratory</td>
<td>1</td>
<td>Laboratory exercises concerning genetic concepts, methods and applications using various plant and animal systems. May be cross-listed with ENWC 310 and/or PLSC 310. COREQ: ANSC 300.</td>
</tr>
<tr>
<td>ANSC 315</td>
<td>Food Safety From Farm to Fork</td>
<td>3</td>
<td>See FOSC 315 for course description. PREREQ: BISC 207 or equivalent. RESTRICTIONS: Offered in Spring semester.</td>
</tr>
<tr>
<td>ANSC 324</td>
<td>Equine Disease and Lameness</td>
<td>3</td>
<td>Study of infectious and non-infectious diseases common to the horse. Principles of pathophysiology, manifestation, prevention, and control of disease emphasized. Approximately one third of course content includes types, cause, prevention, and management of musculoskeletal disease (lameness) in the horse.</td>
</tr>
<tr>
<td>ANSC 328</td>
<td>Food Chemistry</td>
<td>4</td>
<td>See FOSC 328 for course description.</td>
</tr>
<tr>
<td>ANSC 329</td>
<td>Food Analysis</td>
<td>4</td>
<td>See FOSC 329 for course description. PREREQ: CHEM 214 or CHEM 227, and CHEM 220.</td>
</tr>
<tr>
<td>ANSC 332</td>
<td>Introduction to Animal Diseases</td>
<td>3</td>
<td>Nature and mechanisms of disease processes with emphasis on their prevention and control. PREREQ: ANSC 140.</td>
</tr>
<tr>
<td>ANSC 366</td>
<td>Independent Study</td>
<td>1-6</td>
<td>RESTRICTIONS: Contract must have department chair signature. Independent study to involve library or lab research.</td>
</tr>
<tr>
<td>ANSC 390</td>
<td>Honors Colloquium</td>
<td>3</td>
<td>First year interdisciplinary Honors seminar. May be team-taught, specific topics vary.</td>
</tr>
<tr>
<td>ANSC 399</td>
<td>Teaching Assistant</td>
<td>1-2 PF</td>
<td>Practical teaching experience. Students participate and assist in instruction of an undergraduate course. RESTRICTIONS: A GPA of 2.75 (3.0 in major) required. Students must have taken the course or have equivalent experience.</td>
</tr>
<tr>
<td>ANSC 404</td>
<td>Dairy Production</td>
<td>4</td>
<td>Principles of modern dairy production units emphasizing nutrition, reproduction, housing, health, management and lactation. PREREQ: ANSC 101 and ANSC 245. RESTRICTIONS: Offered in Spring of even-numbered years. Laboratory requires some out of class time for hands-on experience in animal production facilities.</td>
</tr>
<tr>
<td>ANSC 409</td>
<td>Food Processing I</td>
<td>4</td>
<td>See FOSC 409 for course description.</td>
</tr>
<tr>
<td>ANSC 415</td>
<td>Vertebrate Developmental Morphology</td>
<td>3</td>
<td>See BISC 415 for course description. PREREQ: BISC 207 and BISC 208.</td>
</tr>
<tr>
<td>ANSC 417</td>
<td>Beef Cattle and Sheep Production</td>
<td>4</td>
<td>Principles of modern beef cattle and sheep production; nutrition, reproduction, housing, health and management. PREREQ: ANSC 101 and ANSC 251. RESTRICTIONS: Laboratory requires some out-of-class time for hands-on experience in animal production. Offered in Spring of odd-numbered years.</td>
</tr>
</tbody>
</table>

ANIMAL SCIENCE
ANSC 418 SWINE PRODUCTION 4
Principles of modern swine production: nutrition, reproduction, housing, health and management.
PREREQ: ANSC101 and ANSC251.
RESTRICTIONS: Laboratory requires some out-of-class time for hands-on experience in animal production. Offered in Spring of odd-numbered years.

ANSC 419 TOPICS IN INTERNATIONAL ANIMAL AGRICULTURE 3-4
Instruction in animal production taught as part of study abroad course. Topics vary with program location and focus.
PREREQ: ANSC101.

ANSC 420 EQUINE REPRODUCTIVE MANAGEMENT 4
Provides an in-depth study of the anatomy, endocrinology, physiology, behavior, and management of the mare, stallion, and foal. Laboratory provides an opportunity to care for a pregnant mare, to be present at foaling, and care for the newborn foal.
PREREQ: ANSC101 and ANSC220 or permission of instructor.

ANSC 421 POULTRY PRODUCTION 4
Application of fundamental principles of incubation, feeding, brooding, growing, disease control, processing and marketing as applied to broilers, heavy breeders and commercial egg producers. Additional hands-on experience outside of class is required.
PREREQ: ANSC101 and ANSC140.

ANSC 424 NONRUMINANT NUTRITION 3
Advanced comparative study of digestion, absorption and metabolism of nutrients in terms of needs of nonruminant animals. Application of principles to swine, poultry and equine nutrition.
PREREQ: ANSC251, CHEM214.
RESTRICTIONS: Offered in Spring of odd-numbered years.

ANSC 435 VIROLOGY 3
Lecture-based introduction to virus functional characterization including classification methods, replication strategies and pathogen-host interactions. Content stresses current methods in the diagnosis and analysis of viruses associated with important animal diseases.
PREREQ: ANSC431 or BISC300.

ANSC 436 IMMUNOLOGY OF DOMESTIC ANIMALS 3
Comparative study of immune response of domestic animals including dog, cat, horse, pig, chicken and others. General topics include ontogeny of immune system, reproductive immunity, neonatal immunity, immunodeficiencies and autoimmunity.
PREREQ: ANSC332 and BISC207.
RESTRICTIONS: Offered in Fall of even-numbered years.

ANSC 441 REPRODUCTIVE PHYSIOLOGY OF DOMESTIC ANIMALS 3
Emphasis on physiology and endocrinology of reproductive function in males and females, comparative aspects of reproductive function and opportunity for enhancing production through newer management practices. Discussion and laboratory involve both classic and current state of knowledge in mammalian and avian reproduction.
PREREQ: ANSC140. BISC306 strongly recommended.

ANSC 442 LACTATIONAL PHYSIOLOGY 3
Fundamentals of physiology and metabolism involved in initiation, maintenance and cessation of lactation. Neuroendocrine control of lactation, nutrient absorption and processing by mammary gland and control of milk composition. Covers mammals of commercial dairy importance as well as rodents, horses and humans.
PREREQ: ANSC140.

ANSC 445 COMPARATIVE PHYSIOLOGY OF DOMESTIC ANIMALS 3
Comparative approach to study of physiology of domestic animals of economic importance in animal agriculture. Emphasis on cardiovascular physiology, immune system, excretion, respiration, stress physiology and control and coordination of body functions via nervous and endocrine systems.
PREREQ: ANSC140.
RESTRICTIONS: Offered in Fall only. Required for prevet concentration.

ANSC 454 RUMINANT NUTRITION 3
Practical and applied aspects of ruminant nutrition with emphasis on dairy. Topics include basic nutrient requirements and nutrition management aspects for different age and production classes of dairy cattle.
PREREQ: ANSC101, ANSC111 and ANSC251. ANSC404 or ANSC417 recommended.

ANSC 464 ANIMAL SCIENCE FIELD EXPERIENCE 1-12 PF
Opportunity to gain work experience in field related to animal sciences and to explore potential occupational areas.
RESTRICTIONS: Over six credits by permission of chair only. A clear understanding of supervision and reporting is required.

ANSC 466 INDEPENDENT STUDY 1-6
RESTRICTIONS: Contract must have department chair signature. Independent study to involve library or lab research.

ANSC 470 PRINCIPLES OF MOLECULAR GENETICS 3
Fundamentals of nucleic acid biochemistry (replication, repair and recombination) and bacterial genetics are studied to provide background needed for detailed study of selected topics in animal and plant molecular biology.
PREREQ: BISC401/411 and ANSC300.

ANSC 615 VETERINARY DEVELOPMENTAL BIOLOGY 3
See BISC615 for course description.
PREREQ: BISC401/411 and BISC403/413.
RESTRICTIONS: Requires approval of instructor.

ANSC 629 FOOD ANALYSIS 4
See FOSC629 for course description.

ANSC 630 TRACE MINERALS AND VITAMINS 3
See NTDT630 for course description.

ANSC 632 ELEMENTS OF PATHOLOGY 3
Microscopic and gross changes in cells, tissues and organs as result of disease process.
PREREQ: ANSC332 or ANSC633.

ANSC 633 POULTRY PATHOLOGY 3
Study of poultry diseases with emphasis on their causes, prevention, treatment and control.
PREREQ: ANSC332, ANSC431 and ANSC633.

ANSC 635 VIROLOGY 3
Lecture-based introduction to virus functional characterization including classification methods, replication strategies and pathogen-host interactions. Content stresses current methods in diagnosis and analysis of viruses associated with important animal diseases.
PREREQ: ANSC431 or BISC300.

ANSC 636 IMMUNOLOGY OF DOMESTIC ANIMALS 3
Comparative study of immune response of domestic animals including dog, cat, horse, pig, chicken and others. General topics include ontogeny of immune system, reproductive immunity, neonatal immunity, immunodeficiencies and autoimmunity.
PREREQ: ANSC332 and BISC207.
RESTRICTIONS: Offered in Fall of even-numbered years.

ANSC 637 AVIAN IMMUNOLOGY 3
Advanced study of avian immune system covering cellular and humoral immune responses; autoimmunity; neuroendocrine-immune interactions; nutritional effects on immune system; and immunogenetics.
RESTRICTIONS: Offered in Spring of even-numbered years.

ANSC 639 FOOD MICROBIOLOGY 4
See FOSC639 for course description.

ANSC 644 BIOINFOMATIC 3
Examines computer applications to biological sciences with emphasis upon genomics and proteomics applications. No computer programming experience required.

ANSC 654 ADVANCED RUMINANT NUTRITION 3
Emphasis of metabolic aspects of ruminant microbiology and intermediary metabolism. Discussions on methods to partition nutrients at tissue level and methods to alter rumen fermentation.
May be cross-listed with NTDT654.
PREREQ: Undergraduate or graduate courses in nutrition, microbiology, biochemistry, ANSC454 or equivalents. ANSC404 or ANSC417 recommended.

ANSC 668 RESEARCH 1-6

ANSC 670 PRINCIPLES OF MOLECULAR GENETICS 3
Fundamentals of nucleic acid biochemistry (replication, repair, and recombination) and bacterial genetics provide background needed for detailed study of selected topics in animal and plant molecular biology.
PREREQ: BISC401/411 and ANSC300.

ANSC 851 SPECIAL TOPICS IN ANIMAL NUTRITION 1-3
Advanced study in selected current topics of ruminant and/or nonruminant nutrition.
PREREQ: Course in advanced nutrition.
RESTRICTIONS: May be repeated for credit when topics vary.

ANSC 856 SEMINAR 1

ANSC 868 RESEARCH 1-9

ANSC 869 MASTER'S THESIS 1-6
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSC 874</td>
<td>Topics in Molecular Biology</td>
<td>1</td>
</tr>
<tr>
<td>ANSC 964</td>
<td>Pre-Candidacy Study</td>
<td>3-12 PF</td>
</tr>
<tr>
<td>ANSC 969</td>
<td>Doctoral Dissertation</td>
<td>1-12 PF</td>
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</table>

**Anthropology**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANTH 101</td>
<td>Introduction to Social and Cultural Anthropology</td>
<td>3</td>
</tr>
<tr>
<td>ANTH 102</td>
<td>Introduction to Biological Anthropology</td>
<td>3</td>
</tr>
<tr>
<td>ANTH 103</td>
<td>Introduction to Prehistoric Archaeology</td>
<td>3</td>
</tr>
<tr>
<td>ANTH 104</td>
<td>Introduction to Archaeology and Biological Anthropology</td>
<td>3</td>
</tr>
<tr>
<td>ANTH 105</td>
<td>Introduction to Historical Archaeology</td>
<td>3</td>
</tr>
<tr>
<td>ANTH 200</td>
<td>Introduction to the History of Anthropological Theory</td>
<td>3</td>
</tr>
<tr>
<td>ANTH 201</td>
<td>Visualizing Humanity: Ethnographic Film</td>
<td>3</td>
</tr>
<tr>
<td>ANTH 202</td>
<td>Human Evolution and the Fossil Record</td>
<td>3</td>
</tr>
<tr>
<td>ANTH 205</td>
<td>Anthropology and Human Nature</td>
<td>3</td>
</tr>
<tr>
<td>ANTH 210</td>
<td>Peoples and Cultures of Southeast Asia</td>
<td>3</td>
</tr>
<tr>
<td>ANTH 211</td>
<td>Peoples and Culture of East Asia</td>
<td>3</td>
</tr>
<tr>
<td>ANTH 212</td>
<td>Peoples and Cultures of the Muslim World</td>
<td>3</td>
</tr>
<tr>
<td>ANTH 213</td>
<td>Food, Gender and Culture</td>
<td>3</td>
</tr>
<tr>
<td>ANTH 214</td>
<td>Peasant Societies</td>
<td>3</td>
</tr>
<tr>
<td>ANTH 215</td>
<td>Peoples and Cultures of the Southwest</td>
<td>3</td>
</tr>
<tr>
<td>ANTH 216</td>
<td>Indians of North America</td>
<td>3</td>
</tr>
<tr>
<td>ANTH 217</td>
<td>Peoples of the World</td>
<td>3</td>
</tr>
<tr>
<td>ANTH 218</td>
<td>Anthropological studies of societies and culture areas throughout the world to illustrate their characteristics and anthropological issues.</td>
<td>3</td>
</tr>
<tr>
<td>ANTH 219</td>
<td>Anthropology of Food</td>
<td>3</td>
</tr>
<tr>
<td>ANTH 220</td>
<td>Arts and Crafts of Native North America</td>
<td>3</td>
</tr>
<tr>
<td>ANTH 221</td>
<td>Contemporary Native American Culture Issues</td>
<td>3</td>
</tr>
<tr>
<td>ANTH 222</td>
<td>Introduction to Ethnics Arts</td>
<td>3</td>
</tr>
<tr>
<td>ANTH 223</td>
<td>Applied Anthropology</td>
<td>3</td>
</tr>
<tr>
<td>ANTH 224</td>
<td>Hunting Societies</td>
<td>3</td>
</tr>
<tr>
<td>ANTH 225</td>
<td>Peoples and Cultures of the Middle East</td>
<td>3</td>
</tr>
</tbody>
</table>

**Additional Notes**

- ANTH 101, ANTH 102, ANTH 103, ANTH 104, ANTH 105, ANTH 200, ANTH 201, ANTH 202, ANTH 205, ANTH 210, ANTH 211, ANTH 212, ANTH 213, ANTH 214, ANTH 215, ANTH 216, ANTH 217, ANTH 218, ANTH 219, ANTH 220, ANTH 221, ANTH 222, ANTH 223, ANTH 224, ANTH 225: May be cross-listed with other courses.
- ANTH 102 requires completion of all required course work.
- ANTH 213 requires permission of instructor.
- ANTH 224 requires permission of instructor.
- ANTH 222 requires permission of instructor.
- ANTH 224 may be cross-listed with AMCS216.

**Restrictions:**

- Neither anthropology major nor degree credit will be granted for ANTH103 if ANTH102 is taken.
- ANTH102 if ANTH104 is taken.
- ANTH103 if ANTH104 is taken.
ANTH 265  HIGH CIVILIZATIONS OF THE AMERICAS  3
Origin and development of pre-Columbian civilizations in Gulf Coast lowlands, Central Mexico, Yucatan peninsula and Andean area.

ANTH 269  EARLY CIVILIZATIONS OF THE OLD WORLD  3
Early civilization in Southeast Asia, Near East, Egypt, China and India.

ANTH 275  DELAWARE PREHISTORIC ARCHAEOLOGY  3
Overview of prehistoric lifeways of Delaware. Considers relationships between people and their environments on Delmarva Peninsula from first inhabitants at end of the Ice Age to arrival of European colonists.

ANTH 278  HISTORIC CULTURES OF THE MIDDLE ATLANTIC REGION  3
Explores development of American culture utilizing Middle Atlantic region - today's states of Delaware, Maryland, New Jersey, Pennsylvania, New York and Virginia - as microcosm. Takes comparative and synthetic approach, drawing on work of scholars in several disciplines.

ANTH 300  PRIMATOLOGY  3
Survey of nonhuman primates, including their taxonomy and biological characteristics, and study of their behavior and how it relates to human behavior.

ANTH 305  THE EVOLUTION OF HUMAN SEX ROLES AND REPRODUCTION  3
Survey of human reproduction and sex differences. Evidence derived from human fossil record, living non-human primates, modern biological differences between human males and females and cross-cultural comparisons of reproductive behavior and sex roles.

ANTH 310  ASIAN WOMEN'S LIVES  3
Using examples from China, Japan, Southeast Asia, South Asia, and the Middle East, examines how lives of Asian women have been constructed by cultural, historical, and international forces and seeks to understand challenge culturally pervasive stereotypes that define their lives.

ANTH 311  THE ANTHROPOLOGY OF TOURISM  3
Views tourism as international industry, cultural practice and phenomenon of globalization. Examines such topics as tourism and modernity, sexual and romantic tourism, ecotourism and environmental tourism, tourism and "authenticity."

ANTH 312  ASIAN WOMEN IN THE GLOBALIZED WORKPLACE  3
Focuses on relationship between work, gender, and social, cultural, and economic transformations associated with globalization in East and Southeast Asia.

ANTH 313  ANTHROPOLOGY OF ELITES: THE NEW RICH IN ASIA  3
Economic and social changes in Asia produced a newly affluent middle class. Focuses on relationship between work, gender, and social, cultural, and economic transformations associated with globalization in East and Southeast Asia.

ANTH 314  IMMIGRANT ISLAM: THE MUSLIM DIASPORA IN THE WEST  3
Examines social and cultural aspects of transnational Muslim cultures in the West, focusing on nature of and responses to Islamic immigration to Western Europe.

ANTH 316  ISLAM AND GENDER  3
Uses anthropological case studies and historical material to comprehend ideals, practices, and themes of gender and gender relations in Islam. Introduces representations of Islamic belief in doctrinal, historical, and contemporary contexts.

ANTH 320  PREHISTORY OF NORTH AMERICA  3
Major cultural and social developments of prehistoric humans in North America, from entrance of Paleolithic to arrival of Europeans in sixteenth century.

ANTH 322  PREHISTORY OF SOUTH AMERICA  3
Survey of prehistoric developments in South America. Focuses on major cultural and social developments in prehistoric humans in South America, from entrance of Paleolithic to arrival of Europeans in sixteenth century.

ANTH 324  OLD WORLD ARCHAEOLOGY  3
Survey of world prehistory, excluding Americans, from earliest evidence of human activity until rise of civilizations with particular emphasis on technological, economic and social change.

ANTH 325  PEOPLES OF EUROPE  3
Cultures and subscultures of Europe, with special attention to rural sectors and their historical development.

ANTH 328  MAYAN ART AND ARCHITECTURE  3
See ANTH338 for course description.

ANTH 330  DEVELOPMENT AND UNDERDEVELOPMENT  3
Anthropological perspectives of sociocultural change in Africa, Asia and Latin America. Emphasis on economic and political relationships established between these areas and industrial societies.

ANTH 333  PEOPLES OF AFRICA  3
Social institutions and cultural traditions of Africa; political, economic, legal and kinship systems, and modes of thought.

ANTH 337  SOUTH AMERICAN INDIANS  3
Types of Indian cultures in contemporary South America: cultural traditions and social institutions of Indian communities, especially tribes of the tropical forest.

ANTH 338  ARTS AND CRAFTS OF NATIVE SOUTH AMERICA  3
Arts and crafts technological processes invented by or available to tribal societies of South America. Artistic and technical achievements in ceramic and textile.

ANTH 342  ISSUES IN AMERICAN CULTURE: ARCHAEOLOGICAL PERSPECTIVES  3
Archaeological perspectives on issues of concern in contemporary American culture, including environment, multiculturalism, war, gender, technology and production, and class.

ANTH 351  RACE AND ETHNICITY IN LATIN AMERICA  3
Examines origins, development, and current status of Amish, Mennonite and Brethren communities in United States. Special emphasis on varied methods these groups used to establish and maintain visible and distinctive identity separate from mainstream American culture. Merchandizing and consumption of their separate identity through tourism also discussed.

ANTH 363  WOMEN IN CROSS-CULTURAL PERSPECTIVE  3
See WOMS363 for course description.

ANTH 366  INDEPENDENT STUDY  1-6

ANTH 370  CULTURE OF FOOD PRODUCTION AND ECONOMIC DEVELOPMENT  3
Social and cultural dynamics of food production, distribution and consumption throughout developing world, examined in context of concepts and policies of development.

ANTH 375  PEOPLES AND CULTURES OF MODERN LATIN AMERICA  3
Contemporary cultures and societies of Latin America, with emphasis on historical perspective. Rural and urban populations, elite, military, the church, students and workers.

ANTH 379  HISTORICAL ARCHAEOLOGY OF THE EASTERN UNITED STATES  3
Surveys substantive contributions of historical archaeology to study of cultural history of eastern North America beginning with period of initial European contact.

ANTH 380  PEOPLES AND CULTURES OF MEXICO AND CENTRAL AMERICA  3
Cultures, institutions and ethnic groups of contemporary Mexico and Central America. Description and analysis of major cultural traditions and social institutions of Indian and non-Indian groups.

ANTH 381  VISIONS OF NATIVE AMERICANS  3
Critically examines visual images of Native Americans created in films, photography, commercial art and media and analyzes how those images function in Euroamerican culture.

ANTH 382  ANTHROPOLOGY AND BUSINESS  3
How culture affects business and capitalism in societies worldwide and how modern capitalistic life affects culture. Looks at diverse work cultures from direct-sales organizations to dot-coms, street-vendor businesses to megacorporations, as well as working women and working poor in different cultures.

ANTH 385  HISTORICAL ARCHAEOLOGY OF AMERICAN BATTLEFIELDS  3
Represents material culture interpretation of selected historical conflicts with emphasis on American war sites. Topics vary and include broad spectrum of social and ethnic groups in battle and material evidence of armed struggle. Besides Civil War, interpretation given from material culture perspective of wars of the twentieth century. Commonality of behavior by individuals subjected to war emphasized.
ART 110  DRAWING I  3
What do we see versus what we think we see? Perceptual drawing as a language and means of communication for artists and designers. Projects in and development of technical skills through basic drawing media explore drawing in its various forms: process/investigation, proposal, document, and artifact.
COREQ: ART111 and ART116.
RESTRICTIONS: Open to majors only

ART 111  DESIGN I  3
Introduction to dynamic shaping of surface and space for expressive communication. Concentration on visual and temporal vocabulary of artist and designer with emphasis on organizational principles relative to art elements. Students represent, rank and rethink originality of designs and ideas.
COREQ: ART110 and ART116.
RESTRICTIONS: Open to majors only.

ART 112  DRAWING II  3
Emphasizes drawing as expressive communication of experience and ideas with increasing attention on conceptual rather than perceptual. Progressive understanding of materials and mixed media with broader development of critical vocabulary.
PREREQ: ART110.
COREQ: ART113 and ART117.
RESTRICTIONS: Open to majors only.

ART 113  DESIGN II  3
Artists and designers apply vocabulary of Design I to projects of increasing complexity. Communicating in representational, abstract and non-objective formats, students give multi-sensory form to original concepts using 2D and 3D media.
COREQ: ART112 and ART117.

ART 116  INTRODUCTION TO DIGITAL MEDIA  3
Introduction to Macintosh computer through pixel-based and object oriented image manipulation plus exposure to time-based media. Looks at digital media as investigative and creative tool in art and design; emphasis on relevance of technology to contemporary creative practices.
COREQ: ART110 and ART111.
RESTRICTIONS: Open to majors only

ART 117  RESEARCH STUDIO: PRACTICE AND PRODUCT  3
Problem solving for artist and designer through projects that are media independent. Discussion of creative strategies for idea generation, research, critical analysis, and communication. Exploration and discovery toward establishment of productive studio practice. Projects include both individual and collaborative investigations.
COREQ: ART112 and ART113.
RESTRICTIONS: Open to majors only

ART 129  DESIGN IN VISUAL ARTS  3
Introduction to design through physical application of various art media as applied to study of 2-dimensional and 3-dimensional design. Study of design criteria and artistic objectives as they relate to environment.
RESTRICTIONS: Open to nonmajors and nonminors only.

ART 130  DRAWING II: TOOLS AND TECHNIQUES  3
Projects involving black and white and color studies in variety of media, including pencil, charcoal, ink and pastels.
RESTRICTIONS: Open to nonmajors and nonminors only.

ART 138  ELEMENTARY DRAWING AND PAINTING I  3
Representational drawing and painting from still lifes, landscapes and human head in variety of media including charcoal, pastel and paint.
RESTRICTIONS: Open to nonmajors and nonminors only.

ART 180  INTRODUCTION TO PHOTOGRAPHY  3
Study of photographic imagery and processes. Photography as fine art medium and its uses past and present. Considerable camera work with slide processing done by students; nondarkroom.
RESTRICTIONS: Open to nonmajors and nonminors only.

ART 200  VISUAL COMMUNICATIONS PROCESS I  3
Introduction to communicating visually through conceptual thinking in visual design process with use of typography, imagery and layout, and introduction to computer page layout and imaging.
RESTRICTIONS: Requires permission of instructor.

ART 201  VISUAL COMMUNICATIONS PROCESS II  3
Continuation of introduction to communicating visually through conceptual thinking in visual design process and use of typography, imagery and layout. Continuation of computer page layout and imaging.
PREREQ: ART200.
COREQ: ART211.
RESTRICTIONS: Requires permission of instructor.

ART 205  MACINTOSH TOPICS  1
Variety of specific offerings for hands-on instruction of Macintosh computer software applications, various levels of expertise and varying length of instruction. Preliminary exam may be necessary to determine advanced coursework.
RESTRICTIONS: May be repeated for up to nine credit hours.

ART 210  VISUAL COMMUNICATIONS IMAGEMAKING I  3
Introduction to imagemaking principles and techniques as applied to design, visual thinking and communication problem solving through both photographic and illustration techniques. Includes various films and light sources for color and b/w photography with basic use of illustration media and techniques.
COREQ: ART200.
RESTRICTIONS: Requires permission of instructor.

ART 211  VISUAL COMMUNICATIONS IMAGEMAKING II  3
Continuation of imagemaking principles and techniques as applied to design, visual thinking and communication problem solving through both photographic and illustration techniques.
COREQ: ART201.
RESTRICTIONS: Requires permission of instructor.

ART 215  BEGINNING PAINTING  3
Exploration of color theory as related to oil painting and examination of both traditional and experimental painting methods as means for providing students foundation for discovering their unique potential for self-expression.

ART 218  BEGINNING LITHOGRAPHY  3
Introduction to basic lithographic processes including stone and plate lithography.

ART 220  BEGINNING SCULPTURE  3
Introduction to basic tools, processes and safety employed in creation of sculptural form. Projects involving black and white and color studies in variety of media, including pencil, charcoal, ink and pastels.
RESTRICTIONS: Open to nonmajors and nonminors only.

ART 222  BEGINNING SCULPTURE II  3
Projects involving black and white and color studies in variety of media, including pencil, charcoal, ink and pastels.
RESTRICTIONS: Open to nonmajors and nonminors only.

ART 244  DIGITAL PRINTMAKING  3
Use of computer investigated as tool for imagemaking by scanning, originating and manipulating digital imagery, both photographic and hand drawn. Exploration of contemporary and traditional printmaking techniques used to produce printed editions of created digital images.

ART 246  BEGINNING SCREENPRINTING  3
Introduction to basic water-based screenprinting including blackout, drawing fluid, crayon resist and photo emulsion techniques.

ART 250  COMMUNITY SCULPTURE  3
Introduction to basic tools, processes and safety employed in creation of sculptural ideas. Past and current concepts studied through library, slides, videos, exhibitions and field trips. Students learn how to best display and present their work through regular class critiques and exhibitions in sculpture building viewing space. Individual expression encouraged.

ART 274  COMMON THREADS: MULTICULTURAL SURVEY OF FIBER AND TEXTILE PROCESSES  3
In nonwestern cultures, basic life sustaining necessities, [e.g., food preparation, clothing, spiritual and/or actual shelter], often involve textile processes which give actual, symbolical and transformational meaning over time. Studio assignments using weaving, surface design and offloom techniques probe both process and content.

ART 280  BEGINNING PHOTOGRAPHY  3
Introduction to tools, techniques, processes and aesthetics of black and white photography.

ART 290  BEGINNING CERAMICS  3
Introduction to tools, processes and aesthetics of ceramics.
ART 302  GRAPHIC DESIGN I  3
Exploration of visual systems, conceptual principles and procedures underlying practice of graphic design. In particular the process of problem solving through visual design; visualization of problems and solutions; and correlation of forms with their content, function and context. PREREQ: ART201 and ART211. COREQ: ART304.

ART 303  GRAPHIC DESIGN II  3
Development of sound visual concepts and economy of thought in basic graphic forms. Emphasis on medium and message of design through integration of typography and images. PREREQ: ART302. COREQ: ART305.

ART 304  ADVERTISING DESIGN I  3
Introduction to design of advertising, emphasizing responsibilities of art director. Projects stress development of creative strategies, evaluation of marketing strategies, conceptual thinking and creative composition for solutions to consumer and trade magazine, newspaper and outdoor advertising. PREREQ: ART201 and ART211. COREQ: ART302.

ART 305  ADVERTISING DESIGN II  3
Application of principles of concept and design to more complex advertising problems. Development of basic presentation and communication skills as well as analysis and implementation of creative strategies. PREREQ: ART304. COREQ: ART305.

ART 306  TELEVISION COMMERCIALS TO MTV  3
Introductory multimedia course involving conceptualizing, sequencing and editing of still and video images with sound. Utilizing computer programs such as Adobe Premiere, projects can include movie trailers, television commercials, film graphics, animation and rock videos. RESTRICTIONS: Only offered during Winter Session.

ART 307  INTERACTIVE MEDIA DESIGN  3
Introduction to interactive design involving information architecture, interactivity, navigation, page sequencing, imagery and page design using still images, moving images and sound. Projects emphasize web site design and may also include games, training and educational applications. RESTRICTIONS: Requires permission of instructor.

ART 309  BOOK Arts  3
Exploration of book arts as complete object that integrates content and form through narratives and/or sequential picture planes. Emphasis on elements of design and principles of book planning and production.

ART 310  APPLIED PHOTOGRAPHY  3
Development of conceptual and technical skills emphasizing both studio and location assignments for graphic and advertising design projects including editorial, annual reports, print advertising, posters, collateral materials, books, book jackets and packaging. PREREQ: ART211 or ART380, ART381. RESTRICTIONS: Requires permission of instructor.

ART 311  APPLIED PHOTOGRAPHIC ILLUSTRATION  3
Development of conceptual and technical skills emphasizing photographic applications in an editorial context. Projects include a wide variety of subjects along with manipulation of images through use of computers. PREREQ: ART211 and ART310, or ART380 and ART381. RESTRICTIONS: Requires permission of instructor.

ART 312  ILLUSTRATION I  3
Introduction of color through watercolor, gouache, acrylic, oil painting and dry color media. Emphasis on approaches to illustrated visual imagery in editorial, book, institutional and advertising. PREREQ: ART211. RESTRICTIONS: Requires permission of instructor.

ART 313  ILLUSTRATION II  3
Application of creative illustration concepts to editorial, book, institutional and advertising projects. PREREQ: ART312. RESTRICTIONS: Requires permission of instructor.

ART 315  ISSUES IN CONTEMPORARY ART  3
Examination of current issues of content and form; developments in technology; and social, political and cultural issues affecting contemporary visual art and artists. RESTRICTIONS: Completion of 60 credit hours.

ART 318  APPLIED DESIGN VISITS  3
To gain global awareness of applied design field students visit, discuss and review design-related organizations (i.e., advertising agencies, design studios, interactive/Web design studios, photographers, illustrators, commercial directors, magazines, and design museums) through series of assigned projects. COREQ: ART319.

ART 319  APPLIED DESIGN TOPICS  3
Students undertake assigned independent research projects relating to applied design topics and projects (i.e., advertising, graphic and design, typography, applied photography, etc.) resulting in visual and written presentations. COREQ: ART318. RESTRICTIONS: Requires permission of instructor.

ART 330  ADVANCED FIGURE DRAWING  3
Continued studies in figure drawing. Emphasis on advanced media techniques, description and personal expression. PREREQ: ART230. RESTRICTIONS: May be repeated up to nine credit hours.

ART 331  INTERMEDIATE PAINTING I  3
Identifying and exploring ideas and abilities in painting by examining context of modern and contemporary works. Emphasis on role of professional quality studio practices in realizing student painting goals. PREREQ: ART231.

ART 332  INTERMEDIATE PAINTING II  3
Continuation of investigations established in ART331 with emphasis on individual student's development of ideas and techniques through studio practice, field trips and the research of contemporary art. PREREQ: ART331.

ART 333  FIGURE STUDIO  3
Advanced conceptual and technical issues in depicting human figure. Topics include figurative descriptions through exploration of wide range of media with special emphasis on color and related concerns. PREREQ: ART230 and ART231.

ART 334  INTERMEDIATE PAINTING: THE FIGURE  3
Technical and conceptual guide to interpreting human figure in oils, with emphasis on use of the figure as vehicle for expression in contemporary painting. PREREQ: ART230 and ART231. RESTRICTIONS: May be repeated up to six credit hours.

ART 340  WOODCUT  3
Introduction to basic woodcut and/or linoleum with relief printing processes. Black and white as well as multi-colored printing processes investigated. PREREQ: ART110, ART111.

ART 341  ETCHING  3
Introduction to etching and intaglio printing processes including drypoint, line etching, soft ground, lifeground, aquatint techniques and non-toxic photo etching. PREREQ: ART11, ART111, ART112, ART113.

ART 342  INTRODUCTION TO MONOPRINTING AND PAPERMAKING PROCESSES  3
Introduction to western and eastern papermaking and cast paper processes. Introduction to monoprinting and collage processes to produce one-of-a-kind prints.

ART 344  DIGITAL PRINTMAKING  3
Investigates computer as tool for imagemaking by scanning, creating and manipulating digital images, both photographic and hand drawn. Exploration of contemporary and traditional printmaking techniques used to produce printed editions of original digital images.

ART 350  INTERMEDIATE SCULPTURE I  3
Continues to emphasize all goals of ART250 and introduces more advanced techniques and information on sculpture. Students strongly encouraged to find and pursue individual goals and guided in seeking choices of media and types of artistic expressions that best suit each individual. Researching modes of contemporary sculptural expression required. PREREQ: ART250.

ART 351  INTERMEDIATE SCULPTURE II  3
At this intermediate level, less emphasis given to tools and techniques, and more attention given to student's search for personal artistic expression. Participation in student and local exhibitions expected. For those interested in concentration in sculpture, time given to portfolio preparation. Research into sculpture intensified. PREREQ: ART350.

ART 366  INDEPENDENT STUDY  1-6

ART 380  INTERMEDIATE PHOTOGRAPHY: BLACK AND WHITE  3
Use of medium for artistic communication. Advanced technical and aesthetic
concepts as related to fine and applied art problems.
PREREQ: ART280.

ART 381  INTERMEDIATE PHOTOGRAPHY: COLOR  3
Shooting and processing of color slides and negatives, producing color prints from
each. Examines color theory, color emulsions and contemporary ideas in color
photography.
PREREQ: ART380.

ART 382  ALTERNATIVE PHOTOGRAPHIC PROCESSES  3
Non-silver photographic processes such as cyanotype, gum-bichromate, photo
transfer, and van-dyke brown. Using existing negatives, students create, alter and
manipulate images.
PREREQ: ART380.
RESTRICTIONS: Ability to work independently.

ART 383  PHOTOGRAPHIC FACILITIES MANAGEMENT  3
First-hand experience of operating and maintaining photographic facility, including
equipment operation for both black/white and color photography labs, course and
out-of-class scheduling, on-loan equipment and materials, ordering and mixing of
chemicals and keeping associated faculty abreast of developments.
RESTRICTIONS: Art major or minor or permission of instructor.

ART 390  INTERMEDIATE CERAMICS I  3
Continuation of Beginning Ceramics.
PREREQ: ART290.

ART 391  INTERMEDIATE CERAMICS II  3
Continuation of Intermediate Ceramics I with emphasis on technical properties of
clay and glazes.
PREREQ: ART390.

ART 402  ADVANCED APPLIED DESIGN I  3
Mastering advanced principles of effective conceptual design through solutions
involving advertising design or graphic design problems as they would occur in
advertising agencies, design studios or corporate design departments.
PREREQ: ART303 and ART305.
COREQ: ART403.
RESTRICTIONS: May be repeated up to six credit hours.

ART 403  PORTFOLIO PREPARATION I  3
Directed toward production of portfolio which accurately and effectively defines
student's conceptual and practical skills in advertising design or graphic design
situations.
PREREQ: ART303 and ART305.
COREQ: ART402.
RESTRICTIONS: May be repeated up to six credit hours.

ART 404  ADVANCED APPLIED DESIGN II  3
Continuation of mastering advanced principles of effective conceptual design
through solutions involving advertising design or graphic design problems as they
would occur in advertising agencies, design studios or corporate design departments.
PREREQ: ART402 and ART403.
COREQ: ART405.
RESTRICTIONS: May be repeated up to six credit hours.

ART 405  PORTFOLIO PREPARATION II  3
Continuation of production of portfolio which accurately and effectively defines
student's conceptual and practical skills in advertising design or graphic design
situations.
PREREQ: ART402 and ART403.
COREQ: ART404.
RESTRICTIONS: May be repeated up to six credit hours.

ART 407  ADVANCED NEW MEDIA DESIGN  3
Continuation and more advanced focus on interactive design involving
information architecture, interactivity, navigation, page sequencing, imagery and page
design using still images, moving images and sound.
PREREQ: ART307.
RESTRICTIONS: Requires permission of instructor.

ART 408  VISUAL COMMUNICATIONS INTERNSHIP  3
Field experience in advertising agency, design studio, illustration studio, or
commercial photography studio in student's concentration.
PREREQ: ART303 and ART305, or ART310 and ART311, or ART312 and
ART313.
RESTRICTIONS: Requires permission of instructor. May be repeated up to six credit hours.

ART 412  ADVANCED IMAGEMAKING I  3
Advanced principles of effective communication through imagery applied to
graphic and advertising design, including work with advanced graphic and
advertising students in developing complete project solutions.
PREREQ: ART303, ART305, ART311, or ART313.
COREQ: ART413.
RESTRICTIONS: Requires permission of instructor.

ART 413  IMAGEMAKING PORTFOLIO I  3
Development toward production of portfolio that accurately and effectively defines
student's conceptual and practical skills in applied photography or illustration.
PREREQ: ART303, ART305, ART311, or ART313.
COREQ: ART412.
RESTRICTIONS: Requires permission of instructor.

ART 414  ADVANCED IMAGEMAKING II  3
Continued work with advanced principles of effective communication through
imagery applied to graphic and advertising design, including work with advanced
graphic and advertising design students in developing complete project solutions.
PREREQ: ART412.
COREQ: ART415.
RESTRICTIONS: Requires permission of instructor.

ART 415  IMAGEMAKING PORTFOLIO II  3
Continued development toward production of portfolio that accurately and
effectively defines student's conceptual and practical skills in applied photography
or illustration.
PREREQ: ART413.
COREQ: ART414.
RESTRICTIONS: Requires permission of instructor.

ART 416  SENIOR SEMINAR  3
Explores issues relevant to advancing studio practice and developing a cohesive
body of work for BFA exhibitions. Examines implications of pursuing future in fine
arts studio discipline.
RESTRICTIONS: Open to BFA seniors only.

ART 417  BFA EXHIBITION  0 PF
Concluding exhibition required of all Bachelor of Fine Arts candidates and usually
held during final semester of undergraduate study.
RESTRICTIONS: BFA seniors only.

ART 418  FINE ARTS INTERNSHIP  3
Field experience related to current fine art discipline offered in Art Department
through hands on involvement at art studio, gallery, museum or related industry.
PREREQ: Junior or senior level in a concentration.
RESTRICTIONS: Requires permission of instructor. May be repeated up to six credit hours.

ART 424  STUDIO IN THE MATERIALS AND TECHNIQUES OF
DRAWING IN THE WEST  3
See MSST480 for course description.

ART 425  SEMINAR IN MATERIALS AND TECHNIQUES OF THE
CONTEMPORARY PAINTER AND DRAFTSMAN  3
See ARTC481 for course description.

ART 426  COLOR MIXING AND MATCHING  3
See MSST485 for course description.

ART 427  STUDIO MATERIALS AND TECHNIQUES OF PAINTING I  3
See MSST488 for course description.

ART 428  STUDIO MATERIALS AND TECHNIQUES OF PAINTING II  3
See MSST489 for course description.

ART 429  STUDIO IN THE MATERIALS AND TECHNIQUES OF
PRINTMAKING I  3
See MSST490 for course description.

ART 430  DRAWING STUDIO  3
Drawing as unique works on paper using traditional or non-traditional media.
Works produced determined by each student as extension of their studio
concentration.
PREREQ: ART230.
COREQ: 400 level art course.
RESTRICTIONS: May be repeated up to six credit hours.

ART 432  ADVANCED PAINTING  3
Provides maturing process through experience. Emphasis on identifying and
sheding undue influences in painting in favor of evolving more personal artistic
direction and vision.
PREREQ: ART331 and ART332, or ART331 and ART334.
RESTRICTIONS: May be repeated up to nine credit hours.
ART 433  PAINTING STUDIO  3
Execution of mature body of work. Emphasis on distilling individual painting ideas
down to their essence through process of rigorous group and self criticism.
PREREQ: ART432.
RESTRICTIONS: May be repeated up to nine credit hours.

ART 440  PRINTMAKING STUDIO  3
Advanced studio work based on agreement between student and instructor as to
content and quantity of work required.
PREREQ: ART241 or ART246, and ART341 or ART342.
RESTRICTIONS: May be repeated up to nine credit hours.

ART 441  ADVANCED PRINTMAKING  3
Advanced techniques in lithography and screenprinting or papermaking,
monoprinting, etching and woodcut. Processes vary according to instructor.
PREREQ: ART241 or ART246, and ART341 or ART342.
RESTRICTIONS: May be repeated up to nine credit hours.

ART 450  SCULPTURE STUDIO  3
Designed to assist student in finding best materials and means of personal
expression in sculpture and relationship of differing fields of artistic expression.
Increasing emphasis on involvement in sculpture profession.
PREREQ: ART351.
RESTRICTIONS: May be repeated up to nine credit hours.

ART 451  ADVANCED SCULPTURE  3
At this level, students expected to have put together solid body of work with a clear
direction. Advanced studio work based on agreements between student and
instructor regarding content and quality of work requirements. Each student receives
personal instruction and attention in what is planned to become student’s profession.
PREREQ: ART351.
RESTRICTIONS: May be repeated up to nine credit hours.

ART 466  INDEPENDENT STUDY  1-6
ART 481  PHOTOGRAPHY STUDIO  3
Advanced studio and conceptual work based on agreement between student and
instructor as to content and quantity of work required. Students taking course for
repeating credit engaged in development of professional photography portfolio
along with other course requirements.
PREREQ: ART381.
RESTRICTIONS: May be repeated up to nine credit hours.

ART 483  PORTFOLIO AND EXHIBITION TECHNIQUE  3
Emphasis on professional methods involved in presenting portfolio for publication
or exhibition. Organization, editing and sequencing, as well as attitudes and
strategies form basis of study.
PREREQ: ART380.
RESTRICTIONS: Previous photographic experience.

ART 486  PHOTOGRAPHIC ELECTRONIC IMAGING  3
Use of computer technology and techniques to create digital photography and
imagery. Students use electronic technology to manipulate, retouch, adjust color,
and technical skills of on site photography. Location and environment may vary.
Winter and/or summer session offering.
PREREQ: ART280 or equivalent.
RESTRICTIONS: Requires permission of instructor.

ART 487  LOCATION PHOTOGRAPHY  3
Series of interrelated projects and assigned topics on location to develop visual
and technical skills of on site photography. Location and environment may vary.
PREREQ: ART280 or equivalent.
RESTRICTIONS: Requires permission of instructor.

ART 490  ADVANCED CERAMICS  3
Continuation of Intermediate Ceramics II with emphasis on individual development
of design and form.
PREREQ: ART391.
RESTRICTIONS: May be repeated up to nine credit hours.

ART 491  CERAMICS STUDIO  3
Advanced studio work based on agreement between student and instructor as to
content and quantity of work required.
PREREQ: ART391.
RESTRICTIONS: May be repeated up to nine credit hours.

ART 600  GRADUATE CRITIQUE  3
Multidisciplinary graduate critique class in which students share and discuss
creative work.
RESTRICTIONS: To be repeated up to twelve credit hours.

ART 632  PAINTING  3-6
Advanced problems in the media and aesthetics of painting.
RESTRICTIONS: May be repeated up to eighteen credit hours.

ART 641  PRINTMAKING  3-6
Provides independent work in chosen print area. Course requirements determined
by agreement of student and teacher.
RESTRICTIONS: May be repeated up to eighteen credit hours.

ART 651  SCULPTURE  3-6
Advanced level course focusing on becoming professionals. Beyond studio and
creation of artistic expression, student artist learns ways voices can be heard.
Focuses on all peripherals involved in profession of sculpture.
RESTRICTIONS: May be repeated up to eighteen credit hours.

ART 677  CRITICAL ISSUES SEMINAR  3
Introduces foundational language and ideas used to talk about qualities of works
of art and the creative practice. Emphasis on development of language that helps
individuals to respond to each other’s work during group critiques, and to elevate
the level of discourse within personal practice. Prepares students to develop their
supporting paper during the second year.

ART 678  RESEARCH SEMINAR  3
Introduction to graduate study focusing on developing research strategies as
integral component of studio practice. Includes critical reading and writing.
Emphasis on students’ identifying directions within their own work.
RESTRICTIONS: Requires permission of instructor.

ART 679  SEMINAR: ISSUES IN CONTEMPORARY ART  3
Examination of current issues of content and form; developments in technology;
social, political and cultural issues affecting visual art and artists; studio visits.
RESTRICTIONS: Requires permission of instructor. May be repeated up to nine
credit hours.

ART 681  MATERIALS AND TECHNIQUES OF THE CONTEMPORARY
PAINTER AND DRAFTSMAN  3
See MSST681 for course description.

ART 682  STUDIO IN THE MATERIALS AND TECHNIQUES OF DRAWING
IN THE WEST  3
See MSST680 for course description.

ART 683  PHOTOGRAPHY  3-6
Individual problems in still photography applied to art education, fine arts, or
applied design.
RESTRICTIONS: May be repeated up to eighteen credit hours.

ART 685  COLOR MIXING AND MATCHING  3
See MSST685 for course description.

ART 686  ELECTRONIC IMAGING  3
Use of computer technology and techniques to create digital photography and
imagery. Students use electronic technology to manipulate, retouch, adjust color,
make multiple images and explore other creative techniques.
RESTRICTIONS: May be repeated up to six credit hours.

ART 688  STUDIO MATERIALS AND TECHNIQUES OF PAINTING I  3
See MSST688 for course description.

ART 689  STUDIO MATERIALS AND TECHNIQUES OF PAINTING II  3
See MSST689 for course description.

ART 690  STUDIO IN THE MATERIALS AND TECHNIQUES OF
PRINTMAKING I  3
See MSST690 for course description.

ART 691  CERAMICS  3-6
Problems in throwing, glazing and firing techniques.
RESTRICTIONS: May be repeated up to eighteen credit hours.

ART 698  MFA EXHIBITION  3
Selection, presentation and installation of art work in an exhibition space
culminating the studio component of graduate study.
RESTRICTIONS: Approval of the student’s individual graduate committee.

ART 699  MFA SUPPORTING PAPER  3
Development of a written and photographic document in support of issues and
concerns characterizing personal artistic development experienced during
graduate study.
RESTRICTIONS: Approval of the student’s individual graduate committee.

ART 868  RESEARCH  1-12
ART CONSERVATION

ARTC 101 ART CONSERVATION FRESHMAN SEMINAR 1 PF
Introduction to field through exposure to Winterthur Museum, Library and Garden and current art conservation projects. Professional interaction fosters academic and social competencies while explaining education, research, and career opportunities.

ARTC 210 SCIENCE OF COLOR PHENOMENA 4
Introduction to basic physical and chemical principles which describe nature of light and phenomena of color. Targeted for non-science majors who seek descriptive understanding of scientific principles underlying formation of color phenomena found in nature and works of art. May be cross-listed with CHEM210 and/or SCEN210.
PREREQ: High school chemistry and algebra.

ARTC 301 CARE AND PRESERVATION OF CULTURAL PROPERTY I 3
Examines philosophy, ethics, practice of art conservation and issues pertaining to collections management of cultural property. Typical deterioration characteristics and preservation alternatives for various materials including photographs, works of art on paper, archival and library materials, and magnetic media presented and discussed.

ARTC 302 CARE AND PRESERVATION OF CULTURAL PROPERTY II 3
Examines philosophy, ethics, approach and practice of art conservation with primary emphasis on easel paintings and secondary emphasis on textiles, objects, furniture and conservation science. Deterioration mechanisms, care and conservation treatment issues are covered.
PREREQ: ARTC301.

ARTC 444 TECHNOLOGY OF CULTURAL MATERIALS: CERAMICS AND GLASS 3
See MSST444 for course description.

ARTC 445 TECHNOLOGY OF CULTURAL MATERIALS: METALS 3
See MSST445 for course description.

ARTC 464 CONSERVATION INTERNSHIP 3

ARTC 480 STUDIO IN THE MATERIALS AND TECHNIQUES OF DRAWING IN THE WEST 3
See MSST480 for course description.

ARTC 481 SEMINAR IN MATERIALS AND TECHNIQUES OF THE CONTEMPORARY PAINTER AND DRAFTSMAN 3
Twentieth century artists' materials. Topics: acrylic emulsion, acrylic solution, alkdy resin, and PVA paints; collage-assemblage; solvent photo transfer; synthetic fiber canvas, paper, panels, oil pastels, print sticks, felt-tip markers, colored ink pencils; airbrush spray gun; and non-art materials. Potential health hazards. Conservation topics: pH, lightfastness, adhesion and storage environments. May be cross-listed with ART425 and/or ARTH481.
RESTRICTIONS: Requires permission of instructor.

ARTC 485 COLOR MIXING AND MATCHING 3
See MSST485 for course description.

ARTC 488 STUDIO MATERIALS AND TECHNIQUES OF PAINTING I 3
See MSST488 for course description.

ARTC 489 STUDIO MATERIALS AND TECHNIQUES OF PAINTING II 3
See MSST489 for course description.

ARTC 490 STUDIO IN THE MATERIALS AND TECHNIQUES OF PRINTMAKING I 3
See MSST490 for course description.
RESTRICTIONS: Requires permission of instructor.

ARTC 615 PROPERTIES AND STRUCTURE OF ART MATERIALS I 3
Relationship between structure of materials and their physical, mechanical and chemical behavior. Emphasis on art materials such as metals, ceramics, glasses, geological materials, polymeric materials, textiles, coatings, cellulose products, pigments, dyestuffs, etc. Also, mechanics of change due to heat, time, radiation and environment.
RESTRICTIONS: Full-time fellowship students only.

ARTC 616 CONSERVATION RESEARCH METHODS 3
Introduction to principles and methodology of scientific research in conservation. Emphasis on topics such as experimental design, data analysis, preparation of research proposals, authenticity and technical studies, accelerated aging, and simple analytical methods.
PREREQ: ARTC615.
RESTRICTIONS: Full-time fellowship students only.

ARTC 617 ANALYSIS OF PAINTED SURFACES 3
Introduction to analysis and technology of painted and varnished surfaces using reflected, visible and ultraviolet light microscopy techniques. Lectures and laboratory work include review of traditional coating materials, color measurement and matching, and analysis and interpretation of cast cross-sections of paint and varnish stratigraphies.

ARTC 618 CONSERVATION CLEANING METHODS 3
Introduction to techniques for controlled removal of overpaints, varnishes, and grime from paintings and decorative and architectural objects. Cross-section microscopy techniques used. Lectures and laboratory work include discussion of solvent and water-based cleaning systems, use of enzymes and chelating agents, and mixing and testing of customized cleaning materials.

ARTC 644 TECHNOLOGY OF CULTURAL MATERIALS: CERAMICS AND GLASS 3
See MSST644 for course description.

ARTC 645 TECHNOLOGY OF CULTURAL MATERIALS: METALS 3
See MSST645 for course description.

ARTC 650 SEMINAR IN ART CONSERVATION 1
Oral reports on current work in fields of art conservation, art history, ethics, philosophy and museum science.
PREREQ: ARTC655.
RESTRICTIONS: Full-time fellowship students only.

ARTC 654 EXAMINATION AND TREATMENT OF ART OBJECTS I 1-3
Application of scientific and art historical techniques to examination, treatment and preservation of works of art on paper, library materials, photographs, textiles, paintings, joined wooden objects, decorative, ethnographic, and archaeological objects, under the supervision of conservation faculty.
RESTRICTIONS: Full-time fellowship students only.

ARTC 655 EXAMINATION AND TREATMENT OF ART OBJECTS II 1-3
Application of scientific and art historical techniques to examination, treatment and preservation of works of art on paper, library materials, photographs, textiles, paintings, joined wooden objects, decorative, ethnographic, and archaeological objects under supervision of conservation faculty.
PREREQ: ARTC654 and ARTC655.
RESTRICTIONS: Full-time fellowship students only.

ARTC 658 TOPICS IN ADVANCED APPRENTICESHIP AND RESEARCH IN CONSERVATION I 6
Discussion, demonstration, practice and research relating to examination, analysis, treatment, and collections care of cultural property including works of art on paper, library materials, photographs, textiles, paintings, joined wooden objects, decorative, ethnographic, and archaeological materials. Course requirements may be fulfilled by work in cooperating institutions outside Winterthur Museum.
PREREQ: ARTC654 and ARTC655.
RESTRICTIONS: Full-time fellowship students only.

ARTC 659 TOPICS: ADVANCED APPRENTICESHIP AND RESEARCH IN ART CONSERVATION II 6
Discussion, demonstration, practice, and research relating to examination, analysis, treatment, and collections care of cultural property including works of art on paper, library materials, photographs, textiles, paintings, joined wooden objects, decorative, ethnographic, and archaeological materials. Course requirements may be fulfilled by work in institutions outside Winterthur Museum.
PREREQ: ARTC654 and ARTC655.
RESTRICTIONS: Full-time fellowship students only.

ARTC 666 INDEPENDENT STUDY 1-12

ARTC 670 CHEMICAL AND PHYSICAL TECHNIQUES USED IN THE EXAMINATION OF ART MATERIALS I 3
Classroom discussion and laboratory application of chemical and physical techniques that art conservators perform to identify and characterize organic art materials.
RESTRICTIONS: Full-time fellowship students only.

ARTC 671 CHEMICAL AND PHYSICAL TECHNIQUES USED IN THE EXAMINATION OF ART MATERIALS II 3
Classroom discussion and laboratory application of chemical and physical techniques that art conservators perform to identify and characterize metals, glass, ceramics, and natural and synthetic polymers. Basic structure, composition and deterioration mechanics of such materials.
PREREQ: ARTC670.
RESTRICTIONS: Full-time fellowship students only.
ARTH 152 CHEMICAL AND PHYSICAL TECHNIQUES USED IN EXAMINATION OF ART MATERIALS III 3
Classroom discussion and laboratory application of more sophisticated analytical and physical techniques used by scientist to characterize materials. Application of these techniques to art materials and treatment-related problems stressed. PREREQ: ARTC670 and ARTC671.
RESTRICTIONS: Full-time fellowship students only.

ARTH 153 CHEMICAL AND PHYSICAL TECHNIQUES USED IN EXAMINATION OF ART MATERIALS IV 3
Independent research project focusing on analytical and physical techniques used by scientist to characterize art materials. PREREQ: ARTC670, ARTC671 and ARTC672.
RESTRICTIONS: Full-time fellowship students only.

ARTH 680 STUDIO IN THE MATERIALS AND TECHNIQUES OF DRAWING IN THE WEST 3
See MSST680 for course description.

ARTH 681 MATERIALS AND TECHNIQUES OF THE CONTEMPORARY PAINTER AND DRAFTSMAN 3
See MSST681 for course description.

ARTH 685 COLOR MIXING AND MATCHING 3
See MSST685 for course description.

ARTH 688 STUDIO MATERIALS AND TECHNIQUES OF PAINTING I 3
See MSST688 for course description.

ARTH 689 STUDIO MATERIALS AND TECHNIQUES OF PAINTING II 3
See MSST689 for course description.

ARTH 690 STUDIO MATERIALS AND TECHNIQUES OF PRINTMAKING 1 3
See MSST690 for course description.

ARTH 870 INTERNSHIP IN CONSERVATION 1-9
Third year of study at accredited institution working with master conservator in student's field of interest. PREREQ: ARTC689.
RESTRICTIONS: Full-time fellowship students only. May be repeated for up to eighteen credits when topics vary.

ARTH 964 PRE-CANDIDACY STUDY 3-12 PF
Research and readings in preparation of dissertation topic and/or qualifying examinations for doctoral students before admission to candidacy but after completion of all required course work.
RESTRICTIONS: Not open to students who have been admitted to candidacy.

ARTH 969 DOCTORAL DISSERTATION 1-12 PF

ART HISTORY

ARTH 101 VISUAL CULTURE 3
Explores ways we make, perceive and experience images and artifacts. Students hone their skills in seeing, analyzing historical models and critically engaging in discussions of visual art and material cultures in selected eras and civilizations around world.

ARTH 150 MONUMENTS AND METHODS IN THE HISTORY OF ART 3
Painting, sculpture and architecture studied as artistic and cultural expressions of their times. Emphasis on selected major artists, monuments and methods of analysis.

ARTH 151 MYTH, RELIGION AND ART 3
Introduction to study of mythical and religious images, types, attributes and symbols on comparative basis from many ages throughout world. Includes archetypal images, such as Great Mother, Great Father, hero, images with supernatural powers and satirical images.

ARTH 153 INTRODUCTION TO ART HISTORY I 3
Painting, sculpture and architecture from Prehistoric times through ancient Egypt, Greece, Rome and the Middle Ages studied in historical and cultural context. RESTRICTIONS: Usually offered in Fall semester.

ARTH 154 INTRODUCTION TO ART HISTORY II 3
Painting, sculpture and architecture of Western Europe from Renaissance to present studied in historical and cultural context. RESTRICTIONS: Usually offered in Spring semester.

ARTH 156 ROME: FROM CAESAR TO FELLINI 3
Investigates Rome from antiquity to twentieth century focusing on art and architecture, archaeology, film, literature, urban planning, law, social history, religion, and politics.

ARTH 162 HISTORY OF ARCHITECTURE 3
Major buildings and architects from ancient world to present. Elements of architectural design and influence of social, economic, political, religious and technological factors on the art of building. Architecture as cultural expression.

ARTH 165 INTERNATIONAL DECORATIVE ARTS 3
See MSST165 for course description.

ARTH 166 SPECIAL PROBLEM 1-3

ARTH 203 ART OF THE BLACK AND AFRICAN DIASPORA 3
Through art and architecture of Atlantic and Indian oceans, introduces art of African Heritage peoples after early fifteenth century and indicates what connects them (and what separates them) in terms of subject matter, style, representational mode and critique.

ARTH 204 ART, POWER AND ARCHITECTURE IN AFRICA 3
Explores several African communities including Bamilke, Yoruba, Shona, Edo, Fon, Kuba and Hasua-Fulani (located among others in Nigeria, Zimbabwe, Benin, Congo). Reveals relationships, sometimes spatial, between art and architecture in their varied stances to, and as representations of, political, social and spiritual power. May be cross-listed with BAMS203.

ARTH 205 SCIENCE AND THE DETECTION OF ART FORGERIES 3
See MSST205 for course description.

ARTH 206 INTRODUCTION TO ART AND ARCHITECTURE IN AFRICA 3
Explores all African selections from diverse art histories including modern Congo, contemporary Nigeria and South Africa, nineteenth century Mandé, seventeenth century Ethiopia, fifteenth century Edo, nineteenth century Yoruba, Nubian Egypt and pre-pharaonic Northeast. Lectures thematize art against backdrop of politics, religions, sensuality and architecture.

ARTH 207 ART OF ANCIENT EGYPT AND THE NEAR EAST 3
Survey of art and architecture of ancient Egypt and Near East. Emphasis on relationship of art to religion, politics and ritual. Topics include Egyptian pyramids and after-life, images of kings and art of propaganda and art in service of religion.

ARTH 208 GREEK AND ROMAN ART 3
Development of Greek art and architecture from Geometric period through Orientalizing, Archaic, Classical and Hellenistic eras. Roman art and architecture from its Etruscan and Greek origins through Republican period and stages of Empire until time of Constantine the Great.

ARTH 209 EARLY MEDIEVAL ART: 200-1000 AD 3
Painting, sculpture and architecture in Europe and Near East. Surveys earliest Christian art as well as Byzantine, Early Islamic, Anglo-Saxon and Carolingian art.

ARTH 210 LATER MEDIEVAL ART: 1000-1400 AD 3
Painting, sculpture and architecture of Christian world, treating later Byzantine, Romanesque and Gothic artistic traditions in their historical and cultural contexts. Development of distinctively European art and society.

ARTH 213 ART OF THE NORTHERN RENAISSANCE 3
Covers late medieval devotional images to art of early modern cities (1400-1570), especially in Netherlands and Germany. Special emphasis on Jan van Eyck, Rogier van der Weyden, Albrecht Durer and Pieter Bruegel.

ARTH 217 EARLY RENAISSANCE ART 3
Italian art of fourteenth and fifteenth centuries. Special emphasis on founders of Renaissance tradition in central Italy such as Giotto, Donatello, Masaccio, Fra Angelico, Botticelli, Brunelleschi and Alberti.

ARTH 218 HIGH RENAISSANCE AND MANNERIST ART 3
Italian art in sixteenth century. Emphasis on such artists as Leonardo da Vinci, Raphael, Michelangelo, Bramante, Titian, Tintoretto and El Greco. Also treats spread of Italian style to France and Spain.

ARTH 219 ART OF THE ITALIAN RENAISSANCE 3
Surveys major artistic centers, personalities and stylistic trends in Italy from fourteenth to sixteenth centuries. Special emphasis on Giotto, Donatello, Mantegna, Leonardo, Michelangelo, Raphael and Titian. Paintings and sculptures discussed in relation to techniques, systems of production, patronage and crucial historical events.

ARTH 220 ITALIAN RENAISSANCE ARCHITECTURE 3
Italian architecture and cities from fourteenth to sixteenth centuries. Emphasis on socio-economic, intellectual and cultural context of Renaissance architecture. Focuses on architects such as Brunelleschi, Alberti, Michelangelo and Palladio and cities such as Florence, Rome and Venice.

ARTH 222 BAROQUE ART 3
Seventeenth century European painting, sculpture and architecture in its social-historical context. Emphasis on such major artists as Caravaggio, Bernini, Rubens, Rembrandt, Vermeer, Poussin and Velasquez. Discussion of rise of genre, still-life and landscape painting, as well as role of patronage.

351
ARTH 225 EIGHTEENTH CENTURY ART 3
Examines major trends and artists in eighteenth century European painting, sculpture and architecture in framework of social, ideological and cultural currents of the time. Artists such as Watteau, Hogarth, Blake, Chardin, Canova, David and Goya.

ARTH 227 MODERN ART I 3
History and theory of art 1789-1900, including the neoclassic, romantic, realist, impressionist, and post-impressionist movements.

ARTH 228 MODERN ART II 3
History and theory of art from 1900 to present in its cultural, social, and political context, including painting, sculpture, photography, installation, performance, film, and video.

ARTH 230 AMERICAN ART: 1607-1865 3
Architecture, painting, sculpture and decorative arts of United States from the first Colonial settlements to the Civil War. American art examined in light of its political, social, economic and religious background and in relationship to European art.

ARTH 231 AMERICAN ART: 1865-PRESENT 3
Architecture, painting, sculpture, photography and decorative arts in United States from Civil War on. American art in political, social, economic and cultural framework. Rise of United States to position of global power and emergence as an international artistic center.

ARTH 232 ART OF LATIN AMERICA 3
Survey of art and architecture in Latin America from pre-Hispanic times to twentieth century. Emphasis on interaction between native traditions and imported ideas, particularly in relationship to religion, politics, and daily life.

ARTH 233 ART AND ARCHITECTURE IN CHINA 3
Through examination of art, architecture, and archaeology, approaches China as a historical and cultural unit. Emphasis on archaeological sites, artifacts, art objects, and architecture in China, with additional materials from nearby regions. Thematic coverage of Chinese history, from Neolithic sites to buildings in the twentieth century.

ARTH 234 ART OF JAPAN 3
Survey of art of Japan from Neolithic times to twentieth century. Emphasis on interaction between imported ideas and native sensibilities, development of Buddhist imagery and influence of literature, drama and political change on visual arts.

ARTH 235 ART OF INDIA 3
Survey of art of Indian Asia from prehistoric culture of Indus Valley through development of Buddhist, Hindu and Islamic religious structures and imagery. Emphasizes interrelationships of philosophical, religious and aesthetic concepts in shaping Indian art and spread of Indian culture.

ARTH 236 ARTS OF THE ISLAMIC WORLD 3
Formation and diffusion of distinctive artistic tradition from eighth to sixteenth centuries. Considers architecture, painting, metalwork and other media, especially in Mediterranean world and Western Asia.

ARTH 237 ART OF TIBET 3
Survey of Tibetan art including sculpture, paintings, textiles, jewelry, ritual objects, architecture, and ephemeral art. Emphasis on relationship of art to religious and philosophical tenets of Buddhist and Bon-po traditions; development of regional styles in Tibet; and artistic connections to northern India, Nepal, and China.

ARTH 243 AMERICAN DECORATIVE ARTS, 1700-1900 3
Introduction to interior decoration and household arts during eighteenth and nineteenth centuries, with emphasis on furniture, metalwork, glass, ceramics, textiles, prints, and wallpaper. Field trips to Winterthur and Delaware Art Museum required. May be cross-listed with AMCS243.

ARTH 245 THE AMERICAN HOME 3
Explores the history and design of the most intimate and public of objects—the house. Our residences are powerful statements about how we see ourselves and how we perceive others. Includes a variety of cultural experiences and investigates the significance of those experiences.

ARTH 250 RULERS’ IMAGES FROM AUGUSTUS TO GEORGE WASHINGTON 3
Thirteen rulers from ancient, medieval and early modern worlds as depicted in contemporary artistic and literary works. Rulers studied include Augustus, Justinian, Saint Louis, Napoleon and Washington. Focuses on rulers’ images in modern world.

ARTH 299 MODERN ARCHITECTURE 3
Introduction to architecture of modern periods. Focuses from eighteenth century to present. Examines classical texts, rising ideas, and major debates in field of modern architecture, and explores various connotations of modernity and modernism that emerged during past three hundred years around world. Interdisciplinary approach.

ARTH 301 RESEARCH AND METHODOLOGY IN ART HISTORY 3
Methods and major approaches to advanced art historical study, together with practical aspects of research and work in art historical professions, such as education, historic preservation, museums and galleries. Experience with original works of art.

ARTH 302 PRINTS AND SOCIETY 3
Social history of prints and printing techniques, focusing on such major printmakers as Durer, Rembrandt, Piranesi, Goya, Daumier and Picasso. Topics include role of woodcuts in popular culture, political and satirical prints, posters and advertising, and connoisseurship of original prints.

ARTH 303 ART OF THE SPANISH RENAISSANCE 3
Art of Spain and its New World territories during fifteenth and sixteenth centuries. Emphasis on negotiation between different artistic and religious traditions in both Iberian Peninsula (Christian, Muslim, and Jewish) and Spanish America (European and Native American).

ARTH 304 NORTHERN BAROQUE ART: THE AGE OF RUBENS, REMBRANDT AND VERMEER 3
Painting, printmaking and art theory in seventeenth century Holland and Flanders in social and historical context. Examines rise of landscape, genre and portraiture, nature of Dutch realism, social role of artist, art and theater, and impact of religion on art.

ARTH 305 ITALIAN BAROQUE ART: METAPHOR AND MARVEL 3
Painting, sculpture and architecture from time of Caravaggio and Carracci to Bernini and Cortona. Examines topics such as Counter-Reformation and its impact on the arts, rise of naturalism and illusionism, design process and function of drawings, theatricality and rhetoric.

ARTH 307 SEURAT TO MATISSE: ART IN FRANCE 3
Examines developments in French art, culture and society between 1880 and 1907. Topics include avant-garde, women artists, public art, bohemianism, mass culture and early cinema. Artists include Manet, Monet, Pissarro, Degas, Cezanne, Morisot, Cassatt, Seurat, Van Gogh, Gauguin, Vuillard, Redon, Moreau, Puvis de Chavannes, Rodin, Claudel, Matisse and Picasso. PREREQ: ART227 or ART228 or permission of instructor.

ARTH 310 THE ROLE OF THE ARTIST IN SOCIETY 3
Explores changing ideas of the artist from medieval craftsman and Renaissance courtier to Romantic genius and modern revolutionary. Topics include self-portraiture, notions of artistic temperament and genius, women artists and artists’ changing relations with their clients.

ARTH 311 RENAISSANCE WOMEN, SOCIETY AND THE ARTS 3
Focuses on role of women in Italian art and society from 1300-1650. Interdisciplinary and feminist readings emphasize variety of approaches. Topics include gender and power; women as patrons; female eroticism and mysticism; masculine vision of ideal beauty; women writers and their complaints; nuns, prostitutes and saints. May be cross-listed with WOMS311.

ARTH 318 HISTORY OF PHOTOGRAPHY 3
History and aesthetics of photography from its beginnings to present. Emphasis on photography as artistic expression, importance of technology and photography in relation to other arts and social history. Photographers such as Negre, Emerson, Stieglitz, Cunningham, Weston and Arbus.

ARTH 322 INTRODUCTION TO HISTORIC PRESERVATION 3
Examines specific research issue within historic preservation including hypothesis construction, design of research methodology and evaluation of results.

ARTH 338 MAYAN ART AND ARCHITECTURE 3
Introduction to civilization of the Maya as evident in Yucatan Peninsula. Incorporates visits to relevant archeological zones. Examines geographical framework that shaped development of Mayan culture, political and economic organizations, art, architecture, ideology and history. May be cross-listed with ANTH328. RESTRICTIONS: Offered abroad only.

ARTH 339 ART AND ARCHITECTURE OF EUROPE 3
Primary focus on painting, sculpture and architecture in Europe from Romanesque to the Modern era. Subject matter determined by country in which overseas program is conducted. RESTRICTIONS: Offered in a foreign language and only in conjunction with a foreign study program. May be repeated for credit when topics vary.
ART 349 ART AND ARCHITECTURE IN CONTEXT 3
Painting, sculpture and architecture studied as artistic and cultural expressions of their times. RESTRICTIONS: Taught only in Study Abroad Program.

ART 360 HUMANITIES COLLOQUIUM 3

ART 366 INDEPENDENT STUDY 1-6

ART 399 TOPICS IN ART HISTORY 3
Detailed investigation in lecture rather than seminar format of varying topics, e.g., St. Denis and Problems of Twelfth Century Art.

ART 402 UNDERGRADUATE SEMINAR IN THE HISTORY OF ART 1-3
Emphasis on art historical reading and research. Student oral reports. Recent seminar topics include Art and Religion in Latin America; Caravaggio; Art of the African Diaspora; Renaissance Rome. RESTRICTIONS: For undergraduates only. May be repeated for credit when topics vary.

ART 403 HISTORY, PHILOSOPHY, FUNCTIONS AND FUTURE OF MUSEUMS 3
See MSST403 for course description.

ART 405 SEMINAR IN GREEK AND ROMAN ART 3
Art and architecture of antiquity from origins of Greek civilization to fall of Rome. Recent topics include Art in the Everyday Life of Ancient Romans, Hellenistic Greek Sculpture, Late Roman Portraiture and Roman Architecture. PREREQ: ARTH203 or ARTH209. RESTRICTIONS: May be repeated for credit when topics vary.

ART 406 SEMINAR IN MEDIEVAL ART 3
Art of Europe from fall of Rome to late Gothic period. Recent topics include The Court of Charlemagne, Early Irish and Anglo-Saxon Art, and Saint Denis and Origins of Gothic Architecture. PREREQ: ARTH309 or ARTH310. RESTRICTIONS: May be repeated for credit when topics vary.

ART 408 SEMINAR IN NORTHERN RENAISSANCE ART 3
Arts in Northern Europe from 1300 to 1600. Topics may change with each time of offering. RESTRICTIONS: May be repeated for credit when topics vary.

ART 413 SEMINAR IN ITALIAN RENAISSANCE ART 3
Italian art from 1300 to 1600. Recent topics include Leonardo da Vinci, Michelangelo, Art of Italian Renaissance Courts. RESTRICTIONS: May be repeated for credit when topics vary.

ART 414 SEMINAR IN ITALIAN RENAISSANCE ARCHITECTURE 3
Italian architecture from 1300 to 1600. Recent topics include Renaissance Villas and Gardens, Brunelleschi and Alberti, Roman Architecture in Age of Michelangelo, and Palladio. PREREQ: ARTH220. RESTRICTIONS: May be repeated for credit when topics vary.

ART 415 SEMINAR IN ITALIAN BAROQUE ART 3
Painting, sculpture and architecture in Italy in seventeenth century. Recent topics include Bernini and Roman Baroque Sculpture, Seicento Poetics and Imagery, Caravaggio. RESTRICTIONS: May be repeated for credit when topics vary.

ART 417 SEMINAR IN NORTHERN BAROQUE ART 3
RESTRICTIONS: May be repeated for credit when topics vary.

ART 419 SPANISH ART OF THE GOLDEN AGE 3
Art in Spain and its colonies from 1500-1700. Topics vary. Seminars may focus on particular artists, or on broader historical and/or methodological issues dealing with artistic production, reception, and circulation within Spanish empire. RESTRICTIONS: May be repeated for credit when topics vary.

ART 420 SEMINAR IN AFRICAN ART 3
Studies recent scholarship on art and/or architecture in Africa, focusing on specific subjects such as Modern and Contemporary art, sculpture before 1500, global views and uses of African art and art institutions in Africa. RESTRICTIONS: Not open to freshmen.

ART 421 SEMINAR IN NINETEENTH CENTURY ART 3
History and theory of art 1789-1900. Topics vary with each time of offering. Recent topics include Paris in the Age of Gericault, Delacroix, and Baudelaire; Art and Ideology; Modern Art and Literature, Modern Portraiture. PREREQ: ARTH227 or permission of instructor. RESTRICTIONS: May be repeated for credit when topics vary.

ART 422 FOLK AND OUTSIDER ART 3
Focuses on traditional and popular arts of United States. Topics covered include colonial Pennsylvania-German decorative arts, Victorian Welsh gravestones, African-American textile and basketry crafts, and contemporary Inuit graphic arts. Discussions and research focus on relationship of folk arts to questions of ethnicity, class, popular culture, and community aesthetics.

ART 423 SEMINAR IN TWENTIETH CENTURY ART 3
History and theory of art from 1900 to present. Topics vary with each offering. PREREQ: ARTH227 or ARTH228 or permission of instructor. RESTRICTIONS: May be repeated for credit when topics vary.

ART 424 SEMINAR IN NINETEENTH CENTURY PHOTOGRAPHY 3
Aspects of history and aesthetics of nineteenth century photography. Topics change with each offering. Recent topics include Photography and Art, Documentary Photography, and "Art" Photography. PREREQ: ARTH227 or ARTH318.

ART 425 SILENT CINEMA 3
Examination of invention, emergence, and development of silent cinema in Europe, the former USSR, and United States. Includes study of significant films and filmmakers; social, cultural and artistic contexts; and critical literature. PREREQ: Either ARTH227 or ARTH228.

ART 427 SEMINAR IN TWENTIETH CENTURY PHOTOGRAPHY 3
Aspects of history and aesthetics of twentieth century photography. Topics change with each offering. Recent topics include Photography and Art, and Photography and Criticism. PREREQ: ARTH227 or ARTH228 or ARTH230 or ARTH311.

ART 429 SEMINAR IN MODERN ARCHITECTURE 3
Architecture in Europe and/or America from 1750 to present. Recent topics include Architecture of Neoclassicism; and Sullivan, Wright and the Prairie School. RESTRICTIONS: May be repeated for credit when topics vary.

ART 431 SEMINAR IN AMERICAN ARCHITECTURE 3
American architecture from Colonies to present. Recent topics include Architecture of the Colonial and Federal Periods, Nineteenth Century American Architecture, and Philadelphia Architecture. RESTRICTIONS: May be repeated for credit when topics vary.

ART 433 SEMINAR IN AMERICAN ART 3
American art from Colonies to present. Recent topics include Art and Revolution in Early America; Early American Modernism, and American Painting and Sculpture after World War II. May be cross-listed with AMCS435. RESTRICTIONS: May be repeated for credit when topics vary.

ART 440 SEMINAR IN LATIN AMERICAN ART 3
Arts of Latin America from preHispanic times to twenty-first century. Topics change with each offering. Recent topics include Art and Religion in Latin America, and Art and Conquest in the New World. RESTRICTIONS: May be repeated for credit when topics vary.

ART 445 SEMINAR IN EAST ASIAN ART AND ARCHITECTURE 3
Art, architecture and archaeology of China, Japan, and/or Korea. Materials from nearby regions may also be included. Topics change each time of offering. Possible topics include Chinese Art and Collecting, Modern Architecture in East Asia, Meiji Art and architecture, East Asian Archaeology and Nationalism.

ART 448 HISTORY, PHILOSOPHY, FUNCTIONS AND FUTURE OF MUSEUMS 3
See MSST403 for course description.

ART 457 SURVEY OF AFRICAN ART 3
See ARTH457 for course description.

ART 466 INDEPENDENT STUDY 1-6

ART 480 STUDIO IN THE MATERIALS AND TECHNIQUES OF DRAWING IN THE WEST 3
See MSST480 for course description.

ART 481 SEMINAR IN MATERIALS AND TECHNIQUES OF THE CONTEMPORARY PAINTER AND DRAFTSMAN 3
See ARTC481 for course description.

ART 488 STUDY MATERIALS AND TECHNIQUES OF PAINTING I 3
See MSST488 for course description.

ART 489 STUDY MATERIALS AND TECHNIQUES OF PAINTING II 3
See MSST489 for course description.

ART 490 STUDIO IN THE MATERIALS AND TECHNIQUES OF PRINTMAKING I 3
See MSST490 for course description.
ART HISTORY

ARTH 599  TOPICS IN ART HISTORY  3
Detailed investigation in lecture rather than seminar format of varying topics, e.g., St. Denis and Problems of Twelfth Century Art.

ARTH 601  THEORIES AND PRACTICES OF ART HISTORICAL INTERPRETATION  3
Critical analysis of selected writings influential in art history and humanities. Designed to help students hone their interpretive skills through close examination of assumptions, standards of argument and evidence, core concepts, procedures, boundaries, and objectives that have shaped art historical writings past and present.

ARTH 602  THEORIES AND METHODOLOGIES IN ARCHITECTURAL HISTORY  3
Introduction to issues and methodologies in architecture and urbanism history. Readings in philosophy and sociology and in recent works of architectural and urbanism history they have inspired. Organized thematically (capitalism; colonialism; print culture, etc.).

ARTH 605  STUDIES IN GREEK AND ROMAN ART  3
Art of antiquity from origins of Greek civilization to fall of Rome. Recent topics include Roman Architecture; Religion, Religiosity and Ritual in the Lives of Romans; Visual Culture in the Age of Rembrandt.
RESTRICTIONS: May be repeated for credit when topics vary.

ARTH 606  STUDIES IN MEDIEVAL ART  3
Art of Europe from fall of Rome to late Gothic period. Recent topics include Court of Charlemagne, Early Irish and Anglo-Saxon Art, and Medieval Ivories.
RESTRICTIONS: May be repeated for credit when topics vary.

ARTH 611  STUDIES IN ITALIAN RENAISSANCE ART  3
Italian art from 1300 to 1600.
RESTRICTIONS: May be repeated for credit when topics vary.

ARTH 614  STUDIES IN ITALIAN RENAISSANCE ARCHITECTURE  3
Italian architecture from 1300 to 1600. Recent topics include Renaissance Villas and Gardens, Brunelleschi and Alberti, Roman Architecture in the Age of Michelangelo, and Palladian.
RESTRICTIONS: May be repeated for credit when topics vary.

ARTH 616  STUDIES IN ITALIAN BAROQUE ART  3
Italian art in the seventeenth century. Recent topics include Bernini and Roman Baroque Sculpture, Seicento Poetics and Imagery, Caravaggio.
RESTRICTIONS: May be repeated for credit when topics vary.

ARTH 617  STUDIES IN NORTHERN BAROQUE ART  3
Seventeenth century art in northern Europe. Recent topics include Vermeer and Dutch Genre Painting, Art and Money, Seventeenth Century Netherlands; and Prints in the Age of Rembrandt.
RESTRICTIONS: May be repeated for credit when topics vary.

ARTH 619  SPANISH ART OF THE GOLDEN AGE  3
Art in Spain and its colonies from 1500-1700. Topics vary. Seminars may focus on particular artists, or on broader and/or methodological issues dealing with artistic production, reception and circulation within Spanish culture.
RESTRICTIONS: May be repeated for credit when topics vary.

ARTH 620  SEMINAR IN AFRICAN ART  3
Topics vary from pre-Dogman art (pre-European 'discovery') to twentieth century painting and contemporary African cinema and may include representations of Africa in Enlightenment art and philosophy, reviews of literature on arts of Fulani peoples and its related archive of documentary film.

ARTH 621  STUDIES IN NINETEENTH CENTURY ART  3
History and theory of art 1789-1900.
RESTRICTIONS: May be repeated for credit when topics vary.

ARTH 622  RESEARCH TOPICS IN HISTORIC PRESERVATION  3
See UAPP636 for course description.

ARTH 623  STUDIES IN TWENTIETH CENTURY ART  3
History and theory of art from 1900 to the present.
RESTRICTIONS: May be repeated for credit when topics vary.

ARTH 624  FOLK AND OUTSIDER ART  3
Focuses on traditional and popular arts of North America. Topics include colonial Pennsylvania-German decorative arts, Victorian-Welsh gravestones, African-American textile and basketry crafts and contemporary fruit graphic arts. Discussions and research focus on relationship of folk arts to questions of ethnicity, class, popular culture and community aesthetics.

ARTH 625  SILENT CINEMA  3
Examination of invention, emergence, and development of silent cinema in Europe, the former USSR, and United States. Includes study of significant films and filmmakers; social, cultural and artistic contexts; and critical literature.
RESTRICTIONS: May be repeated for credit when topics vary.

ARTH 626  STUDIES IN MODERN ART AND THEORY  3
Studies in Modern Art, exploring diverse themes, media, theoretical and interdisciplinary perspectives. Possible topics include Art and Nationalism; Classicism and Modernity; Allegory; Regimes of Visuality; Modern Art and Literature; Modern Portraiture; Freud, Psychoanalysis, and Colonialism.

ARTH 627  STUDIES IN THE HISTORY OF PHOTOGRAPHY  3
Aspects of history and aesthetics of photography. Recent topics include Nineteenth Century Documentary Photography, Nineteenth Century "Art" Photography, Twentieth Century Photography and Criticism, and Twentieth Century Photography and Art.
RESTRICTIONS: May be repeated for credit when topics vary.

ARTH 628  THEORY AND PRACTICE OF HISTORICAL PRESERVATION PLANNING  3
See UAPP629 for course description.

ARTH 629  STUDIES IN MODERN ARCHITECTURE  3
Architecture in Europe and/or America from 1750 to the present. Recent topics include Architecture of Neoclassicism and Sullivan, Wright and the Prairie School.
RESTRICTIONS: May be repeated for credit when topics vary.

ARTH 630  HISTORY OF THEORIES IN MATERIAL CULTURE  3
See EAMC605 for course description.

ARTH 631  STUDIES IN AMERICAN ARCHITECTURE OF THE COLONIAL AND FEDERAL PERIODS  3
RESTRICTIONS: May be repeated for credit when topics vary.

ARTH 632  MAKING THE AMERICAN CITY  3
See UAPP632 for course description.

ARTH 633  STUDIES IN NINETEENTH CENTURY AMERICAN ARCHITECTURE  3
Greek, Gothic, Egyptian and Oriental Revivals; High Victorian Style and its culmination in Age of Elegance; and late nineteenth century American architecture.
RESTRICTIONS: May be repeated for credit when topics vary.

ARTH 635  AMERICAN ART TO 1865  3
Topics change with each offering. Recent topics include Visual Culture in Antebellum America, Common Ground: Dialectics of High and Low in Nineteenth Century American Visual Arts.
RESTRICTIONS: May be repeated for credit when topics vary.

ARTH 636  STUDIES IN AMERICAN ART: 1875-PRESENT  3
Painting, sculpture and related media from Eakins to the present. Recent topics include Eakins and American Modernism, and American Painting and Sculpture after World War II.
RESTRICTIONS: May be repeated for credit when topics vary.

ARTH 637  STUDIES IN ENGLISH ART AND ARCHITECTURE  3
RESTRICTIONS: May be repeated for credit when topics vary.

ARTH 640  SEMINAR IN LATIN AMERICAN ART  3
Arts of Latin America from pre-Hispanic times to twenty-first century. Recent topics include Art and Conquest in the New World, and Life and Afterlife of pre-Hispanic Artifacts.
RESTRICTIONS: May be repeated for credit when topics vary.

ARTH 654  VERNACULAR ARCHITECTURE  3
See HIST654 for course description.

ARTH 657  SURVEY OF AFRICAN ART  3
See ANTH657 for course description.

ARTH 660  STUDIO IN THE MATERIALS AND TECHNIQUES OF DRAWING IN THE WEST  3
See MSST680 for course description.

ARTH 661  MATERIALS AND TECHNIQUES OF THE CONTEMPORARY PAINTER AND DRAFTSMAN  3
See MSST681 for course description.

ARTH 685  CULTURAL THEORY AND CRITICISM  3
See ENGL685 for course description.

ARTH 688  STUDIO MATERIALS AND TECHNIQUES OF PAINTING I  3
See MSST688 for course description.
ARTh 689 Studio Materials and Techniques of Painting II 3
See MSSt689 for course description.

ARTh 690 Studio in the Materials and Techniques of Printmaking I 3
See MSSt690 for course description.

ARTh 801 Introduction to Decorative Arts in America to 1860 3
See EMAC801 for course description.

ARTh 850 Resources in Art History 0 PF
Introduction to art historical resources of University of Delaware and to techniques of scholarly research and bibliographical materials in historical study of visual arts.
RESTRICTIONS: Offered every Fall semester.

ARTh 851 Seminar in Art Historical Pedagogy 3 PF
Discussion of all aspects of teaching in field of art history (lectures, discussions, materials, examinations, grading), especially in context of teaching of large introductory survey course.
RESTRICTIONS: Open only to teaching assistants in ARTh153 or ARTh154. May be taken for credit only once.

ARTh 860 Reading and Research 1-9 PF
Readings and conferences on approved subject under faculty direction.
RESTRICTIONS: Requires permission of Department Chair. Open to Art History Ph.D. students only.

ARTh 869 Master’s Thesis 1-6

ARTh 964 Pre-Candidacy Study 3-12 PF
Research and readings in preparation of dissertation topic and/or qualifying examinations for doctoral students before admission to candidacy but after completion of all required course work.
RESTRICTIONS: Not open to students who have been admitted to candidacy.

ARTh 969 Doctoral Dissertation 1-12 PF

**Black American Studies**

BAMS 107 History of Rock 3
See MUsC107 for course description.

BAMS 110 Introduction to Black American Studies 3
Assesses status of Black America in modern technological order through examination of major spheres of institutional life, including employment, education, politics, criminal justice and the military.

BAMS 134 History of Africa 3
See HIST134 for course description.

BAMS 203 Art, Power and Architecture in Africa 3
See ARTh204 for course description.

BAMS 204 Urban Communities 3
See SOC1204 for course description.

BAMS 205 Contemporary Afro-American Issues 3
Impact of important issues involving Black American people in contemporary American society. Critical theoretical analyses of trends that affect programs of the Black community.

BAMS 206 Survey of Afro-American Culture 3
Historic and contemporary aspects of Black American culture. Multi-faceted approach utilizing resources from history, folklore, religion and sociology.

BAMS 207 History of Jazz 3
See MUsC207 for course description. PREREQ: MUsC105.

BAMS 215 Race in Society 3
See SOC1215 for course description.

BAMS 220 American Civil Rights Movement 3-4
See HIST220 for course description.

BAMS 293 Honors Short Course 1

BAMS 296 Honors Forum 1

BAMS 298 Research on Race, Ethnicity and Culture 1 PF
See WOMS298 for course description.

BAMS 304 History of Black America to the Civil War 3
Black historical impact on American life and culture to Civil War. May be cross-listed with HIST325.
PREREQ: BAMS110.

BAMS 305 Images of Race and Ethnicity in American Culture 3
See HIST305 for course description.

BAMS 306 History of Black America Since the Civil War 3
Survey of broad social, political and economic developments that shaped the Black experience during this period: rise of segregation in the South, migration from plantation to ghetto and struggle for civil rights. May be cross-listed with HIST326.

BAMS 307 Black Thought and Philosophy 3
Readings and discussions of Black philosophies, ideologies and concepts as reflected in thoughts of significant Black figures. May be cross-listed with PHIL307.

BAMS 308 Delaware Black History 3
Survey course in Delaware Black history. The Black American in Delaware from colonial times to recent developments. PREREQ: HIST205.

BAMS 313 African American Literature I 3
See ENGL344 for course description.

BAMS 322 Race and Politics 3
See POSC322 for course description.

BAMS 327 Race, Gender, Science 3
See PHIL327 for course description.

BAMS 330 Rhetoric of Black America 3
Rhetoric of Black Americans from early orators to contemporary figures. Oral interpretation and analysis of methods and techniques. PREREQ: Introductory class in communication.

BAMS 331 History of Caribbean I 3
See HIST311 for course description.

BAMS 332 History of Caribbean II 3
See HIST332 for course description.

BAMS 333 Peoples of Africa 3
See ANTH333 for course description.

BAMS 334 African American Women’s History 3
See HIST334 for course description.

BAMS 345 African American Literature II 3
See ENGL345 for course description. PREREQ: ENGL110.

BAMS 347 Studies in Modern/Contemporary Literature 3
See ENGL347 for course description. RESTRICTIONS: May be repeated once for credit when topics vary.

BAMS 350 Race and Work in the United States 3
Examines how race affects work-related experiences and opportunities of black workers in United States. Explores ways in which race, class, gender and other systems of social organization operate to determine access to resources, how resource access is managed and restricted, and to what extent workers are able to achieve economic and occupational mobility. Also looks at cultural and social capital formation and their impact on Black workers’ employment outcomes.

BAMS 351 Race and Ethnicity in Latin America 3
See ANTH351 for course description.

BAMS 355 Race, Class and Crime 3
See CRJU355 for course description.

BAMS 356 Studies in Modern/Contemporary Literature 3
See ENGL356 for course description. RESTRICTIONS: May be repeated once for credit when topics vary.

BAMS 361 Racial Inequality 3
See SOC361 for course description.

BAMS 373 Psychosocial Elements of Hip-Hop in the Black Community 3
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>BAMS 381</td>
<td>Understanding Black Men in the Streets and in Prison</td>
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<tr>
<td>BAMS 382</td>
<td>Studies in Multicultural Literature in English</td>
<td>3</td>
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<tr>
<td>BAMS 391</td>
<td>Research Methods in Black American Studies</td>
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<td>BAMS 395</td>
<td>Pan Africanism</td>
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<td>BAMS 411</td>
<td>Seminar in American History</td>
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<td>BAMS 415</td>
<td>Race, Class and Gender</td>
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<td>BAMS 418</td>
<td>Race, Gender and Poverty</td>
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<td>BAMS 432</td>
<td>Psychological Perspectives on the Black American</td>
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<td>BAMS 439</td>
<td>Problems in African Politics</td>
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<td>BAMS 440</td>
<td>Themes in Black American Studies</td>
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<td>BAMS 449</td>
<td>Civil Rights Law and Policy</td>
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<td>BAMS 650</td>
<td>Black Community Studies</td>
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<td>BISC 106</td>
<td>Elementary Human Physiology</td>
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<td>BISC 107</td>
<td>Elementary Evolutionary Ecology</td>
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<td>BISC 109</td>
<td>Viruses, Genes and Cancer</td>
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<td>BISC 110</td>
<td>General Biology Laboratory</td>
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<td>BISC 115</td>
<td>Human Heredity and Development Laboratory</td>
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<td>BISC 117</td>
<td>Elementary Evolutionary Ecology Laboratory</td>
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<td>BISC 127</td>
<td>Environments and Cultures in Conflict</td>
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<td>BISC 132</td>
<td>Understanding Black Men in the Streets and in Prison</td>
<td>3</td>
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<tr>
<td>BISC 200</td>
<td>Introductory Biology I</td>
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<td>BISC 208</td>
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<tr>
<td>BISC 244</td>
<td>Cooperative Education: Work Experience</td>
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**Biological Sciences**

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<tr>
<td>BISC 103</td>
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<tr>
<td>BISC 104</td>
<td>Principles of Biology with Laboratory</td>
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<td>BISC 105</td>
<td>Human Heredity and Development</td>
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<tr>
<td>BISC 244</td>
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</table>
BISC 276 HUMAN PHYSIOLOGY 4
Phylogeny of basic organ systems of humans. PREREQ: BISC207 or BISC208; and CHEM101, CHEM103, CHEM105 or CHEM111.
RESTRICTIONS: Open to non-majors only.

BISC 280 FUNDAMENTALS OF BIOTECHNOLOGY 1
Introduction to biotechnology in which students exposed to scientific, legal and ethical aspects of biotechnology. COREQ: BISC208 (may be taken prior to BISC280).

BISC 300 INTRODUCTION TO MICROBIOLOGY 4
Major groups of microorganisms (algae, protozoa, fungi) and bacterial) studied. Emphasis on physiology, metabolism, diversity and interactions between and among each group and bacteria and their interactions with humans. Laboratory included. PREREQ: BISC208.

BISC 302 GENERAL ECOLOGY 3
Interactions between organisms and their environments, population dynamics and interactions, communities, energy transfer within an ecological system, and components of the ecosystem. PREREQ: BISC208.

BISC 305 CELL PHYSIOLOGY 3
Structure and function of eucaryotic cell organelles. Emphasis on dynamic processes such as membrane transport, cell motility and protein trafficking. Current studies from literature and experimental techniques also stressed. PREREQ: BISC208 and CHEM104.

BISC 306 GENERAL PHYSIOLOGY 3
Principles underlying function of organisms at the organ system level; Ionic composition and regulation, respiration, circulation, nutritive metabolism, excretion and neuromuscular activity. PREREQ: BISC208 and two semesters of chemistry.

BISC 312 GENERAL ECOLOGY LABORATORY 2
Laboratory and field exercises demonstrating basic ecological principles and quantitative techniques. Emphasis on population and community phenomena. Natural habitats studied include local fields, forests and streams. COREQ: BISC302 is prerequisite or corequisite.

BISC 315 EXPERIMENTAL CELL BIOLOGY 2
Series of inquiry-based, multi-session laboratory experiences in cell biology. Major techniques include quantitative and fluorescent microscopy, cell culture and gene expression assays. Students learn to keep laboratory notebooks, troubleshoot technical problems and design critical control experiments. Simulated grant proposal critiqued. PREREQ: BISC208, BISC305, and CHEM104.

BISC 316 EXPERIMENTAL PHYSIOLOGY 2
Series of inquiry-based, multi-session laboratory experiences in physiology. Experiments performed on various organ systems, using computerized data-acquisition systems and appropriate animal models. Students learn to keep careful laboratory records, troubleshoot technical problems and design critical control experiments. PREREQ: BISC208, CHEM104, and BISC306.

BISC 317 TROPICAL ECOLOGY 3
Basic aspects of tropical ecology including climatic, geological and adaptive components. Focuses on species' interactions and ecosystems. Includes at least two field trips. PREREQ: BISC208.
RESTRICTIONS: Taught in Costa Rica.

BISC 318 TROPICAL AMPHIBIANS AND REPTILES 3
Topics in worldwide herpetology with major focus on Costa Rica. Topics include evolution, extinct groups and orders Gymnophiona, Caudata, Anina, Tertudines, Crocodylia and others. Field trips included. PREREQ: BISC107 or BISC207.
RESTRICTIONS: Taught in Costa Rica.

BISC 321 ENVIRONMENTAL BIOLOGY 3
Basic ecological and physical principles with major emphasis on effect of human-caused environmental changes on populations, communities and ecosystems. PREREQ: BISC208 or permission of instructor.

BISC 326 GENERAL PHYSIOLOGY DISCUSSION 1
Discussion of selected topics in physiology with emphasis on experimental evidence. COREQ: BISC306.

BISC 366 INDEPENDENT STUDY 1-6
BISC 452 UNDERGRADUATE THESIS II 3
Continuation of BISC451. PREREQ: BISC451 and admission to B.S. in Biology in either CMG or EOB concentration. RESTRICTIONS: Not for students pursuing degree with distinction.

BISC 466 INDEPENDENT STUDY 1-6

BISC 471 INTRODUCTORY IMMUNOLOGY 3
Biological basis of adaptive immunity including participating cells, cellular interactions, counted mechanisms and immunopathologies. PREREQ: BISC208, BISC401/411 or BISC305, BISC300.

BISC 480 VERTEBRATE NATURAL HISTORY 4
Biology of vertebrate organisms dealing specifically with adaptations to the environment, morphology, physiology and taxonomy. PREREQ: BISC208.

BISC 492 HUMAN AND MAMMALIAN CYTOGENETICS 3
Introduction to structure, function and behavior of eukaryotic chromosomes with special emphasis on those from human and mammalian species. Covers methods of chromosome study, gene mapping and medical cytogenetics. PREREQ: BISC208.

BISC 510 TOPICS IN MIDDLE SCHOOL BIOLOGY EDUCATION: GENETICS 3
Strengthens content understanding of developmentally appropriate genetic concepts for middle school students. Instructors model effective inquiry-based classroom pedagogy and teachers engage in reflective discussions of how to enhance student appreciation of genetics. RESTRICTIONS: Enrollment limited to in-service high school science educators.

BISC 530 TOPICS IN BIOLOGY EDUCATION: NATURE OF SCIENCE AND EVOLUTION 3
Strengthens understanding in key areas of evolutionary biology and nature of science, using methods that model inquiry-based classroom practices. Discussions focus on best ways to enhance student understanding, and on dealing with controversies in teaching of evolution in high school. RESTRICTIONS: Enrollment limited to in-service high school science educators.

BISC 600 BIOTECHNOLOGY AND MOLECULAR MEDICINE 3
Application of molecular and cellular biology techniques and principles to field of biotechnology. Stresses applied side of science and focuses on practical side of molecular biology and how scientists and companies reduce basic knowledge to commercial products. Covers general concepts for middle school students. Instructors model effective inquiry-based classroom pedagogy and teachers engage in reflective discussions of how to enhance student appreciation of genetics. RESTRICTIONS: Enrollment limited to in-service high school science educators.

BISC 601 IMMUNOCHEMISTRY 4
Methods as basic as immunization and as complex as developing monoclonal antibodies. Methods used to investigate genetics and protein structure of B-galactosidase. PREREQ: BISC401 or biochemistry. RESTRICTIONS: Requires permission of instructor.

BISC 602 MOLECULAR BIOLOGY OF ANIMAL CELLS 3
Examination of eukaryotic genes, synthesis and processing of messenger RNA and control of protein synthesis with emphasis on regulation of normal cellular growth and differentiation and process of cancer cell transformation. Emphasis on recombinant DNA technology, monoclonal antibody production and tissue culture. PREREQ: BISC401 and BISC403.

BISC 604 NUCLEIC ACIDS LABORATORY 4
Introduces techniques of gene cloning, amplification, manipulation and expression. PREREQ: BISC401. RESTRICTIONS: Biochemistry recommended. Senior or graduate status required.

BISC 605 ADVANCED MAMMALIAN PHYSIOLOGY 4
Systemic mammalian physiology: cellular mechanisms, muscle, cardiovascular, respiratory, renal, digestive and endocrine systems. Emphasizes human physiology and includes discussions of primary literature in field of physiology research. PREREQ: BISC306 or instructor's approval. RESTRICTIONS: Priority given to graduate students and seniors seeking research-related careers.

BISC 612 ADVANCED CELL BIOLOGY 3
Four major sections: (1) cell structure/function; (2) signaling mechanisms and cell fate; (3) protein biosynthesis and trafficking and (4) integrative cell biology. Students required to interpret and evaluate data from primary scientific literature. RESTRICTIONS: Instructor approval required. Meets literature requirement for biology majors.

BISC 615 VERTEBRATE DEVELOPMENTAL BIOLOGY 3
Introduces basic principles of vertebrate development including formation of basic body plan and molecular control of tissue morphogenesis. Importance of each developmental milestone illustrated by discussing underlying causes of birth defects. May be cross-listed with ANSC615. PREREQ: BISC401 and BISC403. RESTRICTIONS: Requires instructor approval.

BISC 617 LABORATORY TECHNIQUES FOR MODERN MICROSCOPY 4
Techniques of electron and confocal microscopic study of tissues. Includes fixation, embedding, ultrathin sectioning, staining, observation and interpretation. RESTRICTIONS: Requires permission of instructor.

BISC 618 COMPUTER IMAGING IN BIOLOGY 3
Principles and methods of computer image processing as they apply to biological images. Laboratory provides hands-on experience prompted by prepared tutorials. Students develop their own projects and present them as posters or other formats. PREREQ: Requires permission of instructor. RESTRICTIONS: Limited by number of computer workstations in laboratory.

BISC 619 GENE EXPRESSION LABORATORY 4
Laboratory in techniques of molecular biology. Student generates recombinant viruses which can express large amounts of foreign protein. The protein purified and characterized functionally and biochemically using such methods as invitro DNA replication, DNA footprinting, DNA melting and/or unwinding and gel retardation. PREREQ: BISC401. RESTRICTIONS: Limited to ten students. Preference given to bachelor of science degree students with a concentration in biotechnology.

BISC 625 CANCER BIOLOGY 3
Provides integrated lecture series summarizing current knowledge in cancer biology. Topics include: statistics of incidence/survival, pathology, the process of chemical carcinogenesis and sources of carcinogens, genetic and epigenetic mechanisms and consequences, viral and hormonal carcinogenesis as well as current treatment options. PREREQ: BISC207, BISC401, CHEM103, CHEM104, CHEM321. RESTRICTIONS: Instructor approval required.

BISC 626 NEUROSCIENCE I 3
See PSYC626 for course description. PREREQ: BISC306, PSYC314, and PSYC310 or PSYC312.

BISC 627 NEUROSCIENCE II 3
Further study of structure and function of nervous system with emphasis on molecular, cellular, and network neurophysiology. May be cross-listed with PSYC627. PREREQ: BISC306, PSYC310 or PSYC312, and PSYC314.

BISC 630 ICTHYOLOGY 4
Biology of fishes including structure and function, reproduction, development, behavior, geographic distribution and systematics. PREREQ: Physiology course.

BISC 631 PRACTICE OF SCIENCE 3
Uses historical, philosophical, and sociological perspectives to better understand nature of modern science and its practice. Examines "science misconduct," and satisfies NIH mandate requiring graduate training in "the responsible conduct of research." May be cross-listed with CHEM631.

BISC 637 POPULATION ECOLOGY 3
Theoretical and experimental aspects of single species growth and multispecies interactions. PREREQ: BISC302.
BISC 639 DEVELOPMENTAL NEUROBIOLOGY 4
Developmental biology of nervous system, including cellular components, neural induction, neurogenesis and neuronal migration, cellular determination, axon outgrowth and pathfinding, synapse formation, programmed cell death, neurotrophic factors, neurodevelopmental disorders, and early critical periods. RESTRICTIONS: Requires permission of instructor.

BISC 641 MICROBIAL ECOLOGY 3
Principles of microbial interactions in natural environments, including applications to industrial microbiology and certain types of pollution. PREREQ: BISC300.

BISC 645 BACTERIAL EVOLUTION 3
Explores development of enormous bacterial diversity beginning with current theories on origin of life. Examines evolution of viruses and "directed evolution" controversy which concerns mechanisms of bacterial evolution. PREREQ: BISC300 or equivalent.

BISC 646 PLANT CELL BIOLOGY 3
Examines cell as integrated system of localized protein-protein interactions. Strongly comparative, using examples from yeast and mammalian. Focuses on underlying principles/methods. Topics include protein structure, folding, targeting, modification and interactions, membranes, cell walls, cytoskeleton, molecular motors, cell cycle, signal transduction, apoptosis and pathogenesis. May be cross-listed with PISC446. PREREQ: Introductory organic chemistry.

BISC 654 BIOCHEMICAL GENETICS 3
Emphasis on operon theory, feedback mechanisms, control of cell division, mutagenesis, isolation of RNA, somatic cell genetics, gene amplification, lysogeny, restriction and modification, and ribosome structure and function. PREREQ: BISC403 or biochemistry.

BISC 656 EVOLUTIONARY GENETICS 3
Exploration of theory, methods and experiments underlying current research in evolutionary processes determining genetic variation within and between species, estimation of population structure from genetic data, and genetics of speciation. PREREQ: BISC403.

BISC 660 ENVIRONMENTAL PHYSIOLOGY 3
Biochemical and morphological adaptive responses of animals to environmental factors; adjustments to changes in salinity, temperature, oxygen, etc. at the level of the whole organism, organ system and cell. PREREQ: BISC306.

BISC 665 ADVANCED MOLECULAR BIOLOGY & GENETICS 3
Presents concepts and approaches regarding our current understanding of molecular biology and molecular genetics in eukaryotic organisms. Requires solid background in biochemistry, cell biology and introductory molecular biology. RESTRICTIONS: Requires permission of instructor.

BISC 671 CELLULAR AND MOLECULAR IMMUNOLOGY 4
Introduces basic concepts of immunology and describes how different immune responses can either protect the body from infection or lead to immunological based diseases. Focuses on cellular interactions and resultant molecular responses that lead to immune protection. PREREQ: BISC401 or BISC305 or BISC300. RESTRICTIONS: Requires permission of instructor.

BISC 675 CARDIOVASCULAR PHYSIOLOGY 3
Physiology and biophysics of mammalian heart and circulation. PREREQ: Physiology course at or above the 300 level.

BISC 679 VIROLOGY 3
Molecular biology of animal viruses. Virus structure and organization; mechanisms of penetration, replication, maturation and transformation. PREREQ: BISC401 or biochemistry.

BISC 693 HUMAN GENETICS 3
Emphasis on medical and social implications of our knowledge of human genetics. Discusses theoretical and practical principles of genetics useful in studying human variation such as cytogenetics and cell genetics, biochemical genetics, developmental genetics and teratology; principles of genetic counseling, multifactorial inheritance and the genetics of cancer. PREREQ: BISC403.

BISC 801 SEMINAR IN ECOLOGY 2
Critical examination of selected topics in ecology, through evaluation of relevant literature. Students prepare seminars on topics provided each semester. RESTRICTIONS: Requires permission of instructor.

BISC 805 MULTIDISCIPLINARY BIOTECHNOLOGY 3
See CHEG805 for course description.
BREG 223 Surveying 3
Error propagation, distance measurement, trigonometric leveling, traversing, area measurement, route surveys, field astronomy, coordinate systems, and GPS. May be cross-listed with CIEG223.
PREREQ: EGTE104 or BREG113.
RESTRICTIONS: Requires competency in trigonometry.

BREG 321 Storm-Water Management 4
Hydrology for small urban/suburban/urban watersheds. Design of culverts, storm drains, spillways, vegetated waterways, and storm-water management systems.
PREREQ: EGTE215 or CIEG305.

BREG 603 Soil Physics 3
See PLSG603 for course description.
PREREQ: PLSG204.

BREG 621 Nonpoint Source Pollution 3
Understanding sources, transport pathways, and transformations of important pollutants and toxic chemicals generated by anthropogenic activities. Topics include transport, transformation, and fate of these pollutants in watersheds. Impacts of these pollutants on soil, forest, and aquatic ecosystems using specific case studies.
PREREQ: BREG321 or CIEG440 or permission of instructor.

BREG 622 Watershed Modeling 3
Application and understanding of mathematical models for quantification and analysis of hydrologic processes. Understanding mechanistic concepts, assumptions behind models, and advantages and limitations associated with using models. Value of observed data in calibrating models and uncertainty associated with model predictions.
PREREQ: BREG321 or CIEG440 or permission of instructor.

BREG 628 Natural Wastewater Treatment Systems 3
Land treatment systems for wastewater, biosolids, and septic tank land application, constructed wetlands and aquatic treatment systems, lagoons and decentralized wastewater management.
PREREQ: EGTE328 or CIEG223 or CIEG331.

BREG 666 Special Problem 1-12

BUSINESS ADMINISTRATION

BUAD 030 Cooperative Education Program 1 RP
Assists integration of classroom theory with on-the-job experience through analysis of cooperative work assignments. Business administration, accounting, and economics co-op students must enroll for one credit hour of BUAD030 during their co-op work term.

BUAD 100 Introduction to Business 3
Survey of basic business concepts designed for non-business major. Topics include business organization, management, marketing, operations research and finance. RESTRICTIONS: No majors within business administration, finance, management information systems or accounting degree programs may receive credit for this course.

BUAD 110 Basics of Business 3
Introduction to business informs about each of the functional areas of business through lectures, readings, discussions, guest speakers, cases and projects. Includes topics relating to operations, marketing, finance, management, accounting and MIS, as well as business ethics, and critical thinking and decision making. COREQ: ENGL110.
RESTRICTIONS: Open only to freshmen in the Alfred Lerner College of Business and Economics.

BUAD 301 Introduction to Marketing 3
Management of marketing functions, marketing research, product planning, distribution channels, pricing, personal selling and advertising. Emphasis on consumer and industrial markets.
PREREQ: ECON100 or ECON152.

BUAD 302 Marketing Research 3
Focus on marketing research process as an aid in marketing decision making. Defining marketing problems, identifying marketing information needs, developing methods to gather information, and applying research results to marketing problems. PREREQ: MATH202, BUAD301, and MYSY160 or CISCI101.

BUAD 306 Operations Management 3
Analysis of major problems faced by operations managers at different levels of management. Topics include scheduling, forecasting, process design, inventory management and quality management. PREREQ: MATH202, and MYSY160 or CISCI101.

BUAD 309 Management and Organizational Behavior 3
Processes and procedures used to manage performance effectively, including behavioral implications and awareness of individual’s impact on others.

BUAD 341 Environment of Multinational Corporations 3
Interdisciplinary approach explores multinational corporation: its political and economic environment; current attitude of policy makers; and techniques used to earn profits. Material supplemented by practicing economists, financial experts, business executives and political analysts. May be cross-listed with ECON341 and/or POSC341.
PREREQ: ECON115.
RESTRICTIONS: Counts as a BUAD elective for BS candidates. Credit for BUAD/ECON/POSC341 given only once.

BUAD 346 Analysis of Operations Problems 3
Intensive treatment of topics covered in BUAD306 to include investigation and development of decision making process in an operations environment. Emphasis on practical applications.
PREREQ: BUAD306.

BUAD 364 Business Administration in Practice 3
Requires completion of at least 120 hours of a management, marketing, operations management, or international business internship with verification by the hiring company. Term paper relating the real-world duties and experiences of the internship to principles learned in traditional business courses also required.
RESTRICTIONS: Requires permission of instructor.

BUAD 366 Independent Study 1-6

BUAD 382 International Business Management 3

BUAD 383 Seminar on International Business 3
Surveys economic, political, and institutional context of international business as well as strategic operations of the international company. Special attention given to cross-discipline topics, both in the form of interdisciplinary materials and lectures and institutional and company visits.
RESTRICTIONS: Taught abroad.

BUAD 391 Seminar on International Management 3
Seminar on selected topics in international management. Combines lectures and visits to local organizations. Research paper typically required.
PREREQ: BUAD309.
RESTRICTIONS: Taught abroad. Counts as BUAD elective for BS candidates.

BUAD 393 Seminar on International Marketing Management 3
Seminar on selected topics in international marketing management. Combines lectures and visits to local organizations. Research paper typically required.
PREREQ: BUAD309.
RESTRICTIONS: Taught abroad. Counts as BUAD elective for BS candidates.

BUAD 394 Seminar on International Operations Management 3
Seminar on selected topics in international operations management. Combines lectures and visits to local organizations. Research paper typically required.
PREREQ: BUAD306.
RESTRICTIONS: Taught abroad. Counts as BUAD elective for BS candidates.

BUAD 420 Labor Relations 3
Treatment of labor-management relationships, with emphasis on collective bargaining behavior and settlement of disputes. Various environmental factors (history, philosophy, law and structure) which greatly affected union-management affairs are first inspected, as a vital background to understanding.
PREREQ: BUAD309.

BUAD 421 Human Resource Management 3
Emphasizes key human resource management requirements: acquisition of personnel (planning, selecting, recruiting and training) and maintenance of personnel (evaluation, compensation, working conditions and labor relations).
PREREQ: BUAD309.

BUAD 422 Designing Effective Organizations 3
Concepts of administration at individual, group and organizational level of analysis. Emphasis on organizational level of analysis with topics including job design, organization structure and design, and inter- and intra-organizational processes.
PREREQ: BUAD309.

BUAD 423 Negotiation 3
Improves negotiation and conflict resolution skills by introducing principles for effective negotiation and providing opportunities to develop skills through use of simulation exercises. Topics include preparing for negotiation, strategies and tactics of negotiation, dealing with interpersonal conflict, and avoiding common mistakes when negotiating.
PREREQ: BUAD309.
BUAD 425 CURRENT ISSUES IN GLOBAL BUSINESS 3
Current topics and emerging issues in changing global marketplace. May focus on regional issues, global business sectors, current issues in globalization of business, or a combination of these.
PREREQ: Senior standing, and at least one of ACCT383, BUAD382, ECON340, or FINC413.

BUAD 428 MANAGEMENT SYSTEMS 3
Concepts of general systems theory, with applications to analysis of management systems, work flows and information flows. Design and analysis of sociotechnical systems, project and program management.
PREREQ: BUAD309.

BUAD 429 SELECTED TOPICS IN MANAGEMENT 3
Topical seminar on such management issues as organizational socialization, work motivation, and organization-environment relations. Development of an individual research project is stressed.

BUAD 441 STRATEGIC MANAGEMENT 3
Case studies and concepts in determination of top-level company policy and solution of problems that cross major functional areas in business.
PREREQ: BUAD301, BUAD306, BUAD309 and FINC311.
RESTRICTIONS: Requires senior standing in business administration or accounting.

BUAD 444 ENTREPRENEURSHIP AND SMALL BUSINESS MANAGEMENT 3
PREREQ: BUAD309.

BUAD 446 OPERATIONS PLANNING AND CONTROL 3
Management of operations and inventories in variety of organizations including banks, hospitals, government and manufacturing firms. Topics include forecasting, operations planning and scheduling, material requirements planning and purchasing.
PREREQ: BUAD306.
COREQ: BUAD447.

BUAD 447 QUALITY MANAGEMENT 3
New technology for quality and productivity. Emphasis on actual implementation of total quality management in general and statistical process control in particular.
PREREQ: BUAD306.
COREQ: BUAD446.

BUAD 448 DECISION SUPPORT SYSTEMS FOR OPERATIONS 3
Effective design and implementation of decision support for operations. Selection of appropriate models for decision support. Emphasis on project work in which an actual decision support system is designed and implemented.
PREREQ: BUAD306, MISY160.
RESTRICTIONS: Open to senior operations management majors only.

BUAD 449 PROBLEM STRUCTURING FOR OPERATIONS DECISION MAKING 3
Focuses on how unstructured problems in various areas of operations management can be structured and solved using a variety of tools and techniques. Emphasis on logistics problems and other unstructured problems related to forecasting, inventory management, scheduling, and supply chain management.
PREREQ: BUAD306, BUAD446 and BUAD447.
RESTRICTIONS: Not open to students who have taken or are taking MISY432. Senior operations management majors only.

BUAD 466 INDEPENDENT STUDY 1-6
Directed research for undergraduate Honors students and Summer Scholars. Research must be scholarly and be related to an undergraduate thesis.
PREREQ: Upper class standing.
RESTRICTIONS: Permission of instructor and department chairperson.

BUAD 470 SALES MANAGEMENT AND SELLING 3
Selling as the process of commercial persuasion and as a service to the customer. Major operating responsibilities of sales manager, recruitment, training, motivation, compensation, territory management and manpower planning and control.
PREREQ: BUAD301.

BUAD 471 ADVERTISING MANAGEMENT 3
Planning, implementing, and evaluating advertising and sales promotion activities. Determining advertising objectives, selection of campaign themes and media, evaluating advertisements and campaigns, controlling advertising and promotion expenditures, client-agency relationship, regulation, and social and economic effects of advertising.
PREREQ: BUAD301.

BUAD 472 MARKETING, SOCIETY AND THE ENVIRONMENT 3
Focuses on interface between marketing management and social-environmental dynamics of surrounding society. Students critically analyze concepts and practices relating to socially responsible marketing management to gain an understanding of emerging social and environmental issues relevant to marketing decision making.
PREREQ: BUAD301.

BUAD 475 INTERNATIONAL MARKETING 3
Analysis of concepts and practices relating to marketing of products and services internationally. Focus on uncontrollable environmental forces facing an international marketer, issues relating to standardization of marketing strategies across countries and unique problems of specific international markets.
PREREQ: BUAD301.

BUAD 477 INFORMATION TECHNOLOGY APPLICATIONS IN MARKETING 3
How changes in information technology affect the marketplace and how it should be used to support marketing decision-making. Emerging opportunities that could drastically alter the way organizations market their products and provide service to their customers are presented and discussed.
PREREQ: BUAD301.
RESTRICTIONS: Open to marketing majors only.

BUAD 478 FIELD PROJECTS IN MARKETING 3
Student teams apply knowledge of marketing and business in a "real world" setting with local, regional, and national profit and nonprofit businesses on marketing projects funded by the companies. Projects involve: defining objectives, collecting relevant data, analyzing, interpreting, and reporting results/recommendations to management.
PREREQ: At least nine credits in marketing including BUAD302 and honors status, or permission of instructor.

BUAD 479 MARKETING STRATEGY FOR THE FIRM 3
The application of management decision processes and strategies to the integration of the firm’s total marketing mix. Multifaceted problems are studied in large, medium and small firms. Students analyze cases and other real marketing problems.
PREREQ: Twelve credit hours of marketing courses including BUAD302.

BUAD 480 STRATEGIC THINKING FOR THE EXECUTIVE LEADER 3
Broad introduction to MBA program and nature of management thought. Topics include strategy, decision-making and organizational behavior. Emphasizes understanding underlying assumptions/limitations of different business perspectives. Provides foundation for MBA program and gives students practical skills.

BUAD 485 MULTIDISCIPLINARY BIOTECHNOLOGY 3
See CHEG805 for course description.

BUAD 487 TEAM DEVELOPMENT SKILLS 1
Develops skills for team formation, development, facilitation and coaching through discussion of principles and strategies for effective team facilitation and through simulation exercises.
PREREQ: BUAD870.

BUAD 488 LEADERSHIP SKILLS FOR CHANGE 1
Develops skills for leading change and leadership coaching through discussion of principles and strategies for effective change and through simulation exercises.
PREREQ: BUAD870.

BUAD 489 NEGOTIATION SKILLS 1
Develops negotiation and conflict resolution skills through discussion of principles and strategies for effective negotiation and through simulation exercises.
PREREQ: BUAD870.

BUAD 491 GLOBALIZATION AND BUSINESS 3
Assesses environmental, institutional, industrial, strategic, and organizational features of globalization and business. Considers frameworks that guide managers’ understanding of globalization and business, how managers interpret challenges and opportunities of globalization and implications of globalization to professional development.
BUAD 820 Data Analysis and Quality Management
Emphasizes quality management primarily via statistical process control. Focuses on data analysis for measurement, inference, quality and productivity improvement. Descriptive statistics, graphical analysis, exploratory data analysis, applications of common distributions and models such as regression are covered.

BUAD 831 Operations Management and Management Science
Topics include decision analysis tools, mathematical programming, operations strategy, process management and planning and inventory management concepts. PREREQ: BUAD820.

BUAD 832 Operations Planning and Control
Analyzes problems and advanced decision techniques for effective management of operating resources. Topics include forecasting, capacity requirements determination, operations planning and scheduling, and inventory management. Applications in both manufacturing and service settings emphasized. PREREQ: BUAD831.

BUAD 833 International Operations
Focuses on issues concerning management of international operations. Topics include international sourcing for materials and services, location decisions for non-domestic production activities, worldwide logistical systems, and managing non-domestic operations and projects. PREREQ: BUAD831.

BUAD 834 Special Topics in Operation Management
Covers various topics in operations management at all levels of the firm. Individual inquiry stressed. PREREQ: BUAD831.

BUAD 835 Managing New Product Development Projects
Examines techniques and issues in project management, with special emphasis on new product development projects. Topics include models for cost estimation, process selection, competitive benchmarking, concurrent engineering, and successful project management. Teams prepare proposal for developing and introducing a new product into the marketplace. PREREQ: BUAD831, BUAD880, FINC850.

BUAD 836 Problem Structuring and Analysis for Decision Making
Introduces problem structuring and analysis for decision making under risk. Emphasizes both applications and methodology. Examines effects of creativity and problem definition on decision making. Uses various problems involving uncertainty to enhance decision making skills and expand awareness and understanding of business problems. PREREQ: BUAD831.

BUAD 837 Decision Support and Expert Systems for Business
Focuses on using decision support systems (DSS) and expert systems (ES) to enhance decision making in business. Critically examines literature on development of information systems. Discusses technical and behavioral issues related to design and implementation of effective DSS and ES. PREREQ: BUAD831.

BUAD 840 Ethical Issues in Domestic and Global Business Environments
Topics include ethics in organizations, and problems and challenges dealing with external environment demands including global issues.

BUAD 841 Managing the Global Enterprise
Focuses on development of business strategies and management practices for managing the multinational business organization. RESTRICTIONS: Counts toward MBA as an elective.

BUAD 842 Special Topics in Management of Technology
Examines selected topics in the management of technology. Individual inquiry stressed. PREREQ: BUAD870.

BUAD 843 Special Topics in Global Business
Examines selected topics in global business that may focus on one or more areas of the world (e.g., the European Union, Latin America, Pacific Basin, etc.). May be offered overseas.

BUAD 849 Seminar in Business Administration
With an emphasis on research methodology, individual inquiry, and communication of results, student pursue areas of interest and prepare formal presentations of their findings. PREREQ: Requires 24 MBA credits.

BUAD 851 Creativity and Innovation for New Ventures
New Venture Creation module explores creative and innovative process and linkages between creativity and innovation both within a corporate environment as well as in an entrepreneurial venture. Students gain an understanding of creative and innovative process, know how to stimulate creativity and break down barriers to innovation. PREREQ: BUAD870.

BUAD 852 Market Research for New Ventures
New Venture Creation module focuses on marketing issues related to new product development. Addresses how to use research to design products that meet customer needs, assess market potential, and segment heterogeneous markets. Strategic issues related to achieving a desirable market position, overcoming obstacles to successful product diffusion, and building equity in new brands are also considered. Depending on student interests, varying emphasis given to business-to-business and business-to-consumer markets. PREREQ: BUAD880.

BUAD 853 Project Planning and Management
Focuses on the innovation process. Various approaches to project planning and management are explored and specific project management techniques such as PACE and Stage Gate process are covered. Objective is to be able to plan an innovation process, know the various tools that are available and to appropriately apply the tools to an innovation project. Learning assessed through a written exam involving a case application. PREREQ: BUAD880.

BUAD 854 Strategic, Technical and Industry Analysis
New Venture module develops principle that effective strategies follow from founder and firm’s fundamental goals. Key course outcomes include: (1) develop skills in analyzing environment in which they or their firm compete; (2) understand how to define a strategy and design a business; (3) interpret the management processes used to analyze, formulate and implement effective strategies. PREREQ: BUAD890.

BUAD 855 Ethical and Regulatory Issues for New Ventures
Extension of legal and regulatory module in MBA core as it applies to technological innovation and new venture creation. Content may vary depending on students’ interests. PREREQ: BUAD840.

BUAD 856 Special Topics in New Venture Creation I
Specialized modules designed for students pursuing a concentration in New Venture Creation. Topics include: strategic, technical and industry analysis; project planning and management; ethical and regulatory issues for new ventures. PREREQ: Complete tier 1 of MBA program. RESTRICTIONS: Cannot be counted in program along with BUAD853, BUAD854 or BUAD855.

BUAD 857 Special Topics in New Venture Creation II
Specialized modules designed for students pursuing a concentration in New Venture Creation. Topics include: creativity and innovation for new ventures; strategic planning for new ventures; market research for new ventures; financing new ventures. PREREQ: Complete tier 1 of MBA program. RESTRICTIONS: Cannot be counted in program along with BUAD851, BUAD852 or FINC860.

BUAD 864 Internship
Fieldwork designed to allow application of acquired knowledge in a corporate setting. Requires a corporate sponsorship, a performance evaluation to be completed by that sponsor, and a written paper to be submitted to the administrator of internships.

BUAD 868 Professional Project
OECD Project demonstrating ability to apply Organizational Development and Change in field setting. Requires written and oral presentation of professional project following UD Thesis guidelines.

BUAD 869 Master’s Thesis
Can be taken for up to 6 credits in the MS program.

BUAD 870 Understanding People in Organizations
Develops knowledge base and requisite skills for managing individual, group and organizational processes through use of diagnostic models, cases and/or experimental experiences.

BUAD 871 Managing for Creativity and Innovation
Focuses on individual characteristics and group and organizational factors that influence ability of organizations to generate new products and/or processes, and to implement new products/processes. Students practice skills to diagnose barriers and develop creative organizations. PREREQ: BUAD870.

BUAD 872 Organizational Development and Change
Provides knowledge and skills to function as effective change agents in organizations. Particularly appropriate for students seeking potential employment in positions requiring skills in facilitating change. Classic OD concepts are studied along with contemporary concepts, approaches and techniques for planned organizational change. PREREQ: BUAD870.
BUAD 874 SPECIAL TOPICS IN ADMINISTRATION 1-3
Examines selected current organizational topics, e.g., new compensation and benefits initiatives, employee involvement, teamwork designs and re-engineering. Individual inquiry is stressed. PREREQ: BUAD870.

BUAD 875 STRATEGIC HUMAN RESOURCES 3
Examines personnel/human resources function focusing on five key areas: 1) procurement, 2) training and development, 3) compensation, 4) security, and 5) labor-management relations. Throughout, attention is paid to international practices and an effort is made to integrate business functions both strategically and operationally. PREREQ: BUAD870.

BUAD 876 LABOR MANAGEMENT RELATIONS 3
Labor-management relationships. Primary focus on contract negotiations and administration as well as inspection of various environmental factors (history, philosophy, law and structure) that underpin collective bargaining.

BUAD 878 LEADERSHIP IN INTERNATIONAL BUSINESS CULTURES 3
Focuses on cultural similarities and differences worldwide and how they affect managers' effectiveness. Attention given to general cultural dimensions as well as specific cultural practices with a special emphasis on cross-cultural communications. PREREQ: BUAD870.

BUAD 879 NEGOTIATION AND CONFLICT RESOLUTION 3
Theory and research on negotiation and conflict resolution and involves students in active negotiation exercises with discussions, including feedback on students' negotiation skills. Negotiation broadly defined to include many varieties of bargaining, third party dispute intervention and organizational justice. PREREQ: BUAD870.

BUAD 880 MARKETING MANAGEMENT 3
Management of marketing functions in modern profit and non-profit enterprises. Introduction to the marketing management process. PREREQ: ACCCT800 and ECON503.

BUAD 881 RESEARCH METHODS FOR MARKETING DECISIONS 3
Focuses on techniques of research design, data collection, and data analysis for making marketing decisions. Helps develop an appreciation for potential contributions and limitations of marketing research data, and enables evaluation of marketing research activities. Emphasizes interpretation, not computation, from statistical analyses. PREREQ: BUAD820 and BUAD880.

BUAD 882 INTERNATIONAL MARKETING MANAGEMENT 3
Develops managerial decision-making skills in several areas related to international/global marketing such as environmental analysis, planning/organization, marketing research, segmentation, targeting and positioning/competitive analysis, and method of entry. PREREQ: BUAD880.

BUAD 883 PRODUCT AND PRICE MANAGEMENT 3
Integrates topics in product management and pricing strategy. Special emphasis given to use of conceptual frameworks and analytical methods used to improve product and price decisions. Concepts and methods applied to real-world case studies. PREREQ: BUAD880.

BUAD 884 SPECIAL TOPICS IN MARKETING 1-3
Examines selected current marketing topics, e.g., strategy development, opportunity assessment, modeling and marketing programming. Individual inquiry is stressed. PREREQ: BUAD880.

BUAD 885 MARKETING CHANNELS 3
Analyzes marketing channels as social, economic and political systems. Strong emphasis on understanding behavioral dimension of channel relationship after focusing on economic and structural aspects of retailing, wholesaling, and physical distribution. Governmental and other constraints on channel activities also studied. PREREQ: BUAD880.

BUAD 886 ADVERTISING STRATEGY 3
For those with little or no prior experience in advertising. Intended to improve skills with respect to determining advertising strategy. Features mixture of core, case study analysis, class discussion, and team development and presentation of an entire advertising campaign. PREREQ: BUAD880.

BUAD 887 BUYER BEHAVIOR 3
Applied concepts from the social sciences to study factors that influence acquisition, consumption and disposition of products, services, and ideas. Covers: 1) buyer decision processes; 2) influences on consumer decisions and consumption patterns; and 3) the relationship between buying behavior and strategic decision making. PREREQ: BUAD880.

BUAD 888 ADVANCED MARKETING MANAGEMENT AND STRATEGY SEMINAR 3
Focuses on issues faced by senior and middle level marketing executives. Emphasizes developing comprehensive marketing strategy consistent with corporate plans. Issues explored include: opportunity assessment and competitive analysis, segmentation and positioning, and development of integrated marketing mix programs. PREREQ: BUAD880.

BUAD 889 INDUSTRIAL MARKETING 3
Studies marketing of goods and services to businesses, institutions, and the government. Covers organizational buying behavior, product/market planning, sales force and distribution management, pricing and promotion from perspective of both buyer and seller. PREREQ: BUAD880.

BUAD 890 CORPORATE STRATEGY 3
Emphasizes total organization function and performance in a global environment. Examines general management responsibilities for determining objectives and future strategies and seeking commitment for their implementation, integrates functional course concepts to enhance decision making and communication skills, through individual and group analyses of specific companies. PREREQ: FINC850, BUAD831, BUAD870, BUAD880.

BUAD 892 MARKETING STRATEGY SIMULATION 3
Uses computer simulation to integrate marketing concepts learned in core and elective classes. PREREQ: BUAD880.

BUAD 898 PROFESSIONAL PROJECT SEMINAR 3
Students required to design and implement a professional field project, compile a portfolio or report of their project and make an oral presentation. Provides a forum for consultation, advice and support from faculty and fellow students. PREREQ: Must have completed at least 12 credits in the MS in OEDC program or permission of instructor. RESTRICTIONS: May be taken twice for up to 6 credits.

BUAD 899 BUSINESS CONSULTING PROJECT 3
Designed to assist students gain an integrative, practical and applied industry experience by solving a real life industry problem in a group setting. Projects may be set up in different functional areas and/or concentrations, e.g., New Venture Creation, Marketing, Interdisciplinary Projects, etc. RESTRICTIONS: MBA advanced elective to be taken after completing the core and required courses.

COGNITIVE STUDIES

CGSC 202 HUMAN EVOLUTION AND THE FOSSIL RECORD 3
See ANTH202 for course description.

CGSC 205 ANTHROPOLOGY AND HUMAN NATURE 3
See ANTH205 for course description.

CGSC 266 SPECIAL PROBLEM 1-3

CGSC 270 INTRODUCTION TO COGNITIVE SCIENCE 3
Introduces symbolic view of mind embodied in cognitive science. Concentrates on domains of language and visual perception and role of representation and algorithm in theories of processing and development. Includes alternatives posed by connectionist models of cognition.

CGSC 314 BRAIN AND BEHAVIOR 3
See PSYC314 for course description.

CGSC 327 RACE, GENDER, SCIENCE 3
See PHIL327 for course description.

CGSC 330 PHILOSOPHY OF MIND 3
See PHIL330 for course description.

CGSC 340 COGNITION 3
See PSYC340 for course description.

CGSC 366 INDEPENDENT STUDY 1-3
CGSC 404  ANIMAL MINDS  
Examines philosophical, theoretical, and methodological issues raised by study of animal cognition and behavior. Topics may include mental continuity between human and nonhuman animals, animal communication and deception, self-recognition, emotions, culture, as well as ethical treatment of animals. May be cross-listed with PHIL404.

CGSC 418  MEANING AND LANGUAGE USE  
See LING418 for course description.

CGSC 421  PHILOSOPHY, BIOLOGY, SOCIETY  
Recent topics in philosophy of biology, with emphasis on those related to self, community, and society at large. Topics may include intelligent design, evolutionary altruism, psychological altruism, evolutionary psychology, cultural evolution, evolutionary game theory, and evolutionary ethics. May be cross-listed with PHIL421.

CGSC 450  RECENT TOPICS IN THE PHILOSOPHY OF MIND  
See PHIL450 for course description.

CGSC 466  INDEPENDENT STUDY  
1-6

CGSC 481  ARTIFICIAL INTELLIGENCE  
See CIS481 for course description.

CGSC 485  SEMINAR IN COGNITIVE SCIENCE  
Intensive study of topics in cognitive science, such as mental representation, vision, computational modeling, disorders. RESTRICTIONS: May be repeated for credit as topics change.

CGSC 496  PSYCHOLINGUISTICS  
Linguistic approaches to cognition. Issues in the relation of language to thought, universals, language acquisition, and theories of syntactic and semantic processing. PREREQ: LING101.

CGSC 604  ANIMAL MINDS  
Examines philosophical, theoretical, and methodological issues raised by study of animal cognition and behavior. Topics may include mental continuity between human and nonhuman animals, animal communication and deception, self-recognition, emotions, culture, as well as ethical treatment of animals. May be cross-listed with PHIL604.

CGSC 618  MEANING AND LANGUAGE USE  
See LING618 for course description.

CGSC 621  PHILOSOPHY, BIOLOGY, SOCIETY  
Recent topics in philosophy of biology, with emphasis on those related to self, community, and society at large. Topics may include intelligent design, evolutionary altruism, psychological altruism, evolutionary psychology, cultural evolution, evolutionary game theory, and evolutionary ethics.

CGSC 630  NEURONS AND NETWORKS  
See PSYC630 for course description. PREREQ: Senior standing or graduate student standing.

CGSC 642  MENTAL REPRESENTATION AND MEMORY  
See PSYC642 for course description.

CGSC 650  RECENT TOPICS IN THE PHILOSOPHY OF MIND  
See PHIL650 for course description.

CGSC 666  SPECIAL PROBLEM  
1-12

CGSC 670  ELEMENTS OF COGNITIVE SCIENCE  
Introduction to interdisciplinary study of the mind. Concentrates on interdisciplinary (linguistic, psychological, anthropological, philosophical and computational) approaches to domains of language and visual perception and other areas of cognition, as well as role of representation and algorithm in theories of processing and development.

CGSC 671  DISCOVERING HUMAN LANGUAGE: INTRODUCTION TO FIELD LINGUISTICS  
See LING 670 for course description.

CGSC 681  ARTIFICIAL INTELLIGENCE  
See CIS681 for course description.

CGSC 685  SEMINAR IN COGNITIVE SCIENCE  
Intensive study of topics in cognitive science, such as mental representation, vision, computational modeling, disorders. RESTRICTIONS: May be repeated for credit as topics change.

CGSC 696  PSYCHOLINGUISTICS  
Study of linguistic approaches to cognition. Issues in the relation of language to thought: universals, language acquisition and theories of syntactic and semantic processing. PREREQ: LING101.

CGSC 848  SEMINAR IN LANGUAGE DEVELOPMENT  
See EDUC848 for course description.

CGSC 866  INDEPENDENT STUDY  
1-12

CGSC 890  STUDIES IN COGNITIVE SCIENCE  
Varying topics in cognitive science, such as mental models, philosophical problems in the study of mind, computational modeling, and development. RESTRICTIONS: May be repeated for credit as topics change.

CHEMICAL ENGINEERING

CHEG 009  FRESHMAN SEMINAR  
0 PF
Defines chemical engineering and presents predictions of the future of the profession in research and development.

CHEG 112  INTRODUCTION TO CHEMICAL ENGINEERING  

CHEG 166  SPECIAL PROBLEM  
1-3
RESTRICTIONS: Cannot count toward graduation in chemical engineering.

CHEG 231  CHEMICAL ENGINEERING THERMODYNAMICS  
First law energy balance; entropy balance, thermodynamic constitutive equations for gases and liquids; thermodynamic cycles and energy conversion; and stability. Kinetic Theory and Partition functions. PREREQ: Minimum grade of C- in CHEG112 or, for environmental engineering majors, in CIEG233. Minimum grade of C- in MATH243.

CHEG 266  SPECIAL PROBLEM  
1-3
RESTRICTIONS: Cannot count toward graduation in chemical engineering.

CHEG 305  APPLIED MATHEMATICS FOR CHEMICAL ENGINEERING  
See MATH305 for course description. PREREQ: Minimum grade of C- in MATH243 and CHEG112.

CHEG 320  ENGINEERING ECONOMICS AND RISK ANALYSIS  
Introduction to chemical process simulation, process safety, and principles of chemical engineering economics, uncertainty and risk assessment within context of chemical engineering analysis and design. PREREQ: Minimum grade of C- in MATH305 and CHEG325.

CHEG 325  CHEMICAL ENGINEERING THERMODYNAMICS  
Continuation of CHEG231. Thermodynamics of mixtures; phase and chemical equilibrium. Application to staged separation processes, particularly distillation. PREREQ: Minimum grade of C- in CHEG231.

CHEG 332  CHEMICAL ENGINEERING KINETICS  
Systematic description of rates of homogeneous and heterogeneous chemical reactions of industrial importance. Application of these principles to analysis and design of chemical reactors. PREREQ: Minimum grade of C- in MATH305, CHEG325 and CHEM444.

CHEG 341  FLUID MECHANICS  
Theory of flow of incompressible viscous and nonviscous fluids; flow of non-Newtonian fluids; empirical correlations for laminar and turbulent flow; and applications in chemical processing. PREREQ: Minimum grade of C- in CHEG231 and MATH305.

CHEG 342  HEAT AND MASS TRANSFER  
Teaches proficiency in engineering analysis of mass exchangers. Learn use of transport theory required to quantify analysis and to tailor experiments needed for the design, operation and control of laboratory, pilot or commercial scale equipment. PREREQ: Minimum grade of C- in CHEG341, or for environmental engineering majors, in CIEG305.
CHEG 345 CHEMICAL ENGINEERING LABORATORY I 3
Laboratory studies demonstrating principles of fluid mechanics, reaction engineering, heat transfer, mass transfer and thermodynamics. Emphasis on correlation of experimental results and on written and oral presentation. PREREQ: Minimum grade of C- in CHEG325, CHEG332 and CHEG341. COREQ: CHEG342.
CHEG 366 INDEPENDENT STUDY 1-6
CHEG 401 CHEMICAL PROCESS DYNAMICS AND CONTROL 3
CHEG 432 CHEMICAL PROCESS ANALYSIS 3
Study of economic/energy utilization/environmental principles of conceptual process design. Optimization of a design along with safety and ethics issues taught by several case process synthesis studies. PREREQ: Minimum grade of C- in CHEG320, CHEG340, and CHEG443.
CHEG 443 MASS TRANSFER OPERATIONS 3
Application of chemical engineering fundamentals to analysis and design of mass transfer processes for separation and purification. Applications of computer-aided design for distillation-based separations. Examples involving absorption, extraction, membrane separations, etc. with special emphasis on bioseparations. PREREQ: Minimum grade of C- in CHEG325 and CHEG342.
CHEG 445 CHEMICAL ENGINEERING LABORATORY II 3
Intensive laboratory experiments illustrate application of chemical and physical principles to industrial processes. Expands upon CHEG332 and CHEG443. Technical report writing emphasized. PREREQ: Minimum grade of C- in CHEG332, CHEG342 and CHEG345. COREQ: CHEG443.
CHEG 460 INTRODUCTION TO SYSTEMS BIOLOGY 3
See MATH600 for course description.
CHEG 466 INDEPENDENT STUDY 1-6
CHEG 468 RESEARCH 1-9
CHEG 473 CHEMICAL ENGINEERING PROJECTS 3
Experimental, theoretical and literature studies of chemical engineering problems. PREREQ: Minimum grade of B in CHEG345.
CHEG 474 CHEMICAL ENGINEERING PROJECTS 3
Continuation of CHEG473.
CHEG 595 INTELLECTUAL PROPERTY FOR ENGINEERS AND SCIENTISTS 3
Methods of protecting intellectual property. Patents, trademarks, copyrights, trade secrets and unfair methods of competition, including analyses of significant court decisions in each area. Directed to innovators in all fields interested in legal protection of their ideas.
CHEG 600 INTRODUCTION TO POLYMER SCIENCE AND ENGINEERING I 3
Introduction to polymer physics with emphasis on structure-property models for bulk polymers, viscoelasticity, polymer morphology, crystallization and crystallization kinetics, effects of processing on bulk polymers and structure-property correlations for bulk polymers.
CHEG 601 STRUCTURE AND PROPERTIES OF POLYMER MATERIALS 3
See MSEG601 for course description.
CHEG 602 POLYMER PROCESS ANALYSIS AND DESIGN 3
Development of tools of continuum mechanics necessary for quantitative description of viscoelastic media. Use of principles of chemical kinetics, fluid and continuum mechanics, and heat and mass transfer to describe the production and processing of polymeric materials. PREREQ: CHEG342, CHEG600 suggested.
CHEG 604 PROBABILITY AND STATISTICS FOR ENGINEERING PROBLEM SOLVING 3
Presents fundamental approach to modeling, characterization and analysis of random phenomena with objective of providing students with basic principles, methods and tools for solving engineering problems involving randomly varying phenomena. Application areas explored include experimental design, manufacturing, system reliability, and cellular biology. PREREQ: MATH302 or equivalent with permission of instructor.
CHEG 605 MULTIPHASE FLUID MECHANICS 3
Presents topics in fluid dynamics of practical importance in chemical process industries, emphasizing two-phase flow and other advanced topics. Covers two-phase gas-liquid and solid-liquid flow, compressible flow, turbulence, non-Newtonian flow and prime movers. PREREQ: CHEG341 or other introductory course in fluid mechanics.
CHEG 606 INTRODUCTION TO CATALYSIS 3
Introduction to modern principles of catalysis with emphasis on industrial catalytic reactions, mechanisms and kinetics. Principles of homogeneous organometallic catalysis, supported-metal and solid acid heterogeneous catalysis. PREREQ: CHEM331 and CHEM444.
CHEG 608 PARTICLE DESIGN AND PROCESSING 3
Examines production of new particles with specific attributes and prepares students to work in the pharmaceutical industry, nanotechnology and biotechnology. Population balances developed and integrated with particle science to model variety of particle design processes, such as crystallization, granulation and comminution. PREREQ: CHEG325 and CHEG341.
CHEG 610 INDUSTRIAL AND ENGINEERING CHEMISTRY 3
Investigation of role of chemistry and engineering in important industrial processes. Emphasis on innovations in chemical processing routes based on interplay between chemistry and engineering. Flowsheeting of specific routes. RESTRICTIONS: Requires permission of instructor.
CHEG 612 APPLIED PROCESS HEAT TRANSFER 3
Principles of heat transfer by conduction, convection and radiation illustrated through case study approach. Emphasis on analyzing heat balance and heat transfer equations with their proper boundary conditions. PREREQ: CHEG342.
CHEG 614 SPECIAL TOPICS IN ENERGY 3
Introduces fundamental and engineering aspects of energy production technology with emphasis on emerging technologies such as microreactors, fuel cells and others. PREREQ: CHEG320 and CHEG322 or equivalents.
CHEG 615 SPECIAL TOPICS IN MIXING 3
Introduces basic principles of fluid dynamics, rheology and turbulence that dictate mixing behavior required to implement desired process result. Agitation in vessels and pipeline and viscous mixing discussed. Emphasis on recent research on effects of mixing on chemical reactions. PREREQ: CHEG341.
CHEG 616 CHEMISTRY AND PHYSICS OF SURFACES AND INTERFACES 3
Fundamental and engineering aspects of metal, semiconductor, and oxide surfaces, their structure and defects, characterization, electronic properties, adsorption and reaction kinetics and thermodynamics. Applications to catalysis, microelectronics, and environment sensitive behavior. May be cross-listed with MSEG616. PREREQ: CHEG342 and CHEM444. RESTRICTIONS: Open only to seniors and graduate students.
CHEG 617 COLLOID SCIENCE AND ENGINEERING 3
Surface thermodynamics and intermolecular forces related to properties of colloidal dispersions and micellar and surfactant structures. Applications to biological systems, nanotechnology, powder dispersions and supramolecular structures. PREREQ: CHEG325 and CHEM444.
CHEG 620 BIOCHEMICAL ENGINEERING 3
Application of chemical engineering principles to analyze different molecular engineering approaches, evaluate bioreactors and product recovery processes, analyze cellular engineering approaches and critically evaluate primary bioengineering data from literature and laboratory experiments. PREREQ: MATH243, and CHEM527 or CHEM641/642.
CHEG 621 METABOLIC ENGINEERING 3
Focuses on design and control of cellular metabolism and includes analysis of metabolic function using systems engineering and molecular biology tools. Goals are to learn computational approaches for analyzing metabolic behavior, and experimental techniques to measure cellular components, metabolites, proteins and nucleic acids. PREREQ: CHEM527 or CHEM641; MATH305. RESTRICTIONS: Open only to graduate students, seniors and juniors.
CHEG 622 CHEMICALS, RISK AND THE ENVIRONMENT 3
Develops foundation for understanding transport and fate of chemical materials in the environment, and how these materials may possibly affect human health and ecology. Principles of heat, mass and momentum transfer, and chemical reaction kinetics used to develop quantitative understanding of transport and fate. These used in conjunction with risk analysis and risk assessment practices to understand how environmental policy evolves. PREREQ: CHEG325 and CHEG341. COREQ: CHEG342.
<table>
<thead>
<tr>
<th>Course Code</th>
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<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 104</td>
<td>General Chemistry</td>
<td></td>
<td>Continuation and application of CHEM103 with additional emphasis on chemical spontaneity, equilibrium, rates of reactions, electrochemistry and organic chemistry. Includes one three-hour laboratory per week. PREREQ: CHEM101, CHEM103 or CHEM105. RESTRICTIONS: For majors in the physical and natural sciences, mathematics and engineering. Only one course among CHEM102, CHEM104 and CHEM112 can count toward graduation.</td>
</tr>
<tr>
<td>CHEM 105</td>
<td>General Chemistry</td>
<td></td>
<td>Nuclear chemistry, periodicity, structure and bonding, states of matter, classes of reactions, stoichiometry, solution chemistry, chemical kinetics, equilibria and electrochemistry. COREQ: MATH101. RESTRICTIONS: For nursing majors who will continue with CHEM106. High school algebra required in lieu of corequisites; one year of high school chemistry recommended. Only one course from among CHEM101, CHEM103, CHEM105 and CHEM111 can count toward graduation.</td>
</tr>
<tr>
<td>CHEM 106</td>
<td>Elementary Bioorganic Chemistry</td>
<td></td>
<td>Survey of organic chemistry and biochemistry, with emphasis on the latter. Includes one three-hour laboratory per week that deals with selected concepts in biochemistry and bioorganic chemistry. PREREQ: CHEM105. RESTRICTIONS: For nursing majors.</td>
</tr>
<tr>
<td>CHEM 111</td>
<td>General Chemistry</td>
<td></td>
<td>Fundamental laws of chemical action with emphasis on atomic structure, chemical bonding and the important classes of substances. PREREQ: One year of high school chemistry, two years strongly preferred. COREQ: CHEM119, and MATH115 or higher math course. RESTRICTIONS: For biochemistry, chemistry, and chemical engineering majors. Only one course among CHEM101, CHEM103, CHEM105 and CHEM111 can count toward graduation.</td>
</tr>
<tr>
<td>CHEM 112</td>
<td>General Chemistry</td>
<td></td>
<td>Introduction to most major subfields of chemistry: descriptive inorganic chemistry, coordination chemistry, organic chemistry, nuclear chemistry, thermodynamics, kinetics and electrochemistry. PREREQ: CHEM103 or CHEM111. COREQ: CHEM120. RESTRICTIONS: For biochemistry, chemistry, and chemical engineering majors. Only one course among CHEM102, CHEM104 and CHEM112 can count toward graduation.</td>
</tr>
<tr>
<td>CHEM 119</td>
<td>Quantitative Chemistry I</td>
<td></td>
<td>Chemical equilibrium theory applied to basic gravimetric and volumetric analyses. Includes one three-hour laboratory per week. PREREQ: One year of high school chemistry, two years strongly preferred. COREQ: CHEM111 and MATH115. RESTRICTIONS: For biochemistry, chemistry, and chemical engineering majors.</td>
</tr>
<tr>
<td>CHEM 120</td>
<td>Quantitative Chemistry II</td>
<td></td>
<td>Theory of analytical chemistry with introductory practice in UV-visible spectroscopy, electrochemistry and separation science. Includes two three-hour laboratories per week. PREREQ: CHEM104, or CHEM111 and CHEM119. COREQ: CHEM112. RESTRICTIONS: For biochemistry and chemistry majors.</td>
</tr>
<tr>
<td>CHEM 165</td>
<td>Freshman Majors Seminar</td>
<td>0 PF</td>
<td>Introduction to CHEM/BIOC Department, as well as to CHEM/BIOC professions. Discussion topics include courses and curricula, subdisciplines in field, communication tools, and career and research opportunities. Social activities help integrate new students into Department community. RESTRICTIONS: Freshmen majoring in CHEM, BIOC, or XCE only.</td>
</tr>
<tr>
<td>CHEM 166</td>
<td>Special Problem</td>
<td>1-3 PF</td>
<td>See ARTC210 for course description.</td>
</tr>
<tr>
<td>CHEM 210</td>
<td>Science of Color Phenomena</td>
<td></td>
<td>See ARTC210 for course description.</td>
</tr>
<tr>
<td>CHEM 213</td>
<td>Elementary Organic Chemistry</td>
<td></td>
<td>Fundamentals of organic chemistry. Includes one three-hour laboratory per week that introduces basic laboratory techniques of organic chemistry. PREREQ: CHEM102 or CHEM104 or CHEM115. RESTRICTIONS: Designed for students of agriculture, human resources and medical technology.</td>
</tr>
<tr>
<td>CHEM 214</td>
<td>Elementary Biochemistry</td>
<td></td>
<td>Principal classes of biomolecules and their structural and metabolic interrelationships. PREREQ: CHEM213.</td>
</tr>
</tbody>
</table>
CHEM 437 INSTRUMENTAL METHODS 3
Study of principles of design and application of spectroscopic, chromatographic and electroanalytical instrumentation in chemical analysis. 
PREREQ: CHEM322 or CHEM332.
RESTRICTIONS: Not acceptable for B.S. degree in chemistry. CHEM419 and CHEM444 cannot both be counted toward graduation.
CHEM 440 INSTRUMENTAL METHODS LABORATORY 1
Application of spectroscopic, chromatographic and electroanalytical techniques to solution of chemical problems. 
PREREQ: CHEM322 or CHEM334.
COREQ: CHEM445.
CHEM 443 PHYSICAL CHEMISTRY I 3
Application of principles and methods of mathematics and physics to quantitative study of chemistry, focusing on thermodynamics. 
PREREQ: CHEM119, or CHEM220 and CHEM221; MATH241 (MATH243 recommended); PHYS208 (recommended) or PHYS202.
RESTRICTIONS: Not acceptable for B.S. degree in chemistry. CHEM419 and CHEM444 cannot both be counted toward graduation.
CHEM 444 PHYSICAL CHEMISTRY II 3
Application of principles and methods of physics and mathematics to quantitative study of chemistry, focusing on kinetics and quantum mechanics. 
PREREQ: CHEM119, or CHEM220 and CHEM221; MATH242 (MATH243 recommended); PHYS208 (recommended) or PHYS202.
RESTRICTIONS: CHEM419 and CHEM444 cannot both be counted toward graduation.
CHEM 445 PHYSICAL CHEMISTRY LABORATORY I 1
Physical methods for studying properties of matter. 
PREREQ: CHEM119, or CHEM220 and CHEM221.
RESTRICTIONS: To be taken concurrently with or subsequent to CHEM418 or CHEM443 or CHEG231.
CHEM 446 PHYSICAL CHEMISTRY LABORATORY II 1
Physical methods for studying properties of matter. 
PREREQ: CHEM120, or CHEM220 and CHEM221.
RESTRICTIONS: To be taken concurrently with or subsequent to CHEM419 or CHEM444.
CHEM 457 INORGANIC CHEMISTRY 3
Basic theoretical concepts of inorganic chemistry with emphasis on structure, bonding and reactions. 
PREREQ: CHEM418 or CHEM443, and CHEM112.
CHEM 458 INORGANIC CHEMISTRY LABORATORY 1
Laboratory synthesis and characterization of inorganic and organometallic compounds and independent study. 
COREQ: CHEM457.
<table>
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<tbody>
<tr>
<td>CHEM 626</td>
<td>Instrumental Methods in Mass Spectrometry</td>
<td>1</td>
<td>Experimental techniques in analytical mass spectrometry: ionization methods, mass analyzers, tandem mass spectrometry, coupled chromatographic methods and applications. COREQ: CHEM624 recommended as corequisite or prerequisite.</td>
</tr>
<tr>
<td>CHEM 631</td>
<td>Practice of Science</td>
<td>3</td>
<td>See BISC631 for course description.</td>
</tr>
<tr>
<td>CHEM 633</td>
<td>Advanced Organic Chemistry: Physical</td>
<td>3</td>
<td>Stereochemistry and reactivity of organic compounds; and reaction mechanisms, structure and bonding. PREREQ: CHEM332.</td>
</tr>
<tr>
<td>CHEM 634</td>
<td>Advanced Organic Chemistry: Synthesis and Reactivity</td>
<td>3</td>
<td>Reactions of organic compounds with emphasis on synthetic methods. PREREQ: CHEM332. COREQ: CHEM633, or permission of instructor.</td>
</tr>
<tr>
<td>CHEM 635</td>
<td>Organic Reactivity and Total Synthesis</td>
<td>3</td>
<td>Focuses on development of new organic reactivity, as exemplified by current accomplishments in total synthesis of natural products. Additional focus on strategies of total synthesis. PREREQ: CHEM634, or permission of instructor.</td>
</tr>
<tr>
<td>CHEM 641</td>
<td>Biochemistry</td>
<td>3</td>
<td>Structure and function of proteins, enzymes and coenzymes; kinetics and mechanisms; carbohydrate metabolism and its regulation; and citric acid cycle. PREREQ: CHEM322 or CHEM332.</td>
</tr>
<tr>
<td>CHEM 643</td>
<td>Intermediary Metabolism</td>
<td>3</td>
<td>General principles of intermediary metabolism with emphasis on biosynthetic pathways of amino acids, nucleotides, coenzymes, antibiotics and toxic secondary metabolites. PREREQ: CHEM641.</td>
</tr>
<tr>
<td>CHEM 644</td>
<td>Mechanisms of Enzyme Catalysis</td>
<td>3</td>
<td>Detailed chemical mechanisms of enzyme catalysis for several representatives. Emphasis on kinetic and physical organic methods. PREREQ: CHEM641 or CHEM297.</td>
</tr>
<tr>
<td>CHEM 645</td>
<td>Protein Structure and Function</td>
<td>3</td>
<td>Overview of structural biology, including how x-ray crystallography, NMR spectroscopy, homology modeling and other techniques are used to solve or model structures of macromolecules. Representative proteins discussed in terms of how protein's structure relates to its function. PREREQ: CHEM641.</td>
</tr>
<tr>
<td>CHEM 646</td>
<td>DNA-Protein Interactions</td>
<td>3</td>
<td>Current topics of DNA-protein interactions which focus on DNA replication, DNA recombination, DNA damage repair, transcription and translation processes. PREREQ: CHEM642.</td>
</tr>
<tr>
<td>CHEM 647</td>
<td>Biochemical Evolution</td>
<td>3</td>
<td>Origins and evolution of life as reconstructed from geochemical, biochemical and genetic evidence. PREREQ: CHEM642 or CHEM527.</td>
</tr>
<tr>
<td>CHEM 648</td>
<td>Membrane Biochemistry</td>
<td>3</td>
<td>Recent advances in structure and function of biomembranes and related model systems, with particular reference to molecular and physiochemical mechanisms. PREREQ: CHEM527 or CHEM641.</td>
</tr>
<tr>
<td>CHEM 649</td>
<td>Molecular Biophysics</td>
<td>3</td>
<td>See CHEM649 for course description. PREREQ: Introductory level courses in chemistry, physics, biochemistry.</td>
</tr>
<tr>
<td>CHEM 651</td>
<td>Advanced Inorganic Chemistry I</td>
<td>3</td>
<td>Inorganic chemistry: application of principles of structure and reactivity, examples from compounds of both representative elements and transition metals. PREREQ: CHEM444 and CHEM457.</td>
</tr>
<tr>
<td>CHEM 652</td>
<td>Organometallic Chemistry</td>
<td>3</td>
<td>Chemistry of carbon to transition-metal bonds beginning with rules governing structure and stability; effects of metal and ancillary ligand environment; general mechanistic steps; NMR and IR spectroscopy; fluorosil processes. Followed by applications in homogeneous catalysis and stoichiometric organic synthesis. PREREQ: CHEM444 and CHEM457.</td>
</tr>
<tr>
<td>CHEM 653</td>
<td>Bioinorganic Chemistry</td>
<td>3</td>
<td>Overview of our current understanding of role of metal ions in structure and function of proteins, enzymes and nucleic acids including applications in medicine. Emphasis placed on synergism between biochemical and synthetic model studies with examples provided by current literature. PREREQ: CHEM457.</td>
</tr>
<tr>
<td>CHEM 654</td>
<td>Advanced Inorganic Chemistry II</td>
<td>3</td>
<td>Group theoretical approach to structure and bonding in inorganic compounds. PREREQ: CHEM444 and CHEM457.</td>
</tr>
<tr>
<td>CHEM 657</td>
<td>Quantum Chemistry</td>
<td>3</td>
<td>Basic principles and methods of quantum theory including wave mechanics of simple systems, angular momentum and the hydrogen atom, and approximate methods applied to atomic and molecular structure. PREREQ: CHEM444.</td>
</tr>
<tr>
<td>CHEM 658</td>
<td>Advanced Quantum Chemistry</td>
<td>3</td>
<td>Applications of quantum theory to predictions of molecular structure, energetics, spectra and reactivity; principles of spectroscopy and the interaction of light with molecules; other topics at the instructor's discretion. PREREQ: CHEM671.</td>
</tr>
<tr>
<td>CHEM 674</td>
<td>Chemical Dynamics</td>
<td>3</td>
<td>Experimental methods in chemical kinetics, rate laws and mechanisms, statistical and dynamical theories of reaction rates, and applications of principles and techniques of kinetics to variety of systems. PREREQ: CHEM444.</td>
</tr>
<tr>
<td>CHEM 677</td>
<td>Chemical Thermodynamics</td>
<td>3</td>
<td>Elements of classical and statistical thermodynamics and their application to chemical problems. PREREQ: CHEM443.</td>
</tr>
<tr>
<td>CHEM 680</td>
<td>Introductory Polymer Science</td>
<td>3</td>
<td>Provides broad foundation in basic concepts of polymer science, including synthesis, physical structures and phase transitions, structure/property relationships, material properties, characterization methods and current trends in polymer technology. PREREQ: CHEM322 or CHEM332; and CHEM419 or CHEM444.</td>
</tr>
<tr>
<td>CHEM 681</td>
<td>Green Chemistry</td>
<td>3</td>
<td>Pollution prevention - how to eliminate toxic chemicals and hazardous wastes while using less energy and, preferably, starting with renewable materials. PREREQ: One year of organic chemistry, or permission of the instructor.</td>
</tr>
<tr>
<td>CHEM 810</td>
<td>Kinetics and Surface Chemistry of Soils</td>
<td>3</td>
<td>See PLSC810 for course description.</td>
</tr>
<tr>
<td>CHEM 820</td>
<td>Special Topics in Analytical Chemistry</td>
<td>1-3</td>
<td>Advanced topics in analytical methods and techniques from current literature. PREREQ: CHEM620, CHEM621, CHEM622 or CHEM623. RESTRICTIONS: May be repeated for credit when topics vary.</td>
</tr>
<tr>
<td>CHEM 830</td>
<td>Special Topics in Organic Chemistry</td>
<td>1-3</td>
<td>Topics from natural product chemistry (alkaloids, terpenes, steroids), organic nitrogen and phosphorus compounds, alicyclic and heterocyclic compounds, stereochemistry, organometallic chemistry, photochemistry and theoretical organic chemistry. PREREQ: CHEM634. RESTRICTIONS: May be repeated for credit when topics vary.</td>
</tr>
<tr>
<td>CHEM 840</td>
<td>Modern Topics in Biochemistry</td>
<td>1-3</td>
<td>Detailed examination of a number of problems of current research interest in biochemistry. PREREQ: CHEM641. RESTRICTIONS: May be repeated for credit when topics vary.</td>
</tr>
<tr>
<td>CHEM 850</td>
<td>Special Topics in Inorganic Chemistry</td>
<td>1-3</td>
<td>Advanced topics selected from chemistry of less common elements, metal hydrides, organometallic compounds, coordination compounds and metal ions in biology. PREREQ: CHEM651. RESTRICTIONS: May be repeated for credit when topics vary.</td>
</tr>
<tr>
<td>CHEM 855</td>
<td>Marine Inorganic Chemistry</td>
<td>3</td>
<td>See MAST850 for course description.</td>
</tr>
<tr>
<td>CHEM 865</td>
<td>Seminar</td>
<td>0 PF</td>
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</tr>
<tr>
<td>CHEM 868</td>
<td>Research</td>
<td>1-9</td>
<td></td>
</tr>
<tr>
<td>CHEM 869</td>
<td>Master's Thesis</td>
<td>1-6</td>
<td></td>
</tr>
</tbody>
</table>
CHEM 874  Special Topics in Physical Chemistry  1-3
REQUIREMENTS: Requires permission of instructor. May be repeated for credit when topics vary.

CHEM 964  Pre-Candidacy Study  3-12 PF
Research and readings in preparation of dissertation topic and/or qualifying examinations for doctoral students before admission to candidacy but after completion of all required course work.
RESTRICTIONS: Not open to students who have been admitted to candidacy.

CHEM 969  Doctoral Dissertation  1-12 PF

CHINESE

CHIN 105  Chinese I - Elementary  4
Introduction to the contemporary Mandarin Chinese language through developing listening comprehension, speaking, reading, and writing skills, including mastery of the pinyin pronunciation system and introduction to Chinese characters.

CHIN 106  Chinese II - Elementary/Intermediate  4
Continued practice in the aural, oral, reading and writing skills of Mandarin Chinese including the identification and reproduction of basic Chinese characters. Introduction to variability levels and to reading and writing texts in Chinese characters.
PREREQ: CHIN 105.

CHIN 107  Chinese III - Intermediate  4
Development of aural, oral, reading and writing skills at the intermediate Chinese level, including continued practice in identifying and reproducing Chinese characters, handling a greater variety of variability levels, and further comprehension of spoken (Koutouyu) and written (Shumianyu) language differences.
PREREQ: CHIN 106.
RESTRICTIONS: Satisfies College of Arts and Sciences language requirement.

CHIN 200  Chinese Grammar and Composition  3
Further study of Mandarin Chinese grammar, and further development of all four language skills for communication. Emphasis on grammar and essay writing.
PREREQ: CHIN 107 or instructor's permission.

CHIN 205  Chinese Conversation  3
Practical use of Mandarin Chinese by means of oral reports on a variety of topics including family, school, and work life. Emphasis on improvement of conversational skills for social situations which require grammatical and written competence.
PREREQ: CHIN 107 or instructor's permission.

CHIN 206  Culture Through Conversation  3
Discussion of topics drawn from contemporary Chinese life. Designed for students who wish to broaden their knowledge of Chinese culture while improving their oral and aural language skills.
PREREQ: CHIN 107.
RESTRICTIONS: Taught abroad only.

CHIN 208  Contemporary Chinese Society  3
Introduction to contemporary China, its culture, people, way of life and issues confronting them.
RESTRICTIONS: Taught abroad only, in both English and Chinese. Not for major credit. Does not satisfy College of Arts and Sciences language requirement.

CHIN 266  Special Problem  1-4

CHIN 305  Chinese Conversation and Composition  3
Discussion of current cultural, social and political topics in Mandarin Chinese. Vocabulary building, grammar exercises and frequent compositions.
PREREQ: Two courses at the 200-level, one of which must be CHIN 200 or CHIN 205, or instructor's permission.

CHIN 355  Special Topics  3
Explores an area of special interest in Chinese literature or culture studies. Topics vary and will be announced in the registration booklet.
PREREQ: Two courses at the 200-level, one of which must be CHIN 200 or CHIN 205, or instructor's permission.
RESTRICTIONS: May be repeated for credit when topics vary.

CHIN 366  Independent Study  1-3
Discussion of subject matters of students' special interest related to Chinese language, literature, and/or culture.
PREREQ: Two courses at the 200-level, one of which must be CHIN 200 or CHIN 205, or permission of instructor.

CHIN 466  Independent Study  1-3
Discussion of subject matters of students' special interest related to Chinese language, literature, and/or culture.
PREREQ: Two courses at the 300-level, one of which must be CHIN 305 or CHIN 355, or instructor's permission.

CIVIL AND ENVIRONMENTAL ENGINEERING

CIEG 113  Introduction to Surveying  2
See BREG 113 for course description.

CIEG 125  Introduction to Civil Engineering  2 PF
Overview of civil engineering disciplines, including structural, environmental, geotechnical and transportation engineering. Addresses physical principles, numerical analysis and elementary design problems in each area. Emphasis on computer use, (text processing, spreadsheet, graphics). Team design project.

CIEG 126  Introduction to Surveying and Computer Aided Drafting  3
Introduction to computer aided drafting with applications from land surveying. Fundamental principles of land surveying and use of surveying instruments. Use of CAD software for drafting, design layout, two dimensional and isometric drafting, creation and modification of entities and attributes. Computer lab and field work.

CIEG 135  Introduction to Environmental Engineering  1
Overview of environmental engineering discipline. Physical, chemical, biological interactions within environment and associated engineering problems. Introduction to common processes for pollution control. Use of computer software for problem solving. Environmental engineering practice and ethics, and introduction to proper design approach.

CIEG 211  Statics  3
Analysis of force systems and equilibrium of rigid bodies in two and three dimensions. Determination of centers of gravity and of centroids. Analysis of statistically determinate trusses, simple frames and "machines." Introduction to analysis of beams.
COREQ: MATH 243.

CIEG 212  Solid Mechanics  3
Stresses and displacements in axially loaded beams and in bars subjected to torsion. Analysis of stresses and deflections of laterally loaded beams. Study of stresses and strains in a plane. Mohr's circle for stresses. Failure theories. Design of structural members using strength criteria.
PREREQ: CIEG 211.
COREQ: MATH 302 or MATH 351.

CIEG 213  Civil Engineering Materials Laboratory  1
Experiments in mechanics of materials and strength of materials to complement content of CIEG 212. Emphasis on behavior of civil engineering materials including steel, aluminum, concrete and timber.
COREQ: CIEG 212.

CIEG 223  Surveying  3
See BREG 223 for course description.

CIEG 233  Environmental Engineering Processes  3
Quantified descriptions of physical, chemical and biological processes of environmental importance. Introductory level analysis of pollution transport, treatment, containment, remediation. Process engineering approach to contaminant removal methods, including use of appropriate computer software.
PREREQ: CHEM 104 or CHEM 120; MATH 242.
RESTRICTIONS: Open to majors only.

CIEG 301  Structural Analysis  4
PREREQ: CIEG 212, MATH 302.

CIEG 302  Structural Design  3-4
Basic concepts of structural design including methodologies, applicable limit states and design codes. Structural members and systems, fabrication issues, loads and load paths. Design of steel and concrete members subjected to tension, compression and bending. Additional topics including connections and combined axial compression and bending.
PREREQ: CIEG 301.

CIEG 305  Fluid Mechanics  3
Incompressible fluid mechanics: fluid statics, control volume analysis of fluid flows, differential analysis of inviscid and viscous fluid flows and dimensional analysis.
PREREQ: MATH 302 or MATH 351, and CIEG 311 or MEEG 211.
CIEG 306 Fluid Mechanics Laboratory
Experiments in fluid mechanics. 1

CIEG 311 Dynamics

CIEG 315 Probability and Statistics for Engineers
Role of chance and variability in engineering activities. Topics include set operations, probability, Bayes' theorem, random variables, common probability distributions, data reduction, statistical estimation and inference, probability model selection, regression analyses and introduction to probability-based design and Monte-Carlo simulation. PREREQ: MATH242 and MATH243 or equivalents.

CIEG 320 Soil Mechanics
Soil properties, soil-water interaction, soil stresses, two-dimensional flow, soil compressibility, shear strength and lateral earth pressures. PREREQ: CIEG212. COREQ: CIEG323.

CIEG 321 Geotechnical Engineering
Introduction to geotechnical engineering. Topics include shallow foundation analysis and design, deep foundation analysis and design, earth retaining structures analysis and design and introduction to slope stability analysis. PREREQ: CIEG320 and CIEG323.

CIEG 322 Soil Mechanics Laboratory
Demonstrates soil properties, soil-water interaction, soil stresses, two-dimensional flow, soil compressibility, shear strength and lateral earth pressures. PREREQ: CIEG212. COREQ: CIEG320.

CIEG 331 Introduction to Environmental Engineering
Introduction to important environmental engineering topics faced by consulting engineers and public works and regulatory agencies, including water treatment, wastewater treatment, air pollution control, solid waste management and hazardous waste management. PREREQ: CIEG305.

CIEG 337 Environmental Engineering Laboratory
Unit operations and unit processes in environmental engineering, with emphasis on biological processes. Introduction to contaminant transport processes in subsurface. Utilizes collaborative, problem-based learning within laboratory context. PREREQ: CIEG348.

CIEG 351 Transportation Engineering
Five components of transportation: vehicle, way, terminal and control; design and dynamic characteristics of vehicles; geometric design of highways and railroad tracks; operation and design of stations, airports and bus terminals; highway traffic flow analysis. RESTRICTIONS: Requires junior status in civil engineering.

CIEG 366 Independent Study
Discussion of approximate solution procedures: finite difference method, weighted residual methods and variational methods. Development of approximate solutions using the finite element method. Application to one- and two-dimensional problems in applied mechanics. Discussion of numerical methods and computer programming techniques applicable to finite element analyses. PREREQ: CIEG361.

CIEG 404 Prestressed Concrete Design
Behavior, analysis and design of prestressed concrete structures. Covers flexure, shear, axial load, bond anchorage design and construction considerations for pretensioned and post-tensioned concrete. PREREQ: CIEG301.

CIEG 405 Matrix Structural Analysis
Computer analysis of two- and three-dimensional frameworks using matrix methods. Straight, tapered, curved and beam on elastic foundation members; flexible supports, element and temperature loads, partially rigid connections and finite sized joints; material and geometric nonlinearities; stability analyses; and determination of ultimate load capacities. PREREQ: CIEG301.

CIEG 407 Building Design
Design of building structural systems and elements. Topics include dead and live loading; earthquake and wind forces; load paths; and gravity and lateral load resisting systems. Approximate analysis of building frames and details regarding design elements for steel and concrete buildings. PREREQ: CIEG301 and CIEG302.

CIEG 408 Introduction to Bridge Design
Provides practical insight into art and science of bridge design. Various design methodologies in use today in field of bridge design and evaluation are investigated. Bridges of steel, reinforced concrete, prestressed concrete, wood and composite materials included. PREREQ: CIEG302.

CIEG 409 Forensic Engineering
Provides practical insight into structural engineering by examining failures. Examples include bridge and building failures; infamous catastrophic collapses to little known examples of design criteria being violated to the structures detriment. Main objective is to learn sound engineering practices through study of failures. PREREQ: CIEG301 and CIEG302.

CIEG 410 Experimental Mechanics of Composite Materials
See MSEG410 for course description.

CIEG 411 Structural Dynamics Design
Design of structures (buildings, bridges, dams, foundation piles and offshore platforms) for dynamic loadings (severe wind force, ocean wave force, strong earthquake excitations, mechanical vibrations, and general impulse and time dependent forces and motions). Determination of realistic dynamic loadings and application of design concepts. PREREQ: CIEG311 and MATH302.

CIEG 415 Probability-based Design
Examines decision making in the presence of uncertainties and application of probabilistic methods in the design and maintenance of engineering systems. Topics include: randomness modeling, failure representation, Monte-Carlo simulation, computation of failure probabilities, concept of risk, and probability-based acceptance criteria. PREREQ: Introductory course in probability such as CIEG315, MATH450 or equivalent.

CIEG 417 Advanced Structural Analyses

CIEG 418 Continuously Supported Structures

CIEG 421 Foundations and Substructures

CIEG 422 Earth Structures Engineering
Properties of soils and methods to determine them: water flow through inhomogeneous and anisotropic earth mass; predictions of pore-water pressures; stresses and settlement predictions; slope stability: type and causes of slope failures, effective and total stability analyses, design strength parameters and safety factors, construction considerations; design of earth dams; and predictions vs. field performance. Computer software used in problem solving. PREREQ: CIEG320/323.

CIEG 425 Geoenvironmental Engineering

CIEG 430 Water Quality Modeling
Water quality modeling and criteria. Application to lakes, streams, and estuaries. Dissolved oxygen, BOD, nitrification. Eutrophication: carbon, nitrogen, phosphorus and silica mass balances; chlorophyll, primary production and dissolved oxygen. Toxic chemicals: PCBs, PAHs, toxic metals; partitioning theory, organic carbon normalization; coupled water column-sediment models. PREREQ: MATH302.
CIEG 431 WATER SUPPLY ENGINEERING 3
Water quality criteria and monitoring, development of water resources, design of water collection and distribution systems, design of water treatment works, economics of water supply engineering, treatment of water works sludge and advanced water purification technology. PREREQ: CIEG233 and CIEG305.

CIEG 432 WASTEWATER ENGINEERING 3
Source and character of wastes; design and operation of wastewater treatment facilities; ultimate disposal of wastewater residues and considerations of discharge criteria, and economic and regulatory aspects. PREREQ: CIEG233.

CIEG 433 HAZARDOUS WASTE MANAGEMENT 3
Toxicological, risk assessment and regulatory aspects of hazardous waste management; characterization of hazardous wastes and materials; waste reduction strategies; storage and transportation methods; engineering processes for chemical, physical and biological treatment of toxic and hazardous wastes; remediation of contaminated soil and groundwater at existing disposal sites. PREREQ: CIEG233.

CIEG 434 AIR POLLUTION CONTROL 3
Introduces origins, characteristics and environmental and health effects of priority air pollutants and equipment commonly used to control emissions of these pollutants from stationary sources. Emphasis placed on understanding principles, operation and design of different control devices. PREREQ: CIEG233, CIEG305, and CHEG321 or equivalent.

CIEG 436 SOLID WASTE MANAGEMENT 3

CIEG 437 WATER AND WASTEWATER QUALITY 3
Principles and applications of analysis of solids, organic load, dissolved oxygen, disinfectants, nutrients, trace metals, trace organic compounds and microorganisms. Lecture and laboratory. PREREQ: CIEG233.

CIEG 438 WATER AND WASTEWATER ENGINEERING 3
Sources and characteristics of water and wastewater; water quality criteria and monitoring; principles and application of physical, chemical, and biological processes for water purification and wastewater treatment. Design and operation of treatment systems to meet water quality and effluent standards. PREREQ: CIEG233.

CIEG 440 WATER RESOURCES ENGINEERING 3
Basics of water resources systems and analysis and introduction to hydraulics. Covers water resources systems, rainfall analysis and flood routing, pipe flow and hydraulic machinery, open channel flow and computer models. PREREQ: CIEG305 and CIEG306.

CIEG 441 HYDROLOGY 3
Fundamentals of climatology, meteorology and hydrologic cycle; their relation to surface water and groundwater; rainfall runoff characteristics; frequency analysis; flood routing; flood plain hydraulics; and groundwater flow. COREQ: CIEG305.

CIEG 442 HYDRAULIC ENGINEERING 3
Application of principles of fluid mechanics to flow in pipelines, open channels, sediment transport, drainage, hydraulic structure and hydraulic models. PREREQ: CIEG305.

CIEG 451 TRANSPORTATION ENGINEERING LABORATORY 1
Exercises related to transportation: design, control, measurement, calculation/simulation, reasoning, and communication. Topics may include geometric roadway design, traffic signal control, design of transportation terminals, traffic simulation and pedestrian flow, pavement design and maintenance, design justification, and contemporary issues involving transportation policies and technologies. PREREQ: CIEG231.

CIEG 452 TRANSPORTATION FACILITIES DESIGN 3
Theoretical concepts of general transportation demand, supply and flow analysis. Planning and design of multi-modal transportation facilities including streets and highways, railways and guideways, airports, and harbors and ports. Engineering, social and economic evaluation of alternative design schemes for simple case studies and existing transportation facilities. PREREQ: CIEG351.

CIEG 454 URBAN TRANSPORTATION PLANNING 3
Characteristics of urban travel demand, travel demand forecasting models, urban transportation modes and their characteristics, urban transportation planning processes and issues, evaluation of plans, economic analysis, transportation financing, transportation policy and regulations, and urban transportation systems management. PREREQ: CIEG351.

CIEG 459 RAILROAD ENGINEERING 3
Evolution and analysis of railroad track design and components, ballast and subgrade, rail axial forces, expansion joints, anchors, and track buckling and preventive measures. Response of tracks to moving loads, track transition problems and track tests. Review of track standards. Movies on maintenance and construction. PREREQ: CIEG212.

CIEG 461 SENIOR DESIGN PROJECT 1-4
Work with advisors from engineering firms and faculty on design projects requiring knowledge and skills acquired in previous courses. RESTRICTIONS: Requires senior status in engineering.

CIEG 466 INDEPENDENT STUDY 1-6
CIEG 468 PRINCIPLES OF WATER QUALITY CRITERIA 3
Toxicological and chemical background and technical basis necessary for understanding the models of water and sediment quality criteria for individual and mixtures of organic chemicals and metals that focus on bioavailability; narcosis models of toxicity; complexation models applied to both the water column and sediments. PREREQ: CHEM104 (or 103) or permission of instructor.

CIEG 471 INTRODUCTION TO COASTAL ENGINEERING 3
Problems of design in ocean and coastal environment. Mechanics of wave motion, tides and storm surge, littoral processes, wave forces on structures and design of coastal structures. Includes observations of hydraulic model tests in Ocean Engineering Laboratory. PREREQ: CIEG305.

CIEG 482 SYSTEMS DESIGN AND OPERATION 3
Methodology and technique for evaluation and design of civil engineering systems. Modern probabilistic and optimization techniques applied to problems in mechanics, structures, transportation, water resources, environmental and ocean systems.

CIEG 486 CONSTRUCTION METHODS AND MANAGEMENT 3
Different methods, management and techniques of construction including earthmoving, heavy construction, building construction and construction management including planning and scheduling, contract administration and construction safety.

CIEG 498 GROUNDWATER FLOW AND CONTAMINANT TRANSPORT 3
Development and application of models for fluid flow and contaminant transport in porous media. Derivation of governing equations, analytical and numerical solutions, and application to the movement of groundwater and transport of contaminants at an actual field site. PREREQ: Previous coursework in fluid mechanics and partial differential equations, or permission of instructor.

CIEG 601 INTRODUCTION TO THE FINITE ELEMENT METHOD 3
Discussion of approximate solution procedures: finite difference method, weighted residual methods and variational methods. Development of approximate solutions using the finite element method. Application to one- and two-dimensional problems in applied mechanics. Discussion of numerical methods and computer programming techniques applicable to finite element analyses. PREREQ: CIEG381.

CIEG 604 PRESTRESSED CONCRETE DESIGN 3

CIEG 605 INTERMEDIATE TOPICS IN FINITE ELEMENT ANALYSIS 3
Topics include finite element analysis in linear elastostatics, linear steady state scalar "field" problems, analysis techniques for linear transient and dynamic analyses and matrix structural analysis. In each case, element formulations and solution algorithms are assessed, limitations and possible improvements presented and numerical methods examined. PREREQ: CIEG601.

CIEG 606 OCEAN AND ATMOSPHERE REMOTE SENSING 3
See MAST606 for course description.
CIEG 608  INTRODUCTION TO BRIDGE DESIGN  
Provides practical insight into art and science of bridge design. Various design methodologies in use today in the field of bridge design and evaluation investigated. Bridges of steel, reinforced concrete, prestressed concrete, wood and composite materials included. 
PREREQ: CIEG302.

CIEG 610  EXPERIMENTAL MECHANICS OF COMPOSITE MATERIALS  
See MEEG610 for course description.

CIEG 611  STRUCTURAL DYNAMICS DESIGN  
Design of structures (buildings, bridges, dams, foundation piles and offshore platforms) for dynamic loadings (severe wind force, ocean wave force, strong earthquake excitations, machine vibrations, and general impulse and time dependent forces and motions). Determination of realistic dynamic loadings and application of design concepts. 
PREREQ: CIEG311 and MATH302.

CIEG 612  ADVANCED MECHANICS OF MATERIALS  
Covers unsymmetrical bending, shear center in thin-walled beams, torsion in thin-walled structures, lateral-torsional buckling, curved beams, energy methods, principal stress and strain in three dimensions. Theory and applications.

CIEG 615  PROBABILITY-BASED DESIGN  
Examines decision making in presence of uncertainties and application of probabilistic methods in design and maintenance of engineering systems. Topics include: randomness modeling, failure representation, Monte-Carlo simulation, computation of failure probabilities, concept of risk, and probability-based acceptance criteria.

CIEG 617  ADVANCED STRUCTURAL ANALYSES  
PREREQ: CIEG212 and MATH302.

CIEG 618  CONTINUOUSLY SUPPORTED STRUCTURES  
PREREQ: CIEG212 and MATH302.

CIEG 619  MECHANICAL BEHAVIOR OF MATERIALS AND STRUCTURES  
PREREQ: CIEG212 and MATH302.

CIEG 620  SOIL MECHANICS II  
Behavior of cohesionless and cohesive soils; failure theories and lateral earth pressures; stresses within earth mass; steady-state flow through porous media; consolidation and time rate settlement; shear strength of cohesive soils. 
PREREQ: CIEG302/322.

CIEG 621  FOUNDATION ENGINEERING  
Field investigation techniques; interpretation of data; theory and design of shallow and deep foundations, retaining walls, sheet pile walls, cofferdams braced excavations and geosynthetically reinforced soil. 
PREREQ: CIEG421.

CIEG 622  EARTH STRUCTURES ENGINEERING  
Properties of soils and methods to determine them: water flow through inhomogeneous and anisotropic earth mass; predictions of pore-water pressures; stresses and settlement predictions; slope stability; types and causes of slope failures, effective and total stability analyses, design strength parameters and safety factors, construction considerations; design of earth dams; and predictions vs. field performance. Computer software used in problem solving. 
PREREQ: CIEG320/323.

CIEG 623  SOIL MECHANICS LAB  
Enhances knowledge of soil properties and behavior. Generally, the following tests are performed: Atterberg limits, sieve and hydrometer analysis, compaction, relative density, permeability, flow-net simulation, consolidation, specific gravity, direct shear, triaxial (CU, CD, UU) tests simulating various loading paths, and liquefaction. 
PREREQ: CIEG320/323.

CIEG 624  SOIL DYNAMICS  
Wave propagation in elastic media; dynamic soil properties; vibration of foundations; influence of soil type on ground motion characteristics; causes of soil failure during earthquake; soil-structure interaction; lateral earth pressures. Discussion of numerical methods used in dynamic analyses of porous media. 
PREREQ: CIEG320/323.

CIEG 625  GEODEVIRONMENTAL ENGINEERING  
RESTRICTIONS: Engineering or science background required.

CIEG 630  WATER QUALITY MODELING  
Water quality modeling and criteria. Application to lakes, streams, and estuaries. Dissolved oxygen, BOD, nitrification. Eutrophication: carbon, nitrogen, phosphorus and silica mass balances; chlorophyll, primary production and dissolved oxygen; Toxic chemicals: PCBs, PAHs, toxic metals: partitioning theory, organic carbon normalization; coupled water column-sediment models. 
PREREQ: MATH302.

CIEG 631  WATER QUALITY AND POLLUTION CONTROL  
Covers water and its impurities, water quality criteria and monitoring, transport and transformation of chemicals in the aquatic environment, stream sanitation, ecological aspects of impoundments and eutrophication processes, groundwater systems, decontamination of subsurface water systems, land application of wastewater and current topics in water pollution.

CIEG 632  CHEMICAL ASPECTS OF ENVIRONMENTAL ENGINEERING  
Principles and applications of aqueous chemistry to environmental systems. Includes review of general chemistry, with emphasis on structure of matter and stoichiometry; chemical thermodynamics; chemical kinetics; equilibrium reactions in homogeneous and heterogeneous solutions; applied electrochemistry and Redox reaction, and interfacial phenomena.

CIEG 633  HAZARDOUS WASTE MANAGEMENT  
Toxicological, risk assessment and regulatory aspects of hazardous waste management, characterization of hazardous wastes and materials, waste reduction strategies, storage and transportation methods, engineering processes for chemical, physical and biological treatment of toxic and hazardous wastes, remediation of contaminated soil and groundwater of existing disposal sites.

CIEG 634  CONTAMINANT TRANSPORT AND SEPARATION IN ENVIRONMENTAL SYSTEMS  
Applies fundamentals of physical phenomena governing behavior of pollutants to practical problems.

CIEG 635  AIR POLLUTION AND ITS CONTROL  
Sources and effects of atmospheric pollutants: meteorological and solar radiation phenomena and atmospheric chemistry. Emphasis on gas cleaning operations such as absorption, chemical conversion and particulate removal process design, among other control measures. 
RESTRICTIONS: Requires upper division or graduate standing in engineering.

CIEG 636  BIOLOGICAL ASPECTS OF ENVIRONMENTAL ENGINEERING  
Presents fundamental molecular biological concepts which pertain to cellular function in environment and in engineered environmental treatment systems. Briefly reviews elementary organic chemical classifications. 
PREREQ: CIEG233.

CIEG 637  WATER AND WASTEWATER QUALITY  
Principles and applications of analysis of solids, organic load, dissolved oxygen, disinfectants, nutrients, trace metals, trace organic compounds and microorganisms. Lecture and laboratory. 
PREREQ: CIEG233.

CIEG 639  OCEAN FLUID DYNAMICS  
Kinematics and dynamics of incompressible fluids with emphasis on coastal and ocean problems, governing equations, examples of solutions for viscous flows, potential flows, vorticity, flows on rotating planet, density vary flows, boundary layers, turbulence. 
May be cross-listed with MAST691. 
PREREQ: CIEG305.

CIEG 650  URBAN TRANSPORTATION SYSTEMS  
Design and operation of urban transportation systems, characteristics of public transportation modes, vehicle design, right-of-way types and terminal facilities. Application of operations research techniques to analysis of scheduling, network optimization, capacity and evaluation of alternatives. 
RESTRICTIONS: Requires permission of instructor.

CIEG 652  TRANSPORTATION FACILITIES DESIGN  
Theoretical concepts of general transportation demand, supply and flow analysis. Planning and design of multi-modal transportation facilities including streets and highways, railways and guideways, airports, and harbors and ports. Engineering, social and economic evaluation of alternative design schemes for case studies and existing transportation facilities. 
RESTRICTIONS: Requires permission of instructor.
CIEG 654  URBAN TRANSPORTATION PLANNING  
Characteristics of urban travel demand, travel demand forecasting models, urban transportation modes and their characteristics, urban transportation planning processes and issues, evaluation of plans, economic analysis, transportation financing, transportation policy and regulations, and urban transportation systems management.

RESTRICTIONS: Requires permission of instructor.

CIEG 655  CIVIL INFRASTRUCTURE SYSTEMS  
Presents unified approach to management of civil infrastructure systems. Topics include analytical methods, development of data collection technologies, life cycle cost, prioritization, and optimization. Software tools for infrastructure management decision making introduced and critical infrastructure protection addressed. Types of infrastructure considered include pavements (roads and airports), bridges, drainage and sewer systems, water supply systems, and power supply facilities.

CIEG 659  RAILROAD ENGINEERING  
Evolution and analysis of railroad track design and components, ballast and subgrade, rail axial forces, expansion joints, anchors, and track buckling and preventive measures. Response of tracks to moving loads, track transition problems and track tests. Review of track standards. Movies on maintenance and construction.

PREREQ: CIEG212.

CIEG 668  PRINCIPLES OF WATER QUALITY CRITERIA  
Toxicological and chemical background and technical basis necessary for understanding models of water and sediment quality criteria for individual and mixtures of organic chemicals and metals that focus on bioavailability: narcosis models of toxicity, complexation models applied to both water column and sediments.

PREREQ: CHEM104 (or 103) or permission of instructor.

CIEG 672  WATER WAVE MECHANICS  
Primary emphasis on linear wave wave theory and its applications. Shoaling, refraction and diffraction of waves. Basic aspects of wave-structure and wave-bottom interaction. Introduction to basic wave propagation models. May be cross-listed with MAST648.

PREREQ: CIEG305.

CIEG 675  MATLAB FOR ENGINEERING ANALYSIS  
Description and usage of commercial Matrix Laboratory (Matlab) software for analyzing multi-dimensional engineering data sets and formulating numerical models of engineering processes.

PREREQ: CIEG672.

CIEG 677  SEDIMENT TRANSPORT MECHANICS  
Mechanics and mathematical modeling of sediment transport in unidirectional and oscillatory flow; sediment properties, initiation of sediment movement, bedload and suspended load transport rates, formation of bed forms and flow resistance, erosion and deposition in vicinity of structures, and practical applications.

PREREQ: CIEG305.

CIEG 680  LITTORAL PROCESSES  
Coastal morphology, equilibrium beach profiles, onshore-offshore response, sediment transport relationships, sand budgets around inlets and along open coasts, modeling of shoreline response, analyses of beach problems and recommendations of remedial measures.

PREREQ: CIEG672.

CIEG 681  WATER WAVE SPECTRA  
Concepts of amplitude and energy spectra, covariances and cross-spectra; linear response functions; use of Fast Fourier Transform for ocean engineering applications including analysis of one-dimensional and directional spectra, probability of ocean waves and wave forces.

RESTRICTIONS: Requires permission of instructor.

CIEG 682  NEARSHORE HYDRODYNAMICS  
Mechanics of waves and currents in nearshore zone: wave breaking, surf zone dynamics, cross- and long-shore currents, turbulence and bottom boundary layers, infra-gravity and edge waves and nearshore modeling.

PREREQ: CIEG672 and CIEG639.

CIEG 683  PROBABILISTIC ENGINEERING ANALYSIS  
Operational techniques, derived distributions and expectations used to develop random models to analyze and design in random environment. Applications may span topics in mechanics, stream and reservoir flows and technologic decision making and management.

CIEG 684  NUMERICAL METHODS FOR COASTAL MODELING  
Principles of finite difference, finite volume and finite element approaches for basic parabolic, hyperbolic and elliptic partial differential equations. Stability and conservation properties of basic schemes. Coastal engineering applications for surface waves, nearshore circulation, sediment transport and morphology. Introduction to popular models in each area.

PREREQ: CIEG672 and CIEG639.

CIEG 693  WAVES IN THE MARINE ENVIRONMENT  
See MAST693 for course description.

CIEG 698  GROUNDWATER FLOW AND CONTAMINANT TRANSPORT  
Development and application of models for fluid flow and contaminant transport in porous media. Derivation of governing equations, analytical and numerical solutions, and application to movement of groundwater and transport of contaminants at an actual field site.

PREREQ: CIEG305 and MATH302, or permission of instructor.

CIEG 801  ADVANCED TOPICS IN FINITE ELEMENT ANALYSIS  
Review of elementary aspects of finite element method. Application of method to linear and nonlinear one-, two- and three-dimensional problems in applied mechanics. Basic and advanced numerical methods and computer programming techniques appropriate to finite element analyses (includes two to three computational laboratory classes).

PREREQ: CIEG401.

CIEG 802  ADVANCED STRUCTURAL DESIGN  
Application of ultimate and elastic design procedures to continuous beams and frames, composite members, statically indeterminate trusses and arches. Projects and special topics focus attention to basis and limitations of codes and specifications for steel structures.

PREREQ: CIEG302.

CIEG 803  ADVANCED CONCRETE DESIGN  
Application of ultimate strength design procedures to continuous beams and frames, composite members, slabs and arches. Projects and special topics focus attention to basis and limitations of codes and specifications for concrete structures.

PREREQ: CIEG302.

CIEG 811  ADVANCED STRUCTURAL DYNAMICS DESIGN  
Linear and nonlinear dynamic analysis of multiple degree of freedom systems subjected to earthquake, wind and impact loadings; the use of analysis results in design. Computer analysis of complex structural systems; distributed, consistent and lumped mass models, wave propagation, random excitations, and structural control.

PREREQ: CIEG611.

CIEG 815  RELIABILITY OF ENGINEERING SYSTEMS  
Examination of performance of systems with multiple modes of failure and whose input, properties, evolution etc. are stochastic in nature. Topics include: stochastic processes, system representation and system failure, component and system reliability, time-dependent reliability, Monte-Carlo simulation, probability-based optimization and design code development.

PREREQ: Strong background in probability and statistics, and proficiency in C/Fortran/ Matlab or equivalent.

CIEG 817  STABILITY OF STRUCTURES  

PREREQ: CIEG212 and MATH302.

CIEG 820  INELASTIC BEHAVIOR OF GEOMATERIALS  
Introduces constitutive laws and numerical methods used to characterize stress-strain-time behavior of geomaterials. Correlation between laboratory experiments and numerical predictions. Finite element analyses of coupled stress-flow problems (e.g., consolidation), reinforced earth structures and slopes. Discussion of anisotropy, time effects and frictional interfaces.

PREREQ: CIEG420, CIEG601.

RESTRICTIONS: CIEG620 is highly recommended as a prerequisite.

CIEG 831  THEORY OF WATER TREATMENT  
Application of physical, chemical and engineering techniques to water treatment processes: aeration, coagulation, sedimentation, filtration and disinfection. Advanced purification methods including adsorption and demineralization processes.

PREREQ: CIEG632 and CIEG634.

CIEG 832  THEORY OF WASTEWATER TREATMENT  
Composition of wastes; physical, chemical and biological methods of wastewater treatment; treatment and disposal of sludges produced at wastewater treatment plants.

PREREQ: CIEG636.
COMPUTER AND INFORMATION SCIENCE

CIEG 833  Fate of Organic Pollutants in the Environment  3
Study of processes governing distribution and transformation of organic pollutants
in natural and engineered environments. Equilibrium and kinetics of exchange
among soil, water, sediment, air, and biota. Photolysis, hydrolysis, oxidation, and
reduction reactions of organic chemicals involving naturally-occurring and man-
made agents. Mechanisms and model prediction of different fate processes.
PREREQ: CIEG632, CIEG634, CIEG636.

CISC 865  Civil Engineering Seminar  1-2 PF
Graduate seminar covering current topics in structural, environmental, ocean
and transportation engineering.

CISC 866  Research  1-6

CISC 869  Master's Thesis  1-6
Independent investigation under supervision of member of the civil engineering
graduate faculty.

CISC 870  Offshore Design  3
Naval hydrodynamics, behavior of submerged and floating bodies, and ship
waves. Tsunamis and harbor response.
PREREQ: CIEG672 and CIEG639.

CISC 871  Coastal Structures  3
Advanced design procedures of coastal structures. Includes statistics and spectra
of random sea waves, random sea transformation in nearshore, design of vertical
and rubble mound breakwaters, harbor oscillations and tranquility, and hydraulic
model tests.

CISC 872  Advanced Water Wave Mechanics  3
Development of finite amplitude wave theories such as solitary, conoidal stokes
and stream function. Application to coastal and ocean engineering problems.
PREREQ: CIEG639, CIEG672.

CISC 964  Pre-Candidacy Study  3-12 PF
Research and readings in preparation of dissertation topic and/or qualifying
examinations for doctoral students before admission to candidacy but after
completion of all required course work.
RESTRICTIONS: Not open to students who have been admitted to candidacy.

CISC 969  Doctoral Dissertation  1-12 PF

COMPUTER AND INFORMATION SCIENCE

CISC 101  Computers and Information Systems  3
Introduces general concepts of computer organization, terminology, usage and
discusses impact of computers on society. Introduces word processing,
spreadsheets, databases, electronic mail, bulletin boards, windowing systems,
networks and the internet, and very simple programming.
RESTRICTIONS: Does not count toward graduation if taken after CISC105 or any
other CISC course. Not open to students with credit for MISY160 or 261, or
FREC135.

CISC 103  Introduction to Computer Science with Web
Applications  3
Principles of computer science illustrated through programming in scripting
languages such as JavaScript and VBScript. Topics include control structures,
arrays, functions, and procedures. Programming projects illustrate web-based
applications.
RESTRICTIONS: Open to non-majors. Students may not get credit for both
CISC103 and CISC105.

CISC 105  General Computer Science  3
Principles of computer science illustrated and applied through programming in the
high level language C. Programming projects illustrate applications in all areas:
business, humanities, social sciences, physical sciences, mathematics.
RESTRICTIONS: Does not count toward graduation if taken after CISC181.

CISC 106  General Computer Science for Engineers  3
Principles of computer science illustrated and applied through programming in
Matlab and C. Programming projects illustrate computational problems, styles, and
issues that arise in engineering computation.

CISC 181  Introduction to Computer Science  3
Principles of computer science illustrated and applied through programming in the
object oriented language C++. Programming projects illustrate computational
problems, styles and issues that arise in computer systems development and in all
application areas of computation.
PREREQ: Grade of C- or better in CISC105 or CISC106 or equivalent
programming experience in a high level language.
COREQ: MATH115, MATH117, MATH171, MATH221, or MATH241.

CISC 220  Data Structures  3
Review of data type abstraction, recursion, arrays, stacks, queues, multiple stacks
and linked lists. Emphasis on dynamic storage management, garbage collection,
trees, graphs, tables, sorting and searching.
PREREQ: Minimum grade of C- in CISC181.
COREQ: MATH210 or MATH241.

CISC 250  Business Telecommunication Networks  3
Examines technologies of information transmission currently utilized in business
environments and implications of these technologies upon development and
implementation of information systems. Provides basic background in convergence
of voice, data and video services into common digital networks. Security issues
also considered.
PREREQ: CISC181.
RESTRICTIONS: Degree credit will not be given for both CISC250 and CISC450.

CISC 260  Machine Organization and Assembly Language  3
Introduction to basics of machine organization. Programming tools and techniques
at machine and assembly levels. Assembly language programming and computer
arithmetic techniques.
PREREQ: Minimum grade of C- in CISC181.
RESTRICTIONS: CISC220 recommended as a prerequisite.

CISC 280  Program Development Techniques  3
Structure and interpretation of computer programs. Different paradigms (mind sets)
that programmers use: procedural, functional, logic and object oriented
programming. Top down design, stepwise refinement, procedural abstraction and
information hiding concepts as applied to program development process.
PREREQ: Minimum grade of C- in CISC220.
COREQ: MATH221 or MATH241.

CISC 303  Automata Theory  3
Automata and formal language theory. Background for advanced applications in
compilers, computer networks, operating systems, and natural language
processing. Finite automata and regular languages. Push down automata and
context free grammars. Turing machines.
PREREQ: Minimum grade of C- in both MATH210 and CISC220.

CISC 304  Logic and Programming  3
Propositional and predicate logic for general reasoning and advanced
applications in knowledge representation in artificial intelligence and database,
program correctness and programming semantics. Models, resolution, logic
programming, and natural deduction.
PREREQ: CISC220, MATH210 (with minimum C- grade).

CISC 308  Introduction to Algorithms  3
Design and analysis of algorithms: worst/average case analysis, proofs for
correctness and performance of algorithms. Algorithmic strategies (divide and
conquer, greedy methods, dynamic programming, etc.). Algorithms for searching,
forming and traversal of strings, trees and graphs. Categorization of computational
problems: classes P and NP. NP completeness.
PREREQ: MATH210 and a minimum grade of C- in CISC220.

CISC 355  Computers, Ethics and Society  3
Explains relationships among information technology, society and ethics by
examining issues raised by increasingly widespread use of computers. Topics
include ethics for computer professionals, computer impact on factory work, office
work, personal privacy and social power distribution.

CISC 360  Computer Architecture  3
Principles and techniques used in architecture of digital computers. Machine
elements and their interrelation. Instruction set, risc vs cisc, registers, busses and
switches.
PREREQ: CPEG210 and CPEG211, or CPEG202, and a minimum grade of C- in
CISC220 and CISC260 (or equivalent courses).

CISC 361  Operating Systems  3
Principles and techniques employed in development of operating systems and their
driver programs. Includes management of memory, processors, I/O devices.
PREREQ: Minimum grade of C- in both CISC220 and CISC260. CPEG222 may
be substituted for CISC260.
RESTRICTIONS: CISC360 recommended as a prerequisite.

CISC 366  Independent Study  1-6

CISC 370  Object Oriented Programming Using Java  3
Object oriented programming through use of Java programming language. Use of
Java’s extensive library of API’s (application programming interfaces). Study of
design issues of large program systems.
PREREQ: CISC220.
CISC 372  PARALLEL PROGRAMMING  3
Introduction to parallel programming concepts, methodologies, and tools. Programming techniques for programs that contain code segments which run simultaneously on multiple processors. Topics include: concurrency, program decomposition, data distribution, communication, load balancing, scalability, locality, granularity, debugging, performance evaluation. PREREQ: CISC220.

CISC 401  ELEMENTS OF THE THEORY OF COMPUTATION  3
General models of computation, formal languages and automata theory and algorithmic unsolvability. PREREQ: CISC303. RESTRICTIONS: Credit cannot be received for both CISC401 and CISC601.

CISC 403  PROGRAM VALIDATION  3
Specification and verification of programs. Testing through use of formal and informal verification techniques, program design made more effective and product quality (meeting specifications) enhanced. PREREQ: CISC304. RESTRICTIONS: Credit cannot be received for both CISC403 and CISC603.

CISC 404  LOGIC IN COMPUTER SCIENCE  3
Formal introduction to first-order logic with emphasis on its relevance to computer science. Syntax, semantics, models, formal proofs and results on soundness, consistency, completeness, compactness and undecidability. Automated theorem proving also covered. PREREQ: CISC304. RESTRICTIONS: Credit cannot be received for both CISC404 and CISC604.

CISC 409  TOPICS IN THEORETICAL COMPUTER SCIENCE  3
Contents vary to coincide with interests of students and current faculty. PREREQ: CISC401. RESTRICTIONS: Credit cannot be received for both CISC409 and CISC609.

CISC 410  INTRODUCTION TO NUMERICAL ANALYSIS AND ALGORITHMIC COMPUTATION  3
See MATH426 for course description.

CISC 411  ALGORITHMIC AND NUMERICAL SOLUTION OF DIFFERENTIAL EQUATIONS  3
See MATH428 for course description.

CISC 429  TOPICS IN ALGORITHMS AND COMPLEXITY THEORY  3
Contents vary to coincide with interests of students and current faculty. RESTRICTIONS: Credit cannot be received for both CISC429 and CISC629.

CISC 436  INTRODUCTION TO BIOINFORMATICS  3
Introduction to concepts, methodologies, and tools in bioinformatics. Abstraction of biological problems for computational solutions. Genome sequencing and assembly, bio-sequence comparison and database search, dynamics programming, hidden Markov models, and phylogenetic trees. PREREQ: CISC220 or consent of instructor.

CISC 437  DATABASE SYSTEMS  3
Physical and logical organization of databases. Data retrieval languages, relational database languages, security and integrity, concurrency, distributed databases. PREREQ: Minimum grade of C- in CISC220. RESTRICTIONS: Credit cannot be received for both CISC437 and CISC637.

CISC 440  COMPUTER GRAPHICS  3
Computer graphics technology, two- and three-dimensional systems, graphics software systems, modeling and object hierarchy, and animation. PREREQ: CISC220 and MATH241. RESTRICTIONS: CISC320 recommended. Credit cannot be received for both CISC440 and CISC640.

CISC 449  TOPICS IN COMPUTER APPLICATIONS  3
Contents vary to coincide with interests of students and current faculty. RESTRICTIONS: Credit cannot be received for both CISC449 and CISC649.

CISC 450  COMPUTER NETWORKS  3
Foundation principles, architectures and techniques employed in computer and communication networks. Focuses on mechanisms used in TCP/IP protocol suite. Topics include connection management, end-to-end reliable data transfer, sliding window protocols, quality of service, flow control, congestion control, routing, LANs, framing, error control, analog versus digital transmission, packet versus circuit switching, multiplexing. PREREQ: CISC303, CISC360 and either MATH205 or MATH350. COREQ: CISC361. RESTRICTIONS: Knowledge of probability recommended. Credit cannot be received for both CISC450 and CISC650. Credit cannot be received for both CISC250 and CISC450.

CISC 451  DATA COMPRESSION IN MULTIMEDIA  3

CISC 452  TELECOMMUNICATIONS SYSTEMS  3
Presents basic concepts in telecommunications, emphasizing topics such as SONET, Cell and Frame Relay and multimedia switching. Concepts of operation and maintenance of large communications networks discussed. PREREQ: CISC250, or CISC450, or CPEG419. RESTRICTIONS: Open CIS and ECE majors and minors only.

CISC 458  APPLIED COMPUTER NETWORKS  3
Principles of communications as they apply to computer networks. Includes advanced concepts of network design, construction and management. PREREQ: CISC450 or CPEG419.

CISC 459  TOPICS IN COMMUNICATIONS, DISTRIBUTED COMPUTING AND NETWORKS  3
Contents vary to coincide with interests of students and current faculty. PREREQ: CISC450. RESTRICTIONS: Credit cannot be received for both CISC459 and CISC659.

CISC 462  COMPUTER SYSTEMS: ARCHITECTURE  3
Recent advances in computer architecture and their impact on architectural design. Multicomputer and multiprocessor architectures. Parallel machines. PREREQ: CISC360 and MATH205. RESTRICTIONS: Credit cannot be received for both CISC462 and CISC662.

CISC 464  INTRODUCTION TO NETWORK SECURITY  3
Practical introduction to network security field. Covers material on cryptography, intrusions, denial-of-service attacks, worms, honeynets and other hot topics in network security. PREREQ: CISC450 or equivalent.

CISC 466  INDEPENDENT STUDY  1-6
PREREQ: CISC450 or equivalent.

CISC 470  PROGRAMMING LANGUAGES  3
Selection, use and implementation of appropriate language(s) for given problems. Syntax, semantics, pragmatics, parameter passing, abstract data types and comparisons between languages. PREREQ: CISC280. RESTRICTIONS: Credit cannot be received for both CISC470 and CISC670.

CISC 471  COMPILER DESIGN  3
Introduction to design and implementation of compilers, with focus on lexical analysis, parsing and syntax directed translation. PREREQ: CISC260 and CISC364.

CISC 473  COMPUTER SCIENCE PROJECTS  3
Experimental, theoretical and literature studies of computer science problems. RESTRICTIONS: Open to majors only. Requires permission of instructor. May be taken twice for credit when topics vary.

CISC 474  ADVANCED WEB TECHNOLOGIES  3
Programming and architecture of web servers and technologies for implementing high performance, sophisticated web sites for applications like e-commerce. Students learn how to install and setup a web server, how to write and install programs for a web server, and how to design and implement multi-tier client/server applications with database backends. PREREQ: CISC220 and CISC363.

CISC 475  OBJECT ORIENTED SOFTWARE ENGINEERING  3
Introduction to object oriented software engineering concepts, methodologies and tools. Requirement analysis, specification, design and implementation of object oriented software development process using UML. Real-life examples and homework projects to cover all aspects of object oriented lifecycle, from the requirements to coding in C++ and/or Java. PREREQ: Minimum grade of C- in CISC280 and senior status. CISC361 is recommended. RESTRICTIONS: Credit cannot be received for both CISC475 and CISC675.

CISC 477  SYSTEMS ADMINISTRATION  3
Introduces internals of UNIX, trouble-shooting system and network problems, hardware and software configuration and installation, and security aspects of hosts on internet. Multi-operating system integration also discussed. PREREQ: CISC361.
CISC 479 Topics in Architecture and Software 3
Contents vary to coincide with interests of students and faculty. PREREQ: CISC361 and CISC462. RESTRICTIONS: Credit cannot be received for both CISC479 and CISC679.

CISC 481 Artificial Intelligence 3
Programming techniques for problems not amenable to algorithmic solutions. Problem formulation, search strategies, state spaces, applications of logic, knowledge representation, planning and application areas. May be cross-listed with CISC481. PREREQ: CISC280, and CISC304. RESTRICTIONS: Credit cannot be received for both CISC481 and CISC681.

CISC 485 Mechatronics 3
Mechatronics is the intersection set of computers, electronics and mechanical engineering. Covers practical and theoretical aspects of mechatronic design, including human/machine interfacing, haptic systems, procedures in mechatronic design, reverse engineering, machine behaviors, and mechatronic control systems. RESTRICTIONS: Credit cannot be received for both CISC485 and CISC685. Permission of instructor required. Offered in alternate years.

CISC 489 Topics: Artificial Intelligence 3
Contents vary to coincide with interests of students and current faculty. PREREQ: CISC481/681. RESTRICTIONS: Credit cannot be received for both CISC489 and CISC689.

CISC 601 Elements of the Theory of Computation 3
General models of computation, formal languages and automata theory, and algorithmic unsolvability. PREREQ: A course in which student was required to prove theorems. RESTRICTIONS: Credit cannot be received for both CISC401 and CISC601.

CISC 603 Program Validation 3
Specification and verification of programs. Testing through use of formal and informal verification techniques, program design made more effective and product quality (meeting specifications) enhanced. PREREQ: CISC304 or equivalent. RESTRICTIONS: Credit cannot be received for both CISC603 and CISC403.

CISC 604 Logic in Computer Science 3
Formal introduction to first-order logic with emphasis on its relevance to computer science. Syntax, semantics, models, formal proofs and results on soundness, consistency, completeness, compactness and undecidability. Automated theorem proving also covered. PREREQ: CISC304 or equivalent. RESTRICTIONS: Credit cannot be received for both CISC604 and CISC404.

CISC 609 Topics in Theoretical Computer Science 3
Contents vary to coincide with interests of students and current faculty. PREREQ: CISC601. RESTRICTIONS: Credit cannot be received for both CISC609 and CISC409.

CISC 621 Algorithm Design and Analysis 3
Emphasis on developing expertise in design and analysis of algorithms. Equal importance given to techniques and specific algorithms. Particular topics include advanced data structures, graph algorithms, disjoint set manipulation, sorting and selection, amortized analysis, NP-completeness, and matrix and polynomial multiplication. PREREQ: Undergraduate algorithms and discrete math courses.

CISC 626 Introduction to Bioinformatics 3
Introduction to concepts, methodologies, and tools in bioinformatics. Abstraction of biological problems for computational solutions. Genome sequencing and assembly, bio-sequence comparison and database search, dynamics programming, hidden Markov models, and phylogenetic trees. PREREQ: CISC220 or consent of instructor. RESTRICTIONS: Credit cannot be earned for both CISC626 and CISC426.

CISC 637 Database Systems 3
Physical and logical organization of databases. Data retrieval languages, relational database languages, security and integrity, concurrency, distributed databases. PREREQ: CISC220, and CISC304, or equivalent. RESTRICTIONS: Credit cannot be received for both CISC637 and CISC437.

CISC 640 Computer Graphics 3
Computer graphics technology. Two- and three-dimensional systems, graphics software systems, modeling and object hierarchy, and animation. PREREQ: CISC220 or equivalent. COREQ: CISC320 recommended. RESTRICTIONS: Credit cannot be received for both CISC640 and CISC440.
CISC 681  ARTIFICIAL INTELLIGENCE  3
Programming techniques for problems not amenable to algorithmic solutions. Problem formulation, search strategies, state spaces, applications of logic, knowledge representation, planning and application areas. May be cross-listed with CGSC681. 
PREREQ: CISC220, and CISC304, or equivalent. 
RESTRICtIONS: Credit cannot be received for both CISC681 and CISC481.

CISC 685  MECHATRONICS  3
Mechatronics is the intersection set of computers, electronics and mechanical engineering. Covers practical and theoretical aspects of mechatronic design, including human/machine interfacing, haptic systems, procedures in mechatronic design, reverse engineering, machine behaviors, and mechatronic control systems. 
RESTRICtions: Credit cannot be received for both CISC685 and CISC485. 
Requires permission of instructor. Offered in alternate years.

CISC 689  TOPICS: ARTIFICIAL INTELLIGENCE  3
Contents vary to coincide with interests of students and faculty. 
PREREQ: CISC681. 
RESTRICtIONS: Credit cannot be received for both CISC689 and CISC489.

CISC 699  GRADUATE INTERNSHIP  1 P
On-the-job experience performing technical computer science related work. 
RESTRICtions: Requires permission of the instructor.

CISC 801  ADVANCED COMPUTABILITY THEORY  3
Advanced abstract computability (or recursive function) theory with emphasis on tools underpinning research in area. Topics include universal programming systems, complexity results, oracle computations and quantifier hierarchies, classification of algorithmically enumerable sets, machine self-reference and priority arguments. 
PREREQ: CISC601.

CISC 805  COMPUTABILITY THEORETICAL LEARNING  3
Mathematically circumscribes absolute boundaries of what algorithms can do about learning grammars for languages and programs for functions. Proves results in recursion-theoretic theory of machine learning. Provides interpretations of results regarding human language learning and philosophy of science. 
PREREQ: CISC601.

CISC 809  ADVANCED TOPICS IN THEORETICAL COMPUTER SCIENCE  3
Contents vary to coincide with interests of students and faculty. 
PREREQ: CISC601.

CISC 822  ALGEBRAIC ALGORITHMS  3
PREREQ: CISC601, and/or an abstract algebra course or permission of instructor. 
RESTRICtions: Offered in alternate years.

CISC 829  ADVANCED TOPICS IN ALGORITHMS AND COMPLEXITY THEORY  3
Contents vary to coincide with interests of students and faculty. 
PREREQ: CISC601.

CISC 841  BIOINFORMATICS  3
Advanced topics in current bioinformatics research, such as hidden Markov models, kernel based methods, and bayesian based analysis with applications to functional annotation, structural prediction, and biological networks inferences. 
PREREQ: CISC436 or CISC636 or consent of instructor.

CISC 849  ADVANCED TOPICS IN COMPUTER APPLICATIONS  3
Contents vary to coincide with interests of students and faculty. 
RESTRICtions: Requires permission of instructor. 

CISC 852  COMPUTER NETWORK PERFORMANCE  3
PREREQ: CISC650 or ELEG651 or equivalent.

CISC 853  NETWORK MANAGEMENT  3
Introduction to network management concepts. Network management architectures and protocols; the Internet and OSI frameworks, management functionalities, management domains and objects, protocols and services (SNMP, CMIS/IP). Design of management agents and clients. Concepts of performance management, fault management, configuration management and other management applications. 
PREREQ: CISC650 or ELEG651.

CISC 856  TCP/IP AND UPPER LAYER PROTOCOLS  3
Advanced principles and techniques of TCP/IP protocol suite. Emphasis on network, transport and application layers, and recent new protocols as proposed by the IETF. Examples: FTP, SMTP, telnet, NTP, HTTP, DNS, Multicast, DHCP, ECN, IMAP, CNDN, ICMP, SCTP. 
PREREQ: CISC650 or ELEG651.

CISC 858  INTERNET PROTOCOLS AND TECHNOLOGY  3
State-of-the-art issues related to Internet protocols, routers, and middleware. Topics include: router architectures, algorithms for packet lookup and flow classification, QoS and differentiated services, TCP congestion control and active queue management, intradomain and interdomain routing, network measurements and traffic characterization, streaming and real-time applications, web middleware. 
PREREQ: CISC450/650, CISC360, CISC361, ELEG651, or equivalent.

CISC 859  ADVANCED TOPICS IN COMMUNICATIONS, DISTRIBUTED COMPUTING NETWORKS  3
Contents vary to coincide with interests of students and faculty. 
PREREQ: CISC650 or ELEG651.

CISC 861  WIRELESS NETWORKS AND MOBILE COMPUTING  3
Provides in-depth study of networking protocol and system software in wireless networks and mobile computing. Topics include MAC layer and 802.11, ad hoc networks, sensor networks, GlomoSim simulation package, Mobile IP, Cellular IP, wireless TCP, middleware for mobile computing, and 3G wireless networks. 
PREREQ: CISC650 or ELEG651.

CISC 862  ADVANCED SOFTWARE DESIGN  3
Review of basic object oriented software development; software design and architecture patterns; component-based software engineering; mobile software agents; protocols and architectures for complex software architecture; project: developing large scale E-trade software application. 
PREREQ: Good Java programming skills; CISC650 is recommended. 
RESTRICtions: Preference given to CIS and ECE graduate students.

CISC 864  RESEARCH TOPICS IN NETWORK SECURITY  3
Focuses on research and emphasizes reading and writing of technical papers, and project work. Covers a variety of network security topics, such as denial-of-service, worm and virus attacks, privacy, anonymization techniques, IP spoofing, social engineering, etc. 
PREREQ: CISC450 or CISC650 or ELEG651.

CISC 868  RESEARCH  1-9
Upper-level graduate research oriented toward student’s potential master’s thesis or Ph.D. dissertation. 
PREREQ: CISC650.

CISC 869  MASTER’S THESIS  1-6
CISC 872  ADVANCED PROGRAM ANALYSIS AND TRANSFORMATIONS  3
Static program analysis and machine-independent code transformations. Topics include control flow analysis, intraprocedural data flow analysis, alias analysis, advanced program representations including SSA and PDG and local, global and interprocedural analysis for classic code-improving transformations. 
PREREQ: CISC672.

CISC 873  COMPILING FOR ADVANCED ARCHITECTURES  3
Techniques for generating code for advanced uniprocessor and multiprocessor architectures. Topics include control flow analysis, intraprocedural data flow analysis, alias analysis, and compiling for shared memory, message passing, distributed shared memory and multi-threaded architectures. 
PREREQ: CISC662 or previous course in compilers, and CISC662 or previous course in computer architecture. 
RESTRICtions: CISC872 is recommended.

CISC 875  IMPLEMENTING OBJECT ORIENTED LANGUAGES  3
Program analysis and code generation for object oriented languages. Program analysis in the presence of polymorphism, threads, exceptions, templates and multiple inheritance. Compiling high-level languages to virtual machines (like JVM) and compiling virtual machine code to register instruction sets. Garbage collection and memory management. 
PREREQ: CISC672 or previous compiler course and exposure to object oriented programming. 
RESTRICtions: CISC872 is recommended.

CISC 877  ADVANCED TOPICS IN ARCHITECTURE AND SOFTWARE SYSTEMS  3
Contents vary to coincide with interests of students and faculty. 
PREREQ: CISC662 or CISC663.

CISC 882  NATURAL LANGUAGE PROCESSING  3
Introduction to computational models of syntax, semantics and pragmatics for natural language understanding. Emphasis on design of English interfaces to data bases and ill-formed input. 
PREREQ: CISC681.
CISC 883  Natural Language Generation  3
Current research directions in generation, models of generation, differences between generation and understanding, text structure and coherence, grammars for generation.
PREREQ: CISC681 and CISC882.

CISC 885  Discourse and Dialogue  3
Pragmatic issues involved in developing intelligent discourse and dialogue systems. Topics: speech acts, characteristics of a coherent dialogue, explicit versus implicit communication, discourse models, planning and plan recognition, ill-formed input, cooperative responses, user models and default reasoning.
PREREQ: CISC681.

CISC 886  Multi-Agent Systems  3
Introduction to field of Multi-Agent Systems, examining issues that arise when groups of self-interested or cooperating autonomous agents interact to solve shared problems. Issues include reasoning about knowledge and beliefs of other agents, communication and negotiation, computational organization, coordination and control.
PREREQ: CISC681 or equivalent.

CISC 887  Internet Information Gathering  3
Approaches to information gathering, filtering, and integration including work in heterogeneous database, information retrieval and agent-oriented communities. Text indexing, vector-based and probabilistic retrieval, semantic web technologies, wrappers and mediators, query planning and optimization, collaborative filtering, information agents, applications.
PREREQ: CISC681 or equivalent.

CISC 889  Advanced Topics in Artificial Intelligence  3
Contents vary to coincide with interests of students and faculty.
PREREQ: CISC681.

CISC 890  Colloquium: Computer Science  0 PF
Weekly lectures by faculty and visiting researchers provide broad overview of scope as well as insight into significant results of current research in computer science.

CISC 964  Pre-Candidacy Study  3-12 PF
Research and readings in preparation of dissertation topic and/or qualifying examinations for doctoral students before admission to candidacy but after completion of all required course work.
RESTRICTIONS: Not open to students who have been admitted to candidacy.

CISC 969  Doctoral Dissertation  1-12 PF

Comparative Literature

CMLT 202  Biblical and Classical Literature  3
See ENGL202 for course description.

CMLT 207  Great Writers of the Western World I: 1100-1700  3
Studies writers such as Dante, Chaucer, Rabelais and Cervantes, in translation. May be cross-listed with ENGL211.
PREREQ: ENGL110.

CMLT 208  Great Writers of the Western World II: 1650-1950  3
Studies writers such as Moliere, Voltaire, Goethe, Dostoevski, Thomas Mann and Herman Hesse, in translation. May be cross-listed with ENGL212.
PREREQ: ENGL110.

CMLT 217  Introduction to Film  3
See ENGL217 for course description.

CMLT 218  Introduction to Drama  3
See ENGL218 for course description.

CMLT 219  Introduction to the Novel  3
See ENGL219 for course description.

CMLT 283  Honors Short Course  1

CMLT 316  Classical Mythology  3
See FLIT316 for course description.

CMLT 317  Film History  3
See ENGL317 for course description.

CMLT 318  Studies in Film  3
See ENGL318 for course description.

CMLT 320  Varying Authors and Genres  3
See FLIT320 for course description.

CMLT 321  Medieval Literature and Culture  3
See ENGL321 for course description.

CMLT 322  Topics: Classical Literature in Translation  3
See FLIT322 for course description.

CMLT 330  Varying Authors, Themes and Movements  3
See FLIT330 for course description.

CMLT 341  Theatre/Drama: Classic/Medieval  3
See THEA341 for course description.

CMLT 342  Theatre/Drama: Renaissance to 1700  3
See THEA342 for course description.

CMLT 343  Theatre/Drama: 1700 to 1900  3
See THEA343 for course description.

CMLT 344  Theatre/Drama: 1900 to Present  3
See THEA344 for course description.

CMLT 360  Humanities Colloquium  3

CMLT 361  Literary Criticism and Theory  3
See ENGL361 for course description.

CMLT 366  Independent Study  1-3

CMLT 385  Studies in Literary Criticism and Theory  3
See ENGL385 for course description.

CMLT 390  Honors Colloquium  3

CMLT 465  Studies in Literature Genres, Types and Movements  3
See ENGL465 for course description.

CMLT 466  Independent Study  1-3

Communication

COMM 200  Topics: Human Communication Systems  3
Analysis of various human communication systems which may include interpersonal, organizational and/or mass.
RESTRICTIONS: May be repeated up to 3 times when topics vary.

COMM 212  Oral Communication in Business  3
Includes analysis of types and principles of communication inherent in a business and professional setting; a concentration upon development of presentational skills: analyzing audiences, questioning, interviewing, researching, supporting, organizing and delivering information; an opportunity to develop and present materials within dyads, small groups and public contexts.
RESTRICTIONS: Not open to communication and communication interest majors. Credit not given for both COMM212 AND COMM225.

COMM 245  Mass Communication and Culture  3
Relationship between media and culture; how media affect culture (i.e., socialization and role modeling); and exploration of new forms of mass communication.

COMM 251  Communicating Effectively  1 PF
Teaches fundamentals of written communication techniques used in communication industries, such as broadcast journalism, public relations, and organizational communication.

COMM 255  Fundamentals of Communication  3
Introduction to theories in communication with applications. Developing, analyzing and critiquing communication in different settings. Includes practice of oral communication skills.
RESTRICTIONS: Not open to seniors or communication majors. Credit not given for both COMM255 and COMM212.

COMM 256  Principles of Communication Theory  3
Introduction to theories and research in communication including a survey of areas of the field.

COMM 263  International Social Conduct  3
Introduction to basic attitudes toward interpersonal relations and socioeconomic and political responsibilities in various cultures. Experiential course integrating foreign and United States students.
RESTRICTIONS: Offered only in Winter. Not for major credit.
COMM 300 INTRODUCTION TO COMMUNICATION PRINCIPLES 3
Survey of communication theories as applied to practical experiences in all contexts ranging from interpersonal communication and small group processes to informative and persuasive speaking. Focuses on same material as COMM212, but without practice of oral communication skills. RESTRICTIONS: Not open to communication majors. Students cannot earn credit for COMM300 and COMM121 or COMM255.

COMM 301 INTRODUCTION TO COMMUNICATION RESEARCH METHODS 3
Conceptual bases of research methodology: formulating questions, designing, conducting and analyzing research. PREREQ: COMM256 or COMM245 or COMM330. RESTRICTIONS: Not open to freshmen.

COMM 309 INTRODUCTION TO PUBLIC RELATIONS 3
Examination of public relations process, practices and principles in various settings, including corporations, non-profit organizations, educational institutions and government. Insights gained through case studies and interviews with public relations professionals.

COMM 310 TOPICS: MASS COMMUNICATION HONORS PRO-SEMINAR 1-4
Focus on areas of study in mass communication. Enhances and expands on other communication courses offered as co-requisite. COREQ: A list of co-requisites will be available to students each semester. RESTRICTIONS: Students with 3.0 or higher GPA. May be repeated up to three times for credit when topics vary.

COMM 311 PUBLIC RELATIONS WRITING 3
Development of writing skills with emphasis on clarity, conciseness, color, organization and flow. Application of skills in various public relations formats (news releases, features, profiles, brochures, etc.) geared to specific audiences and appropriate channels. PREREQ: COMM309.

COMM 313 COMMUNICATION PRINCIPLES IN ADVERTISING 3
Provides comprehensive overview of the marketing function, emphasizing integrated marketing communication. Includes historical perspective and current advertising and promotion principles and practices. Combines both individual and small team projects, such as developing an integrated marketing communication campaign.

COMM 318 TOPICS IN MASS COMMUNICATION 3
Focuses on introductory areas of study in mass communication. RESTRICTIONS: May be repeated three times for credit when topics vary.

COMM 319 TOPICS IN POLITICS AND BROADCAST JOURNALISM 3
Topics vary and may include influence of media on foreign policy, responsibility of media on foreign policy or for policy failures or successes. May be cross-listed with POSC319. RESTRICTIONS: For majors only. May be repeated up to three times for credit when topics vary.

COMM 320 TOPICS: INTERPERSONAL COMMUNICATION HONORS PRO-SEMINAR 1-4
Focus on areas of study in interpersonal communication. Enhances and expands on other communication courses offered as co-requisite. COREQ: Vary from semester to semester. Students will be supplied with list of co-requisites each semester. RESTRICTIONS: Students with a 3.0 GPA or higher. May be repeated up to three times for credit when topics vary.

COMM 325 STUDIO TELEVISION PRODUCTION 3
Television as mass communication media. Background, programming, production and studio procedures in educational television, broadcasting and closed circuit. Laboratory observation and practices.

COMM 326 FIELD TELEVISION PRODUCTION 3
Analysis and synthesis of production, planning, and videotaping of TV programs; news and public affairs, drama, variety and instructional programming.

COMM 327 TELEVISION PRODUCTION LABORATORY I 1 PF
Practice of TV production techniques. RESTRICTIONS: Permission required from department.

COMM 328 TELEVISION PRODUCTION LABORATORY II 1 PF
Further practice of TV production techniques. RESTRICTIONS: Permission required from department.

COMM 329 BROADCAST NEWSWRITING 3
Emphasizes broadcast newswriting fundamentals and comparisons to other forms of writing. Includes news judgment, news gathering, and news editing, as well as integration of current events.

COMM 330 COMMUNICATION AND INTERPERSONAL BEHAVIOR 3
Introduces key principles of interpersonal communication and discusses their application across diverse contexts.

COMM 340 POLITICS AND THE MEDIA 3
See POSC340 for course description. RESTRICTIONS: For majors only.

COMM 341 THEORIES OF INTERPERSONAL COMMUNICATION 3
Survey of concepts and theories in interpersonal communication. Focuses on dyadic interaction and relationships as created, maintained, and modified through verbal and nonverbal behavior.

COMM 342 TOPICS IN ORGANIZATIONAL COMMUNICATION 3
Focuses on introductory areas of study in organizational communication. RESTRICTIONS: May be repeated three times for credit when topics vary.

COMM 343 TOPICS IN INTERPERSONAL COMMUNICATION 3
Focuses on introductory areas of study in organizational communication. RESTRICTIONS: May be repeated three times for credit when topics vary.

COMM 345 LEGAL ISSUES OF THE MASS MEDIA 3
Survey of legal issues affecting the development and performance of the mass media. The foundation of American communications law outlined through the study of First Amendment theory, its origin and development. Legal issues concerning libel, obscenity, copyright and broadcast regulation discussed. May be cross-listed with LEST345.

COMM 350 PUBLIC SPEAKING 3
Analyzes and applies theory and research in public speaking. Develops skills in preparation, presentation and evaluation of speeches. Includes classroom performances.

COMM 351 ORAL COMMUNICATION FELLOWS 3
Oral Communication Fellows training. PREREQ: COMM350. RESTRICTIONS: Enrollment by department invitation only.

COMM 356 SMALL GROUP COMMUNICATION 3
Examines basic group processes, structures and functions. Emphasizes both theory and practical applications. RESTRICTIONS: Requires permission of instructor.

COMM 356 INDEPENDENT STUDY 1-3
3
Practical, on-the-job training in student's field of interest: i.e., interpersonal, mass media, public relations or organizational communication. RESTRICTIONS: Offered in spring and fall semesters only. Open to junior and senior communication majors only. May be repeated two times for credit.

COMM 366 INDEPENDENT STUDY 1-3
3
Examination of foundations and development of theories of mass communication. Specific areas of study include media, society and the individual, media violence, cultivation theory, personal influence, social learning theory, diffusion theory and general media effects.

COMM 388 TELEVISION PRODUCTION PRACTICUM 3
Special topics video/audio course that acts as production arm of an interdisciplinary project. Intensive work on specific projects such as producing promotional or sales campaigns, video documentaries and radio drama. PREREQ: COMM325. RESTRICTIONS: Offered in winter session only.

COMM 401 CAREERS IN COMMUNICATION 1 PF
Offers insights into the many careers open to those with communication degrees and includes guest lectures from successful alumni. Provides strategies for career development. RESTRICTIONS: Open to junior and senior communication majors only.

COMM 408 NEW MEDIA PROJECT DEVELOPMENT 3
Application of communication research processes to designing new media (e.g., web sites, streaming video, electronic communication, interactive media) for a client. Involves conducting research for planning, developing strategies, designing prototypes, and making recommendations for implementation and evaluation.

COMM 409 PUBLIC RELATIONS CAMPAIGN PLANNING 3
Comprehensive recap of the Integrated Marketing Communication function, with an emphasis on public relations research, objectives, strategies, integrated tactics, and campaign evaluation. Utilizes a small team "service learning" setup, wherein teams adopt a community non-profit organization and work closely with Board and staff members to produce and present comprehensive public relations campaign plan. PREREQ: COMM309.
COMM 413 Public Relations Management  
Examination of effects of management systems on public relations function and managerial role of public relations practitioner. Includes in-depth analysis of complex cases, preparation of crisis communications plan for non-profit client, and several writing projects geared to specific audiences.  
PREREQ: COMM309.

COMM 417 Communication and the Management of Conflict  
Overview of communication and conflict process in face-to-face interaction. Emphasis on theories concerning structure, analysis, and management of conflict situations.

COMM 418 Topics in Mass Communication  
Current directions in mass communication theory and practice including new technologies, politics, broadcast programming and research, advertising and audience responses to media content.  
RESTRICTIONS: May be repeated three times for credit when topics vary.

COMM 421 Intercultural Communication  
Enhances students' understanding of cultures, communication and intercultural communication processes. In addition, communicative strategies for improving intercultural communication discussed.  
RESTRICTIONS: Some sections offered in Madrid, Spain and Costa Rica.

COMM 424 Media Message Analysis  
Examination of methodology used to study media content and effects. Focus on past and ongoing research in broadcast, nonbroadcast and print media. Method of how to conduct and assess research relating to mass media.

COMM 425 Advanced Topics in Politics and Broadcast Journalism  
Topics vary and may include influence of crisis news on national and international politics, effectiveness of political documentaries and ethical and historical underpinnings of broadcast journalism.  
May be cross-listed with POSC425.  
RESTRICTIONS: Open to junior and senior communication majors only. May be repeated for credit when topics vary.

COMM 427 Broadcast News  
Learn pressures and standards of broadcast news while writing and producing a scheduled studio TV program. Emphasis on writing news for broadcast, program story-selection issues, video selection, interviewing techniques, professionalism. Students produce weekly news program in laboratory.  
RESTRICTIONS: Open to communication majors only.

COMM 440 Topics in Interpersonal Communication  
Topics vary and focus on significant areas of theory and research in interpersonal communication. Topics may include nonverbal communication, lifespan communication and communication in intimate relationships.  
May be cross-listed with WOMS440.  
RESTRICTIONS: May be repeated three times for credit when topics vary.

COMM 442 Topics in Organizational Communication  
Focuses on significant areas of theory and research in organizational communication. Topics may include gender, communication, or interpersonal relations in organizations, such as superior/subordinate relationships.  
May be cross-listed with PSYC443 and/or WOMS442.  
RESTRICTIONS: May be repeated for up to nine credits when topics vary.

COMM 444 Global Agenda  
See POSC444 for course description.

COMM 450 Mass Communication Effects  
Examines history and nature of research on effects of mass media, particularly television, in such areas as attitude change, socialization, role modeling and sex and violence.  
PREREQ: COMM370.

COMM 452 Communication and Persuasion  
Examination of how influence created and resisted through communication in various settings, including personal relationships, public relations, advertising and political campaigns. Emphasis on contemporary theories of persuasion and attitude change, with applications to various content areas studied.

COMM 454 Children and the Mass Media  
Mass media research and theory as they relate to children. Substantive areas include children's use and comprehension of media, content of children's television programming, television and the family, children and advertising and media's contribution to social values and roles.

COMM 456 Communication in Organizations  
Introduction to concepts and research related to communication processes in organizational settings. Both traditional and interpretive approaches emphasized.

COMM 466 Independent Study  
1-3

COMM 468 Undergraduate Research in Communication  
Undergraduate research in area of communication conducted on or off campus, out of class, and under supervision of faculty member.  
RESTRICTIONS: Open to junior and senior communication majors only. Requires permission of instructor.

COMM 485 Analysis of Face-to-Face Communication  
Examination of methods for analyzing face-to-face interaction, message construction, and message interpretation.

COMM 486 Multimedia Literacy  
See EDUC485 for course description.

COMM 601 Epistemology and Theory in Communication  
General issues in philosophy of knowledge and science critical for understanding of theoretical conceptions and comprehensive survey of theories in communication.  
RESTRICTIONS: Open to graduate students only.

COMM 603 Communication Research Methods - Procedures  
Introduction to communication research methods including general research procedures, sampling, laboratory research and experimental design, survey research, field research, content analysis and longitudinal research. Includes introduction to using computer in research.  
RESTRICTIONS: Open to graduate students only.

COMM 604 Communication Research Methods - Analysis  
Introduction to tools and techniques of data analysis in communication research including descriptive statistics, hypothesis testing, inferential statistics, as well as advanced statistical procedures.  
RESTRICTIONS: Open to graduate students only.

COMM 609 Public Relations Campaign Planning  
Comprehensive recap of Integrated Marketing Communication function, with emphasis on public relations research, objectives, strategies, integrated tactics, and campaign evaluation. Utilizes small team "service learning" setup, wherein teams adopt a community non-profit organization and work closely with Board and staff members to produce and present comprehensive public relations campaign plan.

COMM 610 Organizational Communication Theory  
Examination of major theories of organizations including functionalist paradigm; interpretive paradigm; neoclassical paradigms (classical, social exchange systems theory and structural systems theory); and modern paradigms (technological systems theory, adaptive systems theory and integrative organizational theory).  
RESTRICTIONS: Open to graduate students only.

COMM 613 Public Relations Management  
Examination of effects of management systems on public relations function and managerial role of public relations practitioner. Includes in-depth analysis of complex cases, preparation of crisis communications plan for non-profit client and several writing projects geared to specific audiences.

COMM 617 Communication and the Management of Conflict  
Overview of communication and the conflict process in face-to-face interaction. Emphasis on theories concerning the structure, analysis, and management of conflict situations.

COMM 618 Topics in Mass Communication  
Current directions in mass communication theory and research, cable television, radio and TV regulations, public policy.  
RESTRICTIONS: May be repeated three times for credit when topics vary.

COMM 621 Intercultural Communication: Applications in International Contexts  
Critically assess current intercultural communication theory and apply that theory to practical situations in various international contexts.  
RESTRICTIONS: Open to graduate students only.

COMM 624 Media Message Analysis  
Examination of methodology used to study media content and effects. Focus on past and ongoing research in broadcast, nonbroadcast and print media. Method of how to conduct and assess research relating to mass media.

COMM 625 Advanced Topics in Political and Broadcast Journalism  
Topics vary and focus on significant areas in politics and broadcast journalism. Topics may include crisis news, political documentaries, broadcast presentations and credibility.  
RESTRICTIONS: Open to graduate students only.

COMM 630 Interpersonal Communication Theory  
Examination of theoretical orientations taken by scholars who study interpersonal relationships as well as a number of focused research areas. Of particular importance is development of an understanding of role of communication in creating and maintaining relationships.  
RESTRICTIONS: Open to graduate students only.
### COMMUNICATION

**COMM 640** Topics in Interpersonal Communication 3
Significant research, theories and literature in communication, research design and theory building.
RESTRICTIONS: May be repeated three times for credit when topics vary.

**COMM 642** Topics in Organizational Communication 3
Significant areas of theory and research in organizational communication. Topics may include gender, communication, or interpersonal relations in organizations, such as superior/subordinate relationships.
RESTRICTIONS: May be repeated for up to nine credits when topics vary.

**COMM 652** Communication and Persuasion 3
Examination of how influence created and resisted through communication in various settings, including personal relationships, public relations, advertising and political campaigns. Emphasis on contemporary theories of persuasion and attitude change, with applications to various content areas studied.

**COMM 654** Children and the Mass Media 3
Mass media research and theory as they relate to children. Substantive areas include children's use and comprehension of media, content of children's television programming, television and the family, children and advertising, and media's contribution to social values and roles.
RESTRICTIONS: Open to graduate students only.

**COMM 656** Communication in Organizations 3
Introduction to concepts and research related to communication processes in organizational settings. Both traditional and interpretive approaches emphasized.

**COMM 657** Children, Television and Education 3
Issues relating to education, academic achievement, and development of critical viewing skills; media and comprehension; content of children's television programming and advertising directed toward children; and media's contribution to social values and roles; development of critical viewing skills curriculum. May be cross-listed with EDUC657.

**COMM 664** Internship 1-6
Provides practical, on-the-job training in the field of interest, i.e., interpersonal, mass media, public relations or organizational communication.
RESTRICTIONS: Open to graduate students only.

**COMM 670** Mass Communication Theory 3
Examination of theories of mass communication focusing upon media, society and individual; sociocultural influences; social context of broadcast media; theories relating to effects of media violence; personal influence; social learning theory; diffusion theory; and media effects.
RESTRICTIONS: Open to graduate students only.

**COMM 685** Analysis of Face-to-Face Communication 3
Examination of methods for analyzing face-to-face interaction, message construction, and message interpretation.

**COMM 686** Multimedia Literacy 3
See EDUC685 for course description.

**COMM 868** Research 1-12

**COMM 869** Master's Thesis 1-6

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### COMPUTER ENGINEERING

**CPEG 202** Introduction to Digital Systems 3
Analysis and design of logic circuits. Topics include: Boolean algebra and its application to switching circuits, simplification of switching functions, design of logic circuits at gate level and with MSI and LSI components. Analysis and design of synchronous and asynchronous sequential state machines.

**CPEG 210** Introduction to Combinational Logic 2
Boolean algebra and its application to logic circuits. Simplification of switching functions. Gate level design of circuits to implement logic functions and design with MSI and LSI components.

**CPEG 211** Introduction to Sequential Circuits 2
Analysis and design of asynchronous sequential logic circuits, synchronous sequential machines and algorithmic state machines.

**CPEG 220** Microprocessor Based Systems I 2
Introduction to small computing machines including the architecture, organization and programming of microprocessors. Emphasizes basic machines language and assembly language coding.
PREREQ: CPEG211 and CISC181.

**CPEG 221** Microprocessor Based Systems II 2
Extension of CPEG220 with emphasis on Input/Output, interrupt systems and interfacing of microprocessor systems. Project required that includes design and implementation of microprocessor based system with external interfacing.
PREREQ: CPEG220.

**CPEG 222** Microprocessor Systems 4
Introduction to microprocessors as embedded devices. Emphasizes Input/Output techniques, interrupts, real-time operation, high-level code debugging and interfacing to various types of sensors and actuators. Projects that address various embedded applications are a major part of course.
PREREQ: CPEG202.

**CPEG 323** Introduction to Computer Systems Engineering 3
General purpose, special purpose and embedded computer architecture are studied. Principles of digital system design are introduced including an introduction to tools for automated design and the use of programmable logic devices.
PREREQ: CPEG222.

**CPEG 324** Computer Systems Design I 3
Studies principles of computer system design emphasizing tradeoffs involving cost, performance, testability, reliability and manufacturability. Topics include timing analysis, component and subsystem interconnect, noise effects debugging techniques, boundary scan testing and printed circuit layout. Laboratory work involves design and implementation of computer subsystem.
PREREQ: CPEG323.

**CPEG 409** Signals and Communication Design I 4
See ELEG409 for course description.
PREREQ: ELEG305 and CISC181.

**CPEG 410** Signals and Communications Design II 4
See ELEG410 for course description.
PREREQ: ELEG306 or ELEG403 or ELEG413.

**CPEG 419** Computer Communication Networks 3
Introduction to computer communication networks based on circuit switching and on packet switching. Layered architectures and layer protocols described and models developed to analyze network performance. Other topics include multiple access, local area networks and integrated networks.
PREREQ: ELEG310.

**CPEG 420** Computer Network Design and Management 3
Introduces data networks and telecommunications, with emphasis on practical design and engineering. Covers fundamental computer and voice networking, aided by case studies and hands-on laboratories. Explores standards, protocols, current tools and technologies. Examines issues such as security, convergence, wireless, IPv6 and network management.

**CPEG 421** Compiler Design 3
Introduction to compiler design, syntax and semantics, code generation and optimization. Design of high performance computers together with high performance optimizing compilers as an integral unit. Software/hardware tradeoffs in pipelined computers, superscalar computers and computers embedded in other systems.
PREREQ: CPEG323 and CISC361.

**CPEG 422** Computer Systems Design II 4
Examines modern digital computer design methods using industry standard electronic CAD synthesis tools. Topics include hardware design using VHDL, logic synthesis tools, simulation methods for synthesis and efficient coding techniques for synthesis. Includes experimental laboratory work to design and evaluate FPGA-based digital computer hardware.
PREREQ: CPEG324 and CISC361.

**CPEG 460** Introduction to VLSI Systems 4
Study of CMOS VLSI devices, circuits and systems implemented in VLSI. CAD tools for design and simulation of VLSI. Topics include performance and limitations of VLSI systems, low level circuit design and system design with emphasis on digital systems. Major chip design project required.
PREREQ: ELEG312.

**CPEG 490** Career Skills for Engineers 1
Covers variety of skills engineers need in their careers, including ethics, need for life-long learning, societal and global impact of engineering solutions, teaming and team dynamics, resume writing, interviewing and communications. May be cross-listed with ELEG490.
RESTRICTIONS: Open to engineering seniors, or by permission of instructor.
CPEG 621 Compiler Design 3
Introduction to compiler design, syntax and semantics, code generation and optimization. Design of high performance computers together with high performance optimizing compilers as an integral unit. Software/hardware tradeoffs in pipelined computers, super-scaler computers and computers embedded in other systems. PREREQ: CPEG323 and CISC361.

CPEG 622 Computer System Design II 3
Examines modern digital computer design methods using industry standard electronic CAD synthesis tools. Topics include hardware design using VHDL, logic synthesis tools, simulation methods for synthesis, and efficient coding techniques for synthesis. Includes experimental laboratory work to design and evaluate FPGA-based digital computer hardware. PREREQ: CPEG324 and CISC361.

CPEG 630 Neurons and Networks 3
See PSYC630 for course description. PREREQ: Senior standing or graduate student standing.

CPEG 660 Introduction to VLSI Systems 4
Study of CMOS VLSI devices, circuits and systems implemented in VLSI. CAD tools for design and simulation of VLSI. Topics include performance and limitations of VLSI systems, low level circuit design and system design with emphasis on digital systems. Major chip design project required. PREREQ: CPEG221 and ELEG312.

CPEG 810 Telecommunications and Networks I 3
Leadership skills in information technology, telecommunications and internet technology for technology management. Introduces concepts in data and image compression, digital audio and digital cellular telephony. Provides fundamental knowledge of transmission and storage technology and system-level understanding of computer networks and internet. May be cross-listed with MISY810.
RESTRICTIONS: Preference given to students in the M.S. in Information Systems and Technology Management program.

CPEG 811 Telecommunications and Networks II 3
Considers technology trends and their impact on industry and global economy. Topics include convergence of computation and communications; emerging standards in high-capacity cellular telephony; impact of global positioning systems on business applications; and future capabilities of the internet. May be cross-listed with MISY811.
COREQ: CPEG810. May also be taken as prerequisite.
RESTRICTIONS: Preference given to students in the M.S. in Information Systems and Technology Management Program.

CRJU 110 Introduction to Criminal Justice 3
Responses in American society to problems of crime. Examines criminal behavior, criminal law, the police, courts and corrections, as well as selected issues in criminal justice.

CRJU 120 Illicit Drug Use in America 3
Nature and extent of illicit drug use in United States and sociocultural context. History and effects of major drugs of abuse and social issues since 1950s that contributed to increased use of illicit drugs.

CRJU 134 Great Crimes 3
Examines realities of securing justice in light of crimes that have generated intense interest and critical analysis (Lindbergh kidnapping, Rosenberg spy case, etc.) Using case study method, contrasts made and comparisons drawn among changing legal norms, investigative techniques and public attitudes toward crime.

CRJU 201 Problems of Law Enforcement 3
Introduction to range of historical, political, philosophical and sociological problems in institutions vested with responsibility to enforce laws and/or preserve order.

CRJU 202 Problems of Criminal Judiciary 3
Focuses on problems and issues found in American criminal court system. Includes judicial procedure, organization, judicial personnel and basic criminal law.

CRJU 203 Problems of Corrections 3
General overview of American corrections system and survey of most pressing correctional problems of twenty-first century. Philosophy of punishment extensively discussed. Major emphasis on nature of the prison experience, alternatives to incarceration, judicial intervention in correctional affairs and controversy over efficacy of rehabilitation programs.

CRJU 301 Introduction to Legal Studies 3
See LEST301 for course description.

CRJU 302 Social Deviance 3
See SOCI302 for course description.

CRJU 303 Juvenile Delinquency 3
See SOCI303 for course description.

CRJU 304 Criminology 3
See SOCI304 for course description.

CRJU 311 Capital Punishment and the Law 3
Overview of law of capital punishment. Emphasizes United States Supreme Court's major death-penalty decisions and effects of these decisions. PREREQ: CRJU110 or CRJU203.

CRJU 312 History of Crime and Criminal Justice 3
Examines changing perceptions of criminal and deviant behavior and development of laws, institutions, and social policies to counteract crime from seventeenth century to present. May be cross-listed with HIST312.

CRJU 313 The Study of Murder 3
Historical and contemporary analysis of criminal homicide, examining nature and extent of murder, including those related to assassination and war.

CRJU 320 Introduction to Criminal Law 3
Analysis of evolution of criminal law within larger societal context, and overview of basic structure and administration of criminal law in United States. PREREQ: CRJU110.

CRJU 322 Crowds, Cults and Revolutions 3
Survey of development of judicial review since Reconstruction, emphasizing Supreme Court's response to urbanization and industrialization, growth of executive authority, and extension of civil rights and civil liberties in twentieth century. May be cross-listed with HIST322.

CRJU 324 American Constitutional History 3
Investigates patterns and causes of violence in America, including crimes such as homicide, rape, assault, and domestic abuse and collective violence such as terrorism. Examines social control of violence, including adjudication within criminal justice system. Places trends of violence in cross-national perspective.

CRJU 332 Criminal Violence in America 3
Investigates patterns and causes of violence in America, including crimes such as homicide, rape, assault, and domestic abuse and collective violence such as terrorism. Examines social control of violence, including adjudication within criminal justice system. Places trends of violence in cross-national perspective.

CRJU 333 Crime and Justice in Film and Literature 3
Examines issues and ideologies found in noteworthy American and international films and writings that emphasize themes of justice, punishment, and social control. Contrasts cinematic and literary depictions of these themes with empirical research on criminality, violence, victimization, and practices of criminal justice institutions.

CRJU 336 The Detective in Film and Fiction 3
Study of detective fiction and film has applications to liberal arts approach to crime and justice. Blends literary analysis with insights of social science research on work of private and police detectives. May be cross-listed with ENGL330 and/or SOC1336.
PREREQ: CRJU201.

CRJU 340 The Juvenile Justice System 3
In-depth view of juvenile justice system in United States focusing on crime patterns, police-juvenile relations, juvenile courts and correctional practices.

CRJU 345 Sociology of Law 3
See SOCI345 for course description.

CRJU 346 Psychology and the Law 3
Seminar exploring rapidly expanding field of psychology and law. Review and discussion of psychological research on such topics as adversary system, jury selection, eyewitness testimony, insanity defense, perceptions of crime and death penalty. May be cross-listed with PSYC346.

CRJU 350 Gender and Criminal Justice 3
Reviews historical and contemporary explanations for women's participation in crime and evaluates these explanations in light of current research on gender. Other topics include treatment of women offenders by judicial and correctional systems, women as victims of crime and women as criminal justice personnel. May be cross-listed with WOMS350.
CRJU 351  COMPARATIVE CRIMINAL JUSTICE SYSTEMS  3
Study of different criminal justice systems across the world including discussions of their approaches to law, policing, courts, and corrections, common law, civil law, Islamic traditions as well as others.

CRJU 352  INTERNATIONAL CRIMINAL JUSTICE  3
Introduction to basic structures of international criminal justice system including international and transnational crime, international courts, transnational policing, and international criminal law.

CRJU 355  INEQUALITY, CRIME AND JUSTICE  3
Introduction to challenges in addressing crime in multiracial, multiethnic, class-stratified society. This context serves as backdrop for inquiry into crime causation, operations of the criminal justice system, and experiences of relevant actors. May be cross-listed with BAMS355 and/or SOCI355.

CRJU 357  SEMINAR ON THE POLICE  3
Teaches students to criticize and analyze research and theory in scholarly literature on policing.

CRJU 366  INDEPENDENT STUDY  1-6
Independent research under supervision of faculty member. Requirements include preparation of research report consistent with professional literature in the field. Student and faculty member file a learning contract describing the research and a report with department chair.

CRJU 368  INDEPENDENT RESEARCH  1-6
Independent research under supervision of faculty member. Requirements include preparation of research report consistent with professional literature in the field. Student and faculty member file a learning contract describing the research and a report with department chair.

CRJU 369  ALCOHOL, DRUGS AND CRIME  3
Examines relationship between alcohol, drugs and crime, including societal response to offenders who commit alcohol/drug related offenses and offenders who engage in crime over drug markets. May be cross-listed with SOCI369.

CRJU 370  PRISON AND PRISON SUBCULTURES  3
Provides intensive examination of culture and lifestyles of prisoners. Special emphasis on how gender and race contribute to differential patterns of adjustment to incarceration. Mainly examines how prisoner subculture contributes to racial conflict, violence and mental health crises among prisoners.

CRJU 375  CRIMINAL PROCEDURE  3
Intensive analysis of criminal court procedures that occur once case actually brought against an accused. Emphasis on trial tactics and procedures.

CRJU 409  DOMESTIC VIOLENCE SERVICES  3
See IFST409 for course description.

CRJU 411  HATE CRIMES  3
New to the legal vernacular, hate crimes have become problems of law and justice that have received increased political, academic, and public attention. Explores causes and constitutional issues revolving around hate crime and resulting laws.

CRJU 414  DATA ANALYSIS  3
See SOCI414 for course description.

CRJU 420  CRIMINAL JUSTICE ADMINISTRATION  3
Aids those planning career as administrator in criminal justice system. Topics typically include basic administrative policy and budgetary matters.

CRJU 425  CRIMINAL LAW AND SOCIAL POLICY  3
Analyzes role of American judiciary in making social policy and examines manner in which courts have adjudicated controversial socio-legal issues. Topics typically include capital punishment, abortion, the right to privacy, search and seizure, Miranda rule, and freedom of speech and press.

CRJU 428  CORPORATE CRIME  3
See SOCI428 for course description.

CRJU 435  PUNISHING SPEECH  3
Examines use of criminal law and other regulatory sanctions to punish certain types of speech and efforts of courts to determine which speech is deserving of constitutional protection and therefore beyond governmental control.

CRJU 437  SEMINAR ON CORRECTIONS  3
In-depth examination of central topics in corrections including philosophy of punishment, history of punishment; structure and change of correctional settings and programs; and prison reform.

CRJU 444  CAPITAL PUNISHMENT AND AMERICAN CULTURE  3
Over time, American values about crime, law, and order have come to shape politics and therefore the penalty of death. Explores the death penalty in the public consciousness and in practice.

CRJU 446  JUDGING THE JURY  3
Examines and evaluates institution of the jury. Explores contemporary controversies over the jury by review and analysis of research studies on jury decision making.

CRJU 448  COMMUNITY-BASED TREATMENT  3
See SOCI448 for course description.

CRJU 450  PRISONERS AND THE LAW  3
Examination of legal rights available to prisoners seeking to challenge their convictions or their conditions of confinement. Emphasis on analyzing capacity of courts to spur prison reform and impact of court decisions on American penal practices.

CRJU 452  DRUGS AND THE CRIMINAL JUSTICE SYSTEM  3
Covers both drug and criminal justice issues, focusing on drugs-crime nexus and criminal justice system response. Examines issues of race, gender, victimization, international policy, and new policy responses including drug treatment, harm reduction, and restorative justice. May be cross-listed with SOCI452.

CRJU 456  LAWYERS AND SOCIETY  3
See SOCI456 for course description.

CRJU 457  CRIMINAL EVIDENCE  3
Study of laws of evidence, how they are used in the criminal courts, and their effect on administration of justice.

CRJU 460  CRIMINAL JUSTICE POLICY  3
Critical examination of criminal justice policy in United States over past thirty years, with emphasis on major theoretical positions that have dominated criminal justice policy making during that period.

CRJU 466  INDEPENDENT STUDY  1-6
Examines relationship of social science to law and the legal process, how social science has contributed to our understanding of law, and how social science has been employed in litigation. May be cross-listed with JEST475.

CRJU 470  CRIMINAL LAW AND SOCIAL POLICY  3
Examines role of American judiciary in making social policy and examines manner in which courts have adjudicated controversial socio-legal issues. Topics typically include capital punishment, abortion, the right to privacy, search and seizure, Miranda rule, and freedom of speech and press.

CRJU 475  SOCIAL SCIENCE AND THE LAW  3
Examines relationship of social science to law and the legal process, how social science has contributed to our understanding of law, and how social science has been employed in litigation. May be cross-listed with JEST475.

CRJU 480  CIVIL LIABILITY IN CRIMINAL JUSTICE  3
Examines circumstances under which law provides remedies for individuals harmed by agents of government. May also include discussion of use of civil remedies, such as asset forfeiture, to complement criminal prosecutions.

CRJU 489  CRIME VICTIMS AND VICTIMS' RIGHTS  3
Examines victim-offender relationships, interactions between victims and criminal justice system, and connections between victims and other social groups and institutions (such as the media, social movements, advocacy groups, legislatures and the state). Explores victims' rights and compensation, fear of crime, measurement of victimization and impact of victimization on the individual.

CRJU 490  DRUG ABUSE RESEARCH SEMINAR  3
Concentrated examination of contemporary efforts in areas of drug abuse legislation, enforcement and research, and how these combine to influence prevention, treatment and control strategies.

CRJU 495  FIELD EXPERIENCE IN CRIMINAL JUSTICE  4 PF
Practicum involving actual field experience in a criminal justice agency, e.g., law enforcement, courts or correctional agencies. Emphasis on relating field experience to academic work. May be cross-listed with SOCI495.

CRJU 496  PRACTICUM IN TEACHING  1-3 PF
Practical exposure to undergraduate education gained by assisting a member of the faculty in carefully supervised experiences such as discussion leader, crafting questions, consulting with students. Students may not be involved in grading of student work or assignment of grades. May be repeated for up to three credit hours.

CRJU 497  PRACTICUM IN TEACHING  1-3 PF
Practical exposure to undergraduate education gained by assisting a member of the faculty in carefully supervised experiences such as discussion leader, crafting questions, consulting with students. Students may not be involved in grading of student work or assignment of grades. May be repeated for up to three credit hours.

CRJU 498  PRACTICUM IN TEACHING  1-3 PF
Practical exposure to undergraduate education gained by assisting a member of the faculty in carefully supervised experiences such as discussion leader, crafting questions, consulting with students. Students may not be involved in grading of student work or assignment of grades. May be repeated for up to three credit hours.
### Early American Culture

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>EAMC 602</td>
<td>Material Life in Early America</td>
<td>3</td>
</tr>
<tr>
<td>EAMC 605</td>
<td>History of Theories in Material Culture</td>
<td>3</td>
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<tr>
<td>EAMC 606</td>
<td>Issues in American Material Culture</td>
<td>3</td>
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<tr>
<td>EAMC 671</td>
<td>Connoisseurship of the Decorative Arts in America I</td>
<td>1-3</td>
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<tr>
<td>EAMC 672</td>
<td>Connoisseurship of the Decorative Arts in America II</td>
<td>1-3</td>
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<tr>
<td>EAMC 673</td>
<td>Connoisseurship of the Decorative Arts in America III</td>
<td>1-3</td>
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<tr>
<td>EAMC 801</td>
<td>Introduction to Decorative Arts in America to 1860</td>
<td>3</td>
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<tr>
<td>EAMC 869</td>
<td>Master's Thesis</td>
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### East Asian Studies

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<tr>
<td>EAST 136</td>
<td>Topics in East Asia in Film</td>
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### Economics

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<tr>
<td>ECON 100</td>
<td>Economic Issues and Policies</td>
<td>3</td>
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<tr>
<td>ECON 102</td>
<td>Civics and Economics for Teachers</td>
<td>3</td>
</tr>
<tr>
<td>ECON 141</td>
<td>Swedish Economics: A Survey</td>
<td>2</td>
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<tr>
<td>ECON 151</td>
<td>Introduction to Microeconomics: Prices and Markets</td>
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<td>ECON 152</td>
<td>Introduction to Macroeconomics: The National Economy</td>
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<td>ECON 251</td>
<td>Managerial Economics</td>
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<td>ECON 300</td>
<td>Intermediate Microeconomic Theory</td>
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<td>ECON 301</td>
<td>Quantitative Microeconomic Theory</td>
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<tr>
<td>ECON 302</td>
<td>Banking and Monetary Policy</td>
<td>3</td>
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<tr>
<td>ECON 303</td>
<td>Intermediate Macroeconomic Theory</td>
<td>3</td>
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<td>ECON 305</td>
<td>Comparative Economic Systems</td>
<td>3</td>
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<tr>
<td>ECON 306</td>
<td>Economic Theory of Politics</td>
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<tr>
<td>ECON 311</td>
<td>Economic Issues of Developing Countries</td>
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<tr>
<td>ECON 315</td>
<td>Economic History of Colonial America</td>
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<tr>
<td>ECON 316</td>
<td>Economic History of the United States</td>
<td>3</td>
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</table>
ECON 322  ECONOMICS OF GOVERNMENT SPENDING AND TAXATION  3
Microeconomic and macroeconomic analysis of public expenditure, borrowing and taxation. Introduction to stabilization, efficiency and distributional features of public finance.
PREREQ: ECON151.
RESTRICTIONS: ECON332 and ECON433 cannot both count for degree credit.

ECON 333  CURRENT READINGS IN ECONOMICS  3
Books on controversial economic topics such as the Asian financial crisis, income distribution in America, environmental regulation, economic aid to developing countries, healthcare reform, privatizing Social Security and education vouchers are studied. Student papers and discussion form essence of class sessions.
PREREQ: ECON151.

ECON 340  INTERNATIONAL ECONOMICS  3
Theory, problems and policy in international trade and finance with emphasis on developments since World War II.
PREREQ: ECON151 and ECON152.
RESTRICTIONS: ECON340 cannot be taken for credit after ECON441 and/or ECON443.

ECON 341  ENVIRONMENT OF MULTINATIONAL CORPORATIONS  3
See BUAD341 for course description.

ECON 343  ENVIRONMENTAL ECONOMICS  3
See FREC343 for course description.

ECON 345  ECONOMIES IN TRANSITION  3
Analyzes the economic transition taking place in twenty eight countries in Europe and Asia. Provides a general picture of the historical development of these economies under central planning and analyzes the successes and failures of the transition programs in these countries.
PREREQ: ECON151.

ECON 350  ECONOMICS OF ENTREPRENEURSHIP  3
Analyzes impact of economic environment on behavior and development of new businesses. Reviews economic forces that influence new and developing businesses, including role of public policy. Requires development of a business plan which carefully considers economic factors most relevant to the proposed business.
PREREQ: ECON151.

ECON 360  GOVERNMENT REGULATION OF BUSINESS  3
Normative, economic and legal foundations of government intervention in business, particularly antitrust and regulation; and process and effects of government policies.
PREREQ: ECON151.

ECON 364  ECONOMICS IN PRACTICE  3
Requires completion of at least 120 hours of an economics-related internship with verification by the hiring company. Term paper relating real-world duties and experiences of internship to principles learned in standard economics courses also expected.
PREREQ: ECON300/301 or ECON303.
RESTRICTIONS: Requires permission of instructor.

ECON 366  INDEPENDENT STUDY  1-6

ECON 381  ECONOMICS OF HUMAN RESOURCES  3
Analysis of labor markets and of the family. Topics include labor supply and demand, human capital, labor market discrimination, distribution of income and theories of fertility and family structure. Public policy applications stressed.
PREREQ: ECON151.
RESTRICTIONS: ECON381 and ECON483 cannot both count for degree credit.

ECON 385  WOMEN AND THE ECONOMY  3
Examines wide range of economic issues relating to women’s lives, with special emphasis on family, work and income. Public policy applications and international comparisons are stressed.
May be cross-listed with WOMS385.
PREREQ: ECON151.

ECON 390  ECONOMICS OF HEALTHCARE  3
Introduction to United States healthcare system. Analysis of existing policies and proposals. Examines roles of markets and government. Topics include costs, quantity and quality of healthcare systems, managed care and alternative delivery systems.
PREREQ: ECON151.
RESTRICTIONS: ECON390 and ECON490 cannot both count for degree credit.

ECON 393  URBAN ECONOMICS  3
Uses simple microeconomic analysis to explain why cities exist, where they develop, how they grow, and how different activities are arranged within cities. Explores economics of urban problems and policies related to local governments, land rent and land use patterns, poverty, housing, transportation, education, and crime.
PREREQ: ECON151.
ECON 441 INTERNATIONAL TRADE 3
Focuses on international trade theory and policy, and exchange rates. Topics include trade based on competitive advantage and economics of scale and imperfect competition, international factor movements, tariffs, quotas, export subsidies, customs unions, current account deficits, purchasing power parity, and fixed versus flexible exchange rates.
PREREQ: ECON300 or ECON301 or ECON251.

ECON 442 ECONOMICS OF ENVIRONMENTAL MANAGEMENT 3
See FREC444 for course description.

ECON 443 INTERNATIONAL MONETARY ECONOMICS 3
Applies macroeconomic theory in an international context. Uses historical cases to analyze policy making under fixed and flexible exchange rates. Develops alternative models of exchange rate dynamics. Discusses problems and proposed reforms of international monetary system.
PREREQ: ECON300 or ECON301, and ECON203.

ECON 461 INDUSTRIAL ORGANIZATION AND ANTITRUST POLICY 3
Describes and analyzes markets in terms of structure, methods of competition and social performance, particularly oligopolistic and differential competition. Stresses entrepreneurship, innovation and government competition policy, particularly antitrust.
PREREQ: ECON251, ECON300 or ECON301; and MATH202 and MATH221.

ECON 463 THE ECONOMICS OF REGULATION 3
Analyzes government regulation of industry and its economic rationale, pricing issues, firm incentives and multi-product natural monopolies. Discusses the positive theory of regulation and industry studies, with emphasis on efficiency and regulatory reform.
PREREQ: ECON251, ECON300 or ECON301; and MATH221 or MATH241.
RESTRICTIONS: ECON360 and ECON463 cannot both count for degree credit.

ECON 465 TRANSPORTATION ECONOMICS 3
Applies microeconomics theory to analysis of modes of passenger transportation with special emphasis on planes, trains, and automobiles. Empirical analysis of transportation data used to examine policy choices in transportation sector.
PREREQ: ECON251, ECON300 or 301; and ECON422.

ECON 466 INDEPENDENT STUDY 1-6

ECON 468 INTERNET ECONOMICS 3
Explores internet markets and strategic interactions between participants in these markets. Applies microeconomic theory to investigate sources of competitive advantage and monopoly power, pricing practices, network structure and network externalities, technological standards, copyright, and other economic issues relevant to the internet and e-commerce.
PREREQ: ECON251, ECON300 or ECON301.

ECON 471 FUTURES AND OPTION MARKETS 4
See FREC471 for course description.

ECON 483 ECONOMICS OF LABOR MARKETS 3
Analyzes economic models of labor market topics - sex and race discrimination, determination of wages and fringe benefits, labor unions, individual and firm investments in education and training, geographical mobility, labor supply, and professional sports.
PREREQ: ECON251, ECON300 or ECON301.

ECON 490 ECONOMICS OF HEALTH POLICY 3
Theoretical analysis of healthcare issues and policies. Examination of changing relationships between patients, providers, hospitals, insurers, employers, communities and government. Analysis of spending policies, cost containment, hospital competition, care of elderly, Medicare, Medicaid, managed care regulation, medical malpractice and provider (physician) manpower planning.
PREREQ: ECON251, ECON300 or ECON301.
RESTRICTIONS: ECON390 and ECON490 cannot both count for degree credit.

ECON 503 ECONOMIC ANALYSIS FOR BUSINESS POLICY 3
Business-oriented overview of microeconomic and macroeconomic theory. Approximately two-thirds to focus on microeconomics and one-third on macroeconomics.
RESTRICTIONS: Cannot be taken for credit by economics graduate students.

ECON 530 OPTIMIZATION AND GAME THEORY 3
See MATH330 for course description.
PREREQ: MATH302, MATH349, ECON301 and ECON303.

ECON 540 INTERNATIONAL ECONOMICS FOR MANAGERS 3
Survey of international economic issues relevant to managers operating in a global context.
PREREQ: ECON503 or instructor permission required.

ECON 551 MANAGERIAL ECONOMICS 3
Employs microeconomic theory and analysis to enhance managerial decision-making. Emphasizes development and analysis of economic models to understand different market environments in which firms operate. Special attention paid to effects of antitrust policy, government regulation, and international trade policy.
PREREQ: MATH221.

ECON 552 MACROECONOMIC ENVIRONMENT OF THE FIRM 3
Focuses on formal modeling of macroeconomic activity. Special attention given to short-run and long-run effects of monetary and fiscal policies on national output, economic growth, inflation, interest rates, business capital expenditures, exchange rates, and foreign trade.

ECON 668 RESEARCH 1-3

ECON 670 APPLIED POLICY ANALYSIS 3
See MAST672 for course description.

ECON 671 MICROECONOMICS FOR ECONOMIC EDUCATORS 3
Studies supply and demand, theory of price determination in perfectly and imperfectly competitive markets and role of government in the economy. Emphasizes applications such as industrial regulation antitrust policy, environment and taxation.
RESTRICTIONS: Requires enrollment in Master of Arts in Economics for Educators.

ECON 672 MACROECONOMICS FOR ECONOMIC EDUCATORS 3
Includes national income accounting, theory of income determination, monetary and fiscal policies, budget deficits and surpluses, and national debt.
RESTRICTIONS: Requires enrollment in Master of Arts in Economics for Educators.

ECON 673 CURRICULUM STRATEGIES FOR ELEMENTARY ECONOMIC EDUCATORS 3
Curriculum applications incorporating proper treatment of economic concepts at elementary level. Strategies include techniques of motivation, training and reinforcement.
RESTRICTIONS: Requires enrollment in Master of Arts in Economics for Educators.

ECON 674 CURRICULUM STRATEGIES FOR SECONDARY ECONOMIC EDUCATORS 3
Curriculum applications incorporating proper treatment of economic concepts at secondary level. Strategies include techniques of motivation, training and reinforcement.
RESTRICTIONS: Requires enrollment in Master of Arts in Economics for Educators.

ECON 675 ECONOMICS OF NATURAL RESOURCES 3
See MAST675 for course description.

ECON 676 ENVIRONMENTAL ECONOMICS 3
See MAST676 for course description.

ECON 677 PRACTICUM IN ECONOMIC EDUCATION 1-6
Research and analysis of public policy issues. Projects must demonstrate applicability to economic education.
RESTRICTIONS: Requires enrollment in Master of Arts in Economic Education.

ECON 678 MONETARY AND INTERNATIONAL TRADE THEORIES FOR ECONOMIC EDUCATORS 3
Studies international trade, free trade vs. protectionism, cartels, balance of trade and payments, role of the financial sector, and monetary policy.
RESTRICTIONS: Requires enrollment in Master of Arts in Economics for Educators.

ECON 679 CONTEMPORARY ISSUES FOR ECONOMIC EDUCATORS 3
Emphasizes contemporary economic issues, problems and controversies.
RESTRICTIONS: Requires enrollment in Master of Arts in Economics for Educators.

ECON 801 MICROECONOMIC THEORY 3
Analyzes consumer behavior and market demand, production, costs and the theory of the firm; market structures and competition in open and closed markets, general equilibrium theory and welfare economics.

ECON 802 MACROECONOMIC THEORY 3
Studies determination of output, employment, and price level within classical, neoclassical, and contemporary frameworks; analyzes effects of fiscal and monetary policy within these alternative frameworks, and examines determinants of economic growth.

ECON 805 GAME THEORY FOR ECONOMISTS 3
Study of theory of games with complete and incomplete information in both static and dynamic contexts with applications to economic problems, primarily in areas of labor economics, economics of information and uncertainty, international trade and macroeconomics.
PREREQ: ECON801 or equivalent.

387
ECON 808 UNITED STATES ECONOMIC HISTORY 3
Topics where economic analysis has revolutionized interpretation of United States history are explored. Topics vary by semester, but may include: market for immigrant servants; economics of slavery; impact of railroads; gender discrimination; post-bellum Southern economic failure. PREREQ: MATH202 or equivalent. COREQ: ECON801.

ECON 810 MATHEMATICS FOR ECONOMISTS 3
Introduces fundamental mathematical tools utilized in theoretical economic analysis. Topics include basic set theory and real analysis, optimization in both static and dynamic environments, linear algebra, difference and differential equations and probability theory. Use of these tools in constructing and analyzing economic models is emphasized.

ECON 811 ADVANCED MICROECONOMIC ANALYSIS 3
Prepares doctoral students with microeconomic and mathematical tools needed to read the literature and perform original research. Focuses on producer and consumer theory, general equilibrium, welfare economics, and game theory. Additional topics include: uncertainty, time, stability, social choice, core theory, information, public goods, and externalities. PREREQ: ECON801.

ECON 812 ADVANCED MACROECONOMIC ANALYSIS 3
Examines recent research and literature in macroeconomics. Topics include capital accumulation and economic growth, unemployment, inflation, financial markets, the open economy and international monetary economics, economic fluctuations, stabilization policy, fiscal policy, monetary and banking policy. Intended for doctoral students. PREREQ: ECON802.

ECON 815 MANAGERIAL FORECASTING 3
Reviews quantitative methods commonly used in forecasting within a business and economics environment, including causal and time series techniques. Emphasizes use and evaluation of techniques rather than their mathematical derivation. Economic theory integrates with statistical techniques providing forecasts of series such as prices, sales, inventories and costs. PREREQ: MATH202.

ECON 819 ECONOMICS OF INFORMATION 3
Extends basic economic paradigms to incorporate and assess impact of imperfect information. Topics include analysis of principal-agent relationships with applications to insurance markets and signaling product quality, auctions, consumer search behavior, and an introduction to game theoretic models of economic behavior. PREREQ: ECON801 or ECON802.

ECON 820 ECONOMETRIC THEORY 3
Applies and modifies statistical techniques to economic data; presents essentials of econometric theory. PREREQ: MATH202 or STAT371.

ECON 823 SEMINAR IN ECONOMETRICS 3
Class discussion and research in advanced economic statistics and applied econometrics. PREREQ: ECON822.

ECON 824 TOPICS IN ADVANCED ECONOMETRICS 3
Econometric techniques used in applied microeconomic analysis. Cross-section techniques, limited dependent variables, panel data analysis. Additional topics may also be covered. Intended for doctoral students. PREREQ: ECON822 and ECON823 or equivalent.

ECON 825 TIME-SERIES ECONOMETRICS 3
Introduction to time-series methods, including modeling multivariate systems. Development of methods to test and insure goodness-of-fit of time-series models. Additional topics may also be covered. Intended for doctoral students. PREREQ: ECON822 and ECON823 or equivalent.

ECON 827 ADVANCED PRODUCTION ECONOMICS 3
See FREC827 for course description.

ECON 832 PUBLIC FINANCE 3
Examines recent research and literature in public finance. Topics include public goods, public choice, externalities and environmental policy, expenditure programs for the poor, social insurance, social security, health insurance, unemployment insurance, cost/benefit analysis, tax incidence, optimal taxation. COREQ: ECON801.

ECON 841 INTERNATIONAL TRADE AND DEVELOPMENT 3
Covers basis of exchange, trade policy, international factor movements and integration. Applications to both historical and current economic development. PREREQ: ECON801 or ECON802.

ECON 842 INTERNATIONAL FINANCE AND DEVELOPMENT 3
Continues ECON841. Covers foreign exchange markets, balance of payments, exchange rate systems and international economic policy. PREREQ: ECON852 or ECON802 or equivalent.

ECON 846 TOPICS IN ECONOMIC DEVELOPMENT 3
Topics of current interest to economists, such as labor markets, populations, human capital and income distribution in less developed countries. Additional or substitute topics may also be covered. COREQ: ECON801 (ECON822 is recommended).

ECON 852 MONETARY ECONOMICS 3
Compares the role of money in various macroeconomic models: transactions demand for money, long term effects of inflation and government deficit finance decisions in intertemporal models, capital theory and pricing of financial securities as well as theories of term structure of interest rates. PREREQ: ECON852 or ECON802 or equivalent.

ECON 861 INDUSTRIAL ORGANIZATION AND ANTITRUST POLICIES 3
Analyzes industrial markets in terms of structure, competition and performance, with concentration on oligopolistic and differentiated competition, statistical relationships between profits and concentration, entrepreneurship and hierarchy, and innovation. Also discusses government antitrust policies to promote competition. PREREQ: ECON851 or ECON801 or equivalent.

ECON 862 ECONOMICS OF REGULATION 3
Economic rationale for government regulation of industries. Regulatory mechanisms to induce optimal behavior. Case studies of transportation, telecommunications and electric utility industries with empirical applications. COREQ: ECON801, ECON822 or equivalent.

ECON 868 RESEARCH 1-9

ECON 869 MASTER'S THESIS 1-6

ECON 875 ADVANCED FISHERY ECONOMICS 3
See MAST875 for course description.

ECON 877 ADVANCED BENEFIT-COST ANALYSIS 3
Covers topics in labor economics, including labor demand, labor supply, discrimination. Applications to public policy issues stressed throughout. COREQ: ECON801.

ECON 880 LABOR ECONOMICS 3
Covers topics in labor economics, including labor demand, labor supply, investment in human capital, wage determination, and labor market discrimination. Applications to public policy issues stressed throughout. COREQ: ECON801, ECON822 or equivalent.

ECON 890 COLLOQUIUM: ECONOMICS SEMINAR SERIES 0 PF
Regularly-scheduled lectures by faculty and visiting researchers providing exposure to current research in economics.

ECON 894 APPLIED REGIONAL MODELING 3
Uses quantitative methods to forecast regional economic phenomena. Methods include regional export base, shift-share, input-output and econometric models. Emphasizes policy simulations. PREREQ: ECON822.

ECON 964 PRE-CANDIDACY STUDY 3-12 PF
Research and readings in preparation of dissertation topic and/or qualifying examinations for doctoral students before admission to candidacy but after completion of all required course work. RESTRICTIONS: Not open to students who have been admitted to candidacy.

ECON 969 DOCTORAL DISSERTATION 1-12 PF

EDLM 621 REFERENCE SERVICES AND RESOURCES 3
Explores and evaluates role of information in our society and range of reference materials supporting school library media program. Includes use of print and electronic systems, reference procedures, and instructional role of information in school curriculum.

EDLM 622 INTRODUCTION TO CATALOGING AND CLASSIFICATION 3
Explores and evaluates standardized cataloging and classification systems with special emphasis on organization of school library media center. Topics include: Anglo-American cataloging rules; Library of Congress subject headings; and Dewey Decimal classification.
EDLM 623  ADVANCED CATALOGING AND CLASSIFICATION  3  
Continues study of concepts introduced in EDLM622 but focuses on organizing non-book materials and cataloging in on-line environment. Special emphasis given to organization of school library media center. Topics include: library automation; USMARC format; electronic bibliographic databases.

EDLM 624  LIBRARY COLLECTION DEVELOPMENT  3  
Explores and evaluates theory and practice of building and managing library collections with special emphasis on collections in school library media centers. Topics include: intellectual freedom; selection criteria; collection analysis; budgets; and producing teacher resources.

EDLM 625  SCHOOL LIBRARY MEDIA PROGRAM ADMINISTRATION  3  
Explores and evaluates administration and management of school library media center. Topics include: planning and evaluation; policy making; personnel; budget; facilities; standards; research trends in area.

EDLM 626  DEVELOPMENT OF LIBRARIES IN SOCIETY  3  
Explores and evaluates foundations, concepts, research and issues of librarianship pertaining to goals and functions of American and world cultures with particular emphasis on relationship between school library media centers and society.

EDLM 628  SCHOOL LIBRARY MEDIA PROGRAM CURRICULUM  3  
Explores role of school library media program in meeting information literacy and other education standards. Topics include information literacy, state education standards, advocacy, instructional technology and collaboration. 
PREREQ: EDLM626.  
RESTRICTIONS: Permission of instructor.

EDUC 011  COLLEGE INTENSIVE LITERACY  3 RP  
Remedial course for college students with deficiencies in reading, spelling and handwriting. Also suitable for students learning to read and write in English as a second language.

EDUC 100  INTRODUCTION TO ELEMENTARY AND MIDDLE SCHOOL EDUCATION  1 PF  
First year seminar covers issues in K-8 learning and instruction. Topics include overviews of discipline options within ETE major and examinations of K-8 education practices.  
RESTRICTIONS: ETE majors.

EDUC 166  SPECIAL PROBLEM  1-3  

EDUC 202  HUMAN DEVELOPMENT I: GRADES K-4  3  
Introduces major theories of human development and issues in area of language development. Students also tutor in schools to gain clinical experience.

EDUC 203  HUMAN DEVELOPMENT II: GRADES 5-8  3  
Development of adolescents, including topics of language development and physical, cognitive and social-emotional changes in middle school years. Field experience consisting of interviewing students in area middle schools required.  
RESTRICTIONS: Limited to ETE majors and minors requiring this course.

EDUC 205  HUMAN DEVELOPMENT: GRADES K-8  3  
Explores theories of child and early adolescent development as they pertain to education. Topics include biological, cognitive, linguistic, and social-emotional development and taught through lecture, large- and small-group discussion, and case studies. Requires field placement in schools.  
RESTRICTIONS: Limited to ETE majors and minors requiring this course.

EDUC 210  BEGINNING LITERACY INSTRUCTION  3  
Introduces research-based perspectives on literacy acquisition during kindergarten and first-grade years and emphasizes integration of basic literacy skills, reading, writing, oral language and literature during instruction. Takes cognitive orientation and highlights influence of vocabulary development, phonemic awareness, and establishment of alphabetic principle on literacy learning. Includes field experience.  
RESTRICTIONS: Open to ETE and ECE majors.

EDUC 230  INTRODUCTION TO EXCEPTIONAL CHILDREN  3  
Historical and philosophical basis for special education; physical and psychological characteristics of exceptional children; study and discussion of past and emerging educational practices for exceptional children with emphasis on pedagogical commonalities. Systematic observation of cross section of special education classes required. Emphasis on school-age child.  
RESTRICTIONS: Open to ETE and ECE majors and minors only.

EDUC 240  PROFESSIONAL ISSUES: PHILOSOPHICAL AND LEGAL PERSPECTIVES  3  
Explores ethical dilemmas and legal controversies encountered in school discipline, intellectual freedom, equal treatment of students, planning for moral or character education and other professional concerns.

EDUC 247  PROFESSIONAL ISSUES: HISTORICAL PERSPECTIVES  3  
Interpretation of history of American education as it developed from colonial era into current time, with particular attention to issues of equity, discipline, intellectual freedom and professionalism. Includes all levels of schooling in social, multicultural context.

EDUC 258  CULTURAL DIVERSITY, SCHOOLING AND THE TEACHER  3  
Examines roles and responsibilities of classroom teacher vis-a-vis demographic changes occurring in United States society and public school student population. Topics include race, ethnicity, gender, sexual orientation, social class, poverty and language.

EDUC 259  CULTURAL DIVERSITY IN COMMUNITY CONTEXTS  3  
Examines roles and responsibilities of classroom teacher through critical examination of field placement experiences in diverse community contexts. Topics include race, ethnicity, gender, sexual orientation, social class, poverty and language.  
RESTRICTIONS: Open only to elementary education majors.

EDUC 266  SPECIAL PROBLEM  1-6  

EDUC 286  EDUCATIONAL TECHNOLOGY: PROFESSIONAL TOOLS  1  
Topics include educational resources and communication on internet, word processing, authoring for web, electronic grade books, statistics, presentation technology and assessment tools.  
RESTRICTIONS: Open to education majors only or with permission of instructor.

EDUC 303  CHILDREN'S LITERATURE IN WORDS AND IMAGES  3  
Engages students in analyses of range of children's texts in different modes including books, films, oral performance, computer programs and television. Nature of children's responses to these texts and implications for educational practice addressed.

EDUC 306  EMERGING LITERACY: YOUNG CHILDREN  3  
Nature, acquisition and development of literacy in children to age six. Explores appropriate instructional strategies and resources for use with young children. Field experience in kindergarten.  
PREREQ: EDUC210, IFS722 and IFS724.

EDUC 308  CURRICULUM DEVELOPMENT IN THE PRIMARY AND MIDDLE GRADES  2 PF  
Theories and practices of designing and implementing thematic, interdisciplinary, integrated and standardized curriculum in grades K-8 explored. Stresses need to address local and state curriculum guidelines and consider attributes of age group for whom curriculum provided.  
COREQ: EDUC400 and EDUC433.

EDUC 310  READING AND WRITING IN ELEMENTARY SCHOOL  3  
Focuses on literacy development of second through sixth grade children. Explores relevant research and developmentally appropriate practices. Includes field experience in second through sixth grade classroom.  

EDUC 320  READING AND WRITING IN THE MIDDLE GRADES  3  
Focuses on methods and materials for developing literacy from grades four through eight. Explores practices suited to adolescent development. Includes practicum in fourth through eighth grade classroom.  
PREREQ: EDUC310.

EDUC 333  ELEMENTARY CURRICULUM: MATHEMATICS  3  
Selection and use of appropriate methods and curriculum for teaching arithmetic in grades K-6. Focuses on curriculum materials, teaching strategies, lesson planning and implementation and appraisal of pupil achievement. Practicum included.  
PREREQ: MATH253.

EDUC 336  MIDDLE SCHOOL MATHEMATICS CURRICULUM AND METHODS  3  
Investigates curriculum and teaching methods for presenting mathematical concepts to middle school students (grades 5 through 8). Activities include reviewing materials, examining topics and preparing lessons appropriate for this level. Clinical experience included.  
PREREQ: MATH253, MATH221 and MATH230.  
RESTRICTIONS: Requires permission of advisor.

EDUC 341  ELEMENTARY CURRICULUM: SCIENCE  3  
Introduction to teaching science in elementary school. Includes study of current elementary school programs, instructional materials, teaching strategies, lesson planning and implementation and appraisal of pupil achievement. Practicum included.

EDUC 346  ELEMENTARY CURRICULUM: SOCIAL STUDIES  3  
Introduction to teaching social studies in elementary school. Includes study of current elementary school programs, instructional materials, teaching strategies, lesson planning and implementation and appraisal of pupil achievement. Practicum included.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDUC 348</td>
<td>Investigating Social Studies in Middle School Communities</td>
<td>3</td>
<td>Encourages and supports professional development as social studies teacher. Students investigate teaching, learning and assessing at middle school level and consider their roles as educators in diverse classrooms and communities. Field experience required. PREREQ: EDUC346.</td>
</tr>
<tr>
<td>EDUC 358</td>
<td>Linguistics and Language Arts</td>
<td>3</td>
<td>Explores linguistic and cultural assumptions that motivate and guide current language arts curricula and pedagogy. Encourages future teachers to reflect on their role in classroom and on how they can empower their students to think critically about language and cultural meanings. May be cross-listed with ENGL358 and/or LING358. PREREQ: ENGL390 or LING101.</td>
</tr>
<tr>
<td>EDUC 360</td>
<td>Learning in Community Contexts</td>
<td>3</td>
<td>Study of educational process in institutions and organizations with focus on non-profit groups oriented toward community service. Emphasis upon relation of these groups' educational practices to their overall public service mission. May be cross-listed with IFS360.</td>
</tr>
<tr>
<td>EDUC 366</td>
<td>Independent Study</td>
<td>1-6</td>
<td></td>
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<tr>
<td>EDUC 376</td>
<td>Education Practicum</td>
<td>1-3 PF</td>
<td>Field-based internship in a school working as assistant with professional teacher, including tutoring, small group instruction, grading of instructional materials and limited whole group instruction.</td>
</tr>
<tr>
<td>EDUC 386</td>
<td>Educational Technology III: Literacy and Language Arts Laboratory</td>
<td>1</td>
<td>Introduces prospective teachers to technology available for use in literacy and language arts curriculum. Enables students to evaluate this technology by applying approaches studied in their literacy and language arts methods courses. Concludes with teaching project incorporating use of technology. PREREQ: EDUC286. COREQ: EDUC310.</td>
</tr>
<tr>
<td>EDUC 387</td>
<td>Integrating Technology in Education</td>
<td>2</td>
<td>Introduces prospective teachers to technology available for use in classroom content areas. Enables students to evaluate technology use and identify and create classroom lessons that demonstrate effective use of technology integration. Concludes with development of teaching project incorporating use of technology. PREREQ: EDUC286. RESTRICTIONS: Open to ETE majors only.</td>
</tr>
<tr>
<td>EDUC 390</td>
<td>Building Communities of Learners</td>
<td>3</td>
<td>Designing teaching and learning communal environments sensitive to diverse needs of all elementary school children: academic, emotional, moral, and relational. Holistic integration of instruction, classroom management, and students' whole person growth guided by mutual respect, caring, self-reflection, problem solving, community of learners' educational philosophy, and professional collaboration. RESTRICTIONS: Open to ETE majors only.</td>
</tr>
<tr>
<td>EDUC 400</td>
<td>Student Teaching</td>
<td>3-12 PF</td>
<td>Full-time extended student teaching experience in pre-kindergarten through 12th grade schools. Students under guidance and supervision of cooperating teacher in classroom and University of Delaware supervisor. PREREQ: Students must show evidence of passing Praxis I and must present evidence (copy of test scores) of taking state-designated certification test in their academic content field. See student teaching program coordinator/course instructor for portfolio requirements.</td>
</tr>
<tr>
<td>EDUC 403</td>
<td>Literature for Adolescents: Multimedia Texts</td>
<td>3</td>
<td>Explores classic and contemporary reading materials and non-print texts pervasive in lives of adolescents. Addresses selection of texts for middle school classes as well as techniques for developing and promoting critical reading and informed interpretation of non-print texts. May be cross-listed with ENGL403.</td>
</tr>
<tr>
<td>EDUC 410</td>
<td>Assistive Technology</td>
<td>1</td>
<td>Identify, evaluate, and use technology to support education of individuals with disabilities, including assistive technology to promote academic learning and to compensate for cognitive, physical and sensory disabilities. COREQ: EDUC431, EDUC432 and EDUC435.</td>
</tr>
<tr>
<td>EDUC 413</td>
<td>Adolescent Development and Educational Psychology</td>
<td>4</td>
<td>Examines social, emotional, moral, and cognitive development of adolescent learners; psychological processes underlying learning, motivation, and classroom behaviors; and teacher-student and group processes. Looks at implications of these psychological processes for instruction; motivational strategies; classroom management, and assessment with emphasis on creating learning environment that encourages positive social interaction, active engagement in learning, and self-motivation. RESTRICTIONS: Open only to sophomores, junior, and senior secondary education majors. High school practicum of 18 hours is required. Students must keep a 3.5 hour block of time free between 7am-2pm once a week or keep a 3.5 hour block of time free between 7am-2pm twice a week.</td>
</tr>
<tr>
<td>EDUC 414</td>
<td>Teaching Exceptional Adolescents</td>
<td>3</td>
<td>Examines characteristics of exceptional adolescents and historical, legal and philosophical bases for special education. Focuses on teaching students with special needs within general education settings using research-based instructional strategies, classroom management, and related services. RESTRICTIONS: Open only to secondary education majors and students in disabilities minor.</td>
</tr>
<tr>
<td>EDUC 419</td>
<td>Diversity in Secondary Education</td>
<td>3</td>
<td>Examines aspects of diversity (e.g., gender, class, language) in secondary schools and classrooms. Reviews foundations of multicultural education and considers implications for curriculum, instruction and classroom management. RESTRICTIONS: Open only to secondary education majors. Eighteen hour field placement required.</td>
</tr>
<tr>
<td>EDUC 420</td>
<td>Reading in the Content Areas</td>
<td>4</td>
<td>Overview of reading comprehension issues at middle and high school levels based primarily upon task analyses of content-area materials (math, social studies and science). Students apply current theories of reading comprehension to texts in their areas of interest.</td>
</tr>
<tr>
<td>EDUC 429</td>
<td>Methods of Teaching Languages in Elementary School</td>
<td>3</td>
<td>See FIU429 for course description.</td>
</tr>
<tr>
<td>EDUC 430</td>
<td>Classroom Management in Secondary Schools</td>
<td>1 PF</td>
<td>Examines various aspects of discipline in high school classrooms: causes of misbehavior, procedures and rules to establish and maintain order, responding to misbehavior and legal issues. COREQ: EDUC400.</td>
</tr>
<tr>
<td>EDUC 431</td>
<td>Applied Behavior Analysis</td>
<td>3</td>
<td>Covers principles of behavior analysis and variety of strategies based on these principles that teachers can employ to eliminate inappropriate behaviors and to teach academic skills. Includes explanation of classroom management techniques and systems for children and youth with and without disabilities. Participate in behavior analytic field experience in public elementary school. PREREQ: EDUC230. COREQ: EDUC410, EDUC432 and EDUC435.</td>
</tr>
<tr>
<td>EDUC 432</td>
<td>Curriculum for School-Age Exceptional Children</td>
<td>3</td>
<td>Focuses on understanding special instructional needs of students with mild to moderate educational disabilities and on planning and monitoring instruction. Emphasis placed on diagnostic assessment of learning problems, design and implementation of instructional interventions, and monitoring of progress. Methods for preventing early reading problems included. PREREQ: EDUC230. COREQ: EDUC410, EDUC431 and EDUC435. RESTRICTIONS: Requires field placement.</td>
</tr>
<tr>
<td>EDUC 433</td>
<td>Non-School Factors Affecting Learning in the Classroom</td>
<td>2</td>
<td>Emphasis on research findings describing extent to which academic success affected by non-curricular factors including role of families as partners and collaborators, peer relations, child abuse and classroom social climate. Counseling and mentoring skills taught and role of other school and community based referrals examined. COREQ: EDUC308 and EDUC400.</td>
</tr>
<tr>
<td>EDUC 435</td>
<td>Educational Evaluation for Exceptional Children</td>
<td>3</td>
<td>Examination of formal and informal assessment techniques for teacher use in identifying learning problems. Hands-on experience with test instruments used by school psychologists to improve student teacher’s understanding of reports in school records. Proper techniques for construction and evaluation of teacher-made tests. PREREQ: EDUC230. COREQ: EDUC410, EDUC431 and EDUC432. RESTRICTIONS: Requires field placement.</td>
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<tr>
<td>EDUC 436</td>
<td>Literacy Problems: Assessment and Instruction</td>
<td>3</td>
<td>Introduces general and special education teachers to needs of students whose literacy attainments are below expectations. Prepares teachers to use diagnostic assessment as basis for planning preventive and remedial instruction.</td>
</tr>
</tbody>
</table>
EDUC 437 Diagnosis and Instruction: Literacy Problems 3
Prepares special education teachers to meet needs of students with significant problems in reading and writing. Emphasis placed on understanding and analysis of learning problems and design and implementation of instructional interventions in reading and language arts. Field experience required.
PREREQ: EDUC431, EDUC432, EDUC435, EDUC436.
RESTRICTIONS: Open to students in the Elementary Teacher Education program who are seeking dual certification in elementary education and special education.

EDUC 443 Teaching Science in Middle School 3
Introduction to curriculum and appropriate methods for teaching science concepts to middle school students (grades 4-8). Activities include review and evaluation of current middle school programs, research on student thinking, instructional materials, teaching strategies and appraisal of student learning. Clinical experience required.
PREREQ: EDUC431.

EDUC 451 Educational Assessment for Classroom Teachers 3
Explores principles and methods for construction and evaluation of student learning assessments, including knowledge, understanding and skills. Presents methods to enhance teacher inquiry into student learning. Considers strengths and limitations of each method in regard to informing teachers' judgments. Discusses implications of assessment policy.

EDUC 462 Language Acquisition 4
Factors which distinguish human language from animal communication, as well as development of many facets of language (semantics, syntax and phonology). To supplement reading and discussion, students gain research experience by working approximately eight hours per week on ongoing language acquisition projects. May be cross-listed with LING462 and/or PSYC462.

EDUC 466 Research Internship Experience 1-6
Research apprenticeship with faculty mentor.

EDUC 473 Transitions from Secondary Special Education 3
Examines legislation, research and practices relating to school-to-adult life transition for youth with mild/moderate/severe disabilities. Emphasis on model secondary programs and instructional practices, family involvement, inter-agency collaboration and adult service systems.
RESTRICTIONS: Requires permission of instructor.

EDUC 474 Instructional Methods in Secondary Special Education 3
Reviews current issues and practices in curriculum and instruction for secondary students with mild/moderate disabilities. Within school-to-adult life transition framework, examines general principles of effective instruction and their application to teaching academic, vocational and life skills at middle and high school levels.
RESTRICTIONS: Requires permission of instructor.

EDUC 475 Senior Thesis 3
Substantial research paper directed by faculty mentor.

EDUC 476 Second Language Acquisition and Bilingualism 3
See LING476 for course description.
PREREQ: LING101.

EDUC 477 The Structure of English 3
See LING477 for course description.
PREREQ: LING101.

EDUC 485 Multimedia Literacy 3
Defines multimedia and discusses its impact on society. Surveys applications across curriculum and reflects on effects of multimedia on current teaching practice. Provides multimedia toolbox and shows how to use it to create and publish multimedia applications on internet. Discusses multimedia frontiers, emerging technology and societal issues including human impact, regulation, copyright, fair use, equity, cost and universal access. May be cross-listed with COMM486.

EDUC 486 Educational Technology IV: Science, Social Studies and Mathematics Laboratory 1
Introduces prospective teachers to technology available for use in mathematics, science, and social studies curricula. Enables students to evaluate this technology by applying approaches studied in their mathematics, science, and social studies methods courses. Concludes with teaching project incorporating use of technology.
PREREQ: EDUC386.
COREQ: EDUC430, EDUC433, EDUC431, EDUC434 and EDUC436.

EDUC 498 Teaching English as a Second Language 3
See LING498 for course description.

EDUC 500 Topics in Service Education 1-6 PF
Review and analysis of research and/or practices of specific topic. Topics and format vary depending on needs of participants.
RESTRICTIONS: Not intended for students enrolled in a degree program.

EDUC 524 Intensive Literacy Instruction 3
Training in methods of teaching reading, writing and spelling developed in Reading Study Center, School of Education, called Intensive Literacy. Program useful for beginners, remedials and students learning English as a second language.

EDUC 541 Environmental Resources 3
Focuses on air and water quality, proper waste disposal and soil conservation using government and private resources. Provides teachers with background information and activities. Creates opportunities for teachers to become active participants in programs from different disciplines, age levels and locations.
RESTRICTIONS: Includes presentations of outdoor teaching units and field trips suitable for class visits.

EDUC 566 Special Problem 1-12

EDUC 588 Geometry and Measurement for Middle School Teachers 3
See MATH588 for course description.

EDUC 600 Teacher as Researcher 3
Helps develop strategies used by teachers and administrators to bridge gap between theory and practice. Assists teachers and administrators in initiating research on classroom problems related to teacher and student behavior and assessment.

EDUC 601 Language Development in the Classroom 3
Focuses on applying knowledge about language development in school-age children to development of language processes and assessment of language performance. Explores language processes that provide foundation for reading, speaking and listening.

EDUC 602 Childhood Literature 3

EDUC 603 Literature for Adolescents 3
Evaluation of classic and contemporary reading materials and their application to junior-high school curriculum. Study of criteria, methods and tools for selection of books. Techniques for developing and promoting reading.

EDUC 604 Teaching Writing in the Elementary and Middle School 3
Focuses on development of appropriate instructional programs for elementary and middle school children. Provides information on writing process, beginnings of writing, exemplary programs, evaluation of children's writing and functions/terminology of writing.

EDUC 605 Measurement Applications in Education 3
Focuses on educational measurement strategies and processes that teachers use to assess student learning. Emphasis on assessment skills and knowledge that can enhance professional practice and promote student learning.
RESTRICTIONS: Open to persons teaching in the public schools.

EDUC 606 Methods of Teaching Foreign/Second Languages in Elementary Schools 3
See FLIT629 for course description.

EDUC 607 Educational Research Procedures 3
Introduction to quantitative methods and procedures in education through study of logic and procedures of educational and social research. Provides information about various stages of research process with attention on measurement, sampling, design, data analysis and application.

EDUC 608 Foundations of Reading Instruction 3
Explores relationships between reading theory, research, and practice. Sociological, psychological, and linguistic foundations of reading and writing processes and seminal reading research studies examined.
PREREQ: EDUC420.
RESTRICTIONS: Permission of instructor.

EDUC 609 Assessment and Instruction for Reading 3
Focuses on assessment and instruction in reading and writing for K-12 students with learning problems.
PREREQ: EDUC608.
RESTRICTIONS: Permission of instructor.

EDUC 610 Assessment in Secondary Special Education 3
Examines assessment principles and practices that support instruction and school-to-adult life transition planning for secondary special education students. Teaches use of standardized and informal instruments including aptitude and interest inventories, curriculum-based assessments and job analyses.

EDUC 612 Ethnic Studies and Multicultural Education 3
Content, strategies, concepts and resources for teaching comparative ethnic studies and integrating these studies into regular curriculum. Techniques for evaluating multicultural education outcomes. Surveys culture and history of major American ethnic groups; emphasizes major ethnic groups in our geographic area.
EDUC 613  ADOLESCENT DEVELOPMENT AND EDUCATIONAL PSYCHOLOGY 3
Examines (a) social, emotional, moral, and cognitive development of adolescent learners, (b) psychological processes underlying learning, motivation, and classroom behaviors, and (c) teacher-student and group processes. Also looks at implications of these psychological processes for (a) instruction, (b) motivational strategies, (c) classroom management, and (d) assessment, with emphasis on creating learning environments that encourage positive social interaction, active engagement in learning, and self-motivation.
RESTRICTIONS: Open only to secondary education majors. 18-hour field placement required. Students must keep a 4.5-hour block of time free between 7am-2pm once a week or keep a 3-4 hour block of time free between 7am-2pm twice a week.

EDUC 614  TEACHING EXCEPTIONAL ADOLESCENTS 3
Examines characteristics of exceptional adolescents and historical, legal and philosophical bases for special education. Focuses on teaching students with special needs within general education settings using research-based instructional strategies, classroom management, and related services.
RESTRICTIONS: Open to secondary education majors/certification candidates only.

EDUC 615  PREVENTING READING PROBLEMS THROUGH EARLY INTERVENTION 5
Focuses on instructional and assessment procedures designed to prevent reading problems in kindergarten through third grade. Working with individual and small group instruction and assessment procedures in summer early intervention program site based in local public school.
PREREQ: EDUC607, EDUC608.
RESTRICTIONS: Requires permission of instructor.

EDUC 616  PREVENTING READING PROBLEMS THROUGH EARLY INTERVENTION 1
Required follow-up to EDUC615. Students use videocassette and other evidence to show how applying instructional strategies and models developed in EDUC615 to instructional settings in which they work.
PREREQ: EDUC615.

EDUC 617  DELAWARE READING PROJECT SUMMER INSTITUTE 6
Delaware Reading Project (DRP) focuses on research, theory, and practice in literacy instruction for grades K-12. DRP’s central purpose for students to become familiar with and evaluate best practices in literacy instruction in order to develop workshop for other teachers.
PREREQ: EDUC607, EDUC622 or equivalent.
RESTRICTIONS: Approval of instructor.

EDUC 618  INTRODUCTION TO SCHOOL PSYCHOLOGY 3
Explores roles and functions of school psychologists and current issues pertaining to assessment, education, and prevention/intervention for children with disabilities. Professional standards in school psychology, history of school psychology, special services in schools, and legal and ethical issues pertaining to school psychology and special education examined.

EDUC 619  DIVERSITY IN SECONDARY EDUCATION 3
Examines aspects of diversity (e.g., ethnicity, gender, class, language) in secondary schools and classrooms. Reviews foundations of multicultural education and considers implications for curriculum, instruction, and classroom management.
RESTRICTIONS: Field placement of 18 hours is required. Open to secondary education majors/certification candidates only.

EDUC 620  FOUNDATIONS OF READING INSTRUCTION 3
Psychology and pedagogy of reading instruction. Lectures and demonstrations covering: psychology of reading process, recent trends in reading instruction, initial reading procedures, directing reading activities, developing word recognition competence, developing efficient comprehension and differentiating instruction.

EDUC 621  DEVELOPMENTAL READING AND THE ROLE OF THE READING CONSULTANT 3
Laboratory to prepare students as reading consultants. Teaching experience in Reading Center required along with visits to different schools. Provides opportunity to study and compare remedial and developmental reading programs.
PREREQ: EDUC620.

EDUC 622  THE ROLE OF LITERACY IN CONTENT AREAS 3
Explores contributions of literacy research for content learning (e.g., math, science, social studies). Underscores benefits of linking reading, writing, listening, speaking and viewing acquisition of domain knowledge and suggests various frameworks for supporting this linkage.
PREREQ: EDUC608.
COREQ: EDUC320.

EDUC 623  APPLIED HUMAN DEVELOPMENT IN THE SCHOOLS 3
Research and theory in child adolescent development studied with emphasis on applications in schools. Designed primarily for school psychologists, school counselors and other educators. Examines social, moral, affective, cognitive and biological bases of behavior within school setting.
May be cross-listed with IFST623.
PREREQ: EDUC202 or EDUC413.

EDUC 624  INTRODUCTION TO AUTISM AND SEVERE DISABILITIES 3
Introduction to issues related to identification and assessment of students with autism or severe disabilities. Presents identification instruments, assessment systems and their relation to theoretical models about these disabilities. Reviews relationship between assessment and educational planning.
PREREQ: EDUC681.
RESTRICTIONS: Requires at least two other special education courses in addition to prerequisite.

EDUC 625  METHODS AND CURRICULUM FOR INDIVIDUALS WITH AUTISM AND SEVERE DISABILITIES 3
Reviews behaviorally-based educational models for students with autism and other severe disabilities. Presents methods aimed at enhancing functional skill development in major life domains, with emphasis on community-based training.
PREREQ: EDUC681.
RESTRICTIONS: Requires at least two other special education courses in addition to prerequisite.

EDUC 626  FUNCTIONAL COMMUNICATION FOR INDIVIDUALS WITH AUTISM AND SEVERE DISABILITIES 3
Reviews appropriate functionally relevant communication objectives for students with autism and severe disabilities. Highlights the impact of functional communication upon social skills and behavior management. Presents variety of alternative communication methods and modalities.
PREREQ: EDUC624, EDUC681.
RESTRICTIONS: Requires at least two other special education courses in addition to prerequisites.

EDUC 627  MODELS OF INSTRUCTION 3
Study of alternative models of instruction as applied to differing instructional objectives, content and settings.

EDUC 628  INSTRUCTION IN READING AND WRITING WITH LEARNING DISABILITY STUDENT 3
Focuses on cognitive processes involved in reading and writing and instructional methods for helping students, especially those with learning problems, develop strategies for meaningful reading and writing activities.
PREREQ: EDUC620.

EDUC 629  PSYCHOLOGY OF TEACHING 3
Study of research on teacher characteristics, teaching style and method, and teaching.

EDUC 630  SUPERVISED READING CLINIC 6
Supervised practice and lecture in assessing and instructing students who struggle with reading and writing. Participants have opportunities to implement and discuss wide range of instructional approaches, methods, and materials as they work closely with school-age students.
PREREQ: EDUC607 and EDUC609 or permission of instructor.

EDUC 631  ORGANIZATION AND SUPERVISION OF LITERACY PROGRAMS 3
Contextualizes assessment and instruction for reading in whole-class context. Designed to introduce leadership roles currently held by Reading Specialists and Literacy Coaches and includes extensive school-level case study.
PREREQ: EDUC609 required; EDUC608, EDUC630, and EDUC668 recommended.
RESTRICTIONS: Requires permission of instructor.

EDUC 632  INTERNET CURRICULUM APPLICATIONS 3
Explore uses of internet to support, enhance, and deliver curriculum in grades K-12. Participants use variety of tools including World Wide Web, File Transfer Protocol (FTP), listservs, newsgroups, and e-mail to access and utilize internet resources in education and related disciplines. Individuals or small groups create units of instruction appropriate to their teaching levels which utilize internet tools and resources.
RESTRICTIONS: Familiarity with the World Wide Web and e-mail and an active e-mail account.

EDUC 633  INTRODUCTION TO COMPUTER INSTRUCTION 3
Introduction to field of computer-based instruction, including instructional theory and design, hardware and software systems, artificial intelligence techniques, author languages and politics and sociology of educational technology.

EDUC 634  TOPICS IN MATHEMATICS CURRICULA: GRADES K-8 3
Examines in-depth topics usually included in K-8 mathematics program. Provides not only overview of topics, but increased understanding as well.

EDUC 635  TEACHING MATHEMATICS IN THE ELEMENTARY SCHOOL 3
Acquaints students with historic and recent information from theory and research on teaching and learning mathematics in grades 1-4, and engages students in methods and materials for instruction that such information suggests.
PREREQ: EDUC634 or MATH252.
RESTRICTIONS: Grade of C or better in EDUC634 or MATH252.
EDUC 636  Teaching Mathematics in the Middle School  3
Acquaints students with historic and recent information from theory and research on teaching and learning mathematics in grades 5-8, and engages students in methods and materials for instruction that such information suggests. Field experience included. PREREQ: EDUC634 or MATH252. RESTRICTIONS: Grade of C or better in EDUC634 or MATH252.

EDUC 639  Educational Technology Topics  3
In-depth study of major problem in educational technology. Problems studied vary with each offering. RESTRICTIONS: May be repeated for credit when topics vary.

EDUC 640  Introduction to Curriculum  3
Three main topic: a) major goals of education and their influence on curriculum policy and teacher planning; b) operational curriculum (what happens in the classroom); and c) strategies suitable for evaluating operational curriculum.

EDUC 641  Science Curriculum and Instruction  3
Examination of goals of science education and their relation to science curricula. Examination of theories of learning and motivation as they relate to how individuals develop scientific concepts. Discussion and development of science instructional materials and strategies consistent with current learning theories.

EDUC 642  Topics in Science Education  3
In-depth study of major problem in science education. RESTRICTIONS: May be repeated for credit when topics vary.

EDUC 643  Environmental Education  3
Survey of and practice with existing environmental education materials and programs; development of lessons in environmental education; and practical experiences with curriculum development and teaching procedures.

EDUC 644  Social Studies Curriculum and Instruction  3
Compares goals of social studies curriculum with research on how teaching and learning typically occur in social studies classrooms. Consideration of traditional and innovative approaches to instruction, curriculum materials development and evaluation for social studies.

EDUC 645  Topics: Social Education Issues  3
Analyzes selected topics and practices in social education. Reviews research findings, theoretical bases, resources and instructional strategies. Conceptual frameworks and/or curriculum modules designed with appropriate provisions for implementation and evaluation of student achievement. RESTRICTIONS: May be repeated for credit when topics vary.

EDUC 646  Assistive Technology for Secondary Schools and Work  3
Emphasizes strategies for assessing and augmenting performance of persons with disabilities in secondary schools and work settings. Includes discussion of principles of environmental modification, vocational preparation and rehabilitation, use of electronic networks and funding for technology resources.

EDUC 647  Advanced Methods in Teaching English as a Second Language  3
Examines application of current methods, techniques and procedures in EFL and ESL instructional settings. Although theoretical concerns included, emphasis on their practical use in listening, speaking, pronunciation, reading, writing and grammar. PREREQ: EDUC698.

EDUC 648  Master’s Portfolio  1 PF
Use of multiple assessment indicators in formative evaluation of improvement of candidate’s teaching effectiveness. PREREQ: Requires completion of at least 27 graduate credits toward master’s degree.

EDUC 649  Delaware Writing Project Summer Institute  6
Provides teachers opportunities to read and write professionally and create workshops on teaching of writing. Develops knowledge of best teaching of writing practices. PREREQ: At least three years in the classroom. Must be nominated and invited.

EDUC 650  Advance Group Counseling for Children and Adolescents  3
Focuses on specialized skills and knowledge necessary in counseling groups of children and adolescents, integrating developmental considerations, leadership skills and fundamentals of group counseling practice. Students supervised practicing skills in class and at practicum site. PREREQ: EDC669.

RESTRICTIONS: Requires permission of instructor.

EDUC 651  School-Based Family Issues and Intervention  3
Provides ecological view of children in families and relationships between families and school system. Topics include family as a system, differing family shapes in contemporary society, special families in special circumstances and models of intervention.

EDUC 652  Introduction to Technology in Special Education and Rehabilitation  3
Introduction to concepts and skills in special education technology including instructional software, augmentative communication systems, assistive devices, interactive video, robotics, artificial intelligence, electronic networks and productivity aids. PREREQ: EDUC230 or EDUC697.

EDUC 653  Computer-Assisted Instruction in Remedial/Special Education  3
Focuses on design and evaluation of instructional technology applications for elementary and secondary school students with disabilities. Topics include instructional design principles and their application to development, modification and evaluation of computer-assisted and multimedia instruction. PREREQ: EDUC652, EDUC679.

EDUC 654  Augmentative and Alternative Communication  3
Focuses on augmentative and alternative communication systems for persons with disabilities, especially in the elementary, secondary and post-secondary school setting. Topics include assessment of functional communication needs, matching those needs to communication strategies and devices, and evaluation and generalization of communication skills. PREREQ: EDUC652.

EDUC 655  Assistive Technology  3
Focuses on use of computer-based aids and other assistive devices to reduce barriers to education and rehabilitation of children and adults with mild, moderate, and severe physical and cognitive disabilities. Topics include strategies to facilitate learning of cause-and-effect, alternate control interfaces to access computers and other aids, human factors principles in design and configuration of assistive devices and strategies and devices to improve interactivity of learning and living environments. Federal policies regarding assistive technology. PREREQ: EDUC652.

EDUC 657  Children, Television and Education  3
See COMM657 for course description.

EDUC 658  Discipline and Classroom Management  3
Review of discipline procedures, sources of assistance, legal implications, parental role, management techniques and strategies for developing school discipline policies.

EDUC 660  Educational Statistics and Measurement  3
Basic statistics necessary for research studies and educational and psychological measurement. Addresses measurement issues including norm-referenced vs. criterion-referenced assessment, interpretation of various derived scores, types of norms, reliability, validity and how statistics applied to research studies.

EDUC 661  School Business Management  3
Study of financial and business aspects of school administration.

EDUC 662  Adult Learner  3
Study of values, interests and social roles through life span. Emphasis on social and psychological development of adult learners; practical implications of aging on learner studied from perspective of teachers of adults.

EDUC 663  Counseling Skills Laboratory for Counselors and Psychologists  3
Provides opportunity to develop skills necessary for facilitating counseling relationships. Students observe, participate in and critique a variety of role playing exercises and actual counseling sessions as means of mastering particular skills.

EDUC 664  Legal Issues for School Managers  3
Legal problems affecting school management including tort and contractual liability, pupil personnel law, employee negotiations, Delaware school law and recent court decisions.

EDUC 665  Elementary Statistics  3
Provides conceptual understanding of useful statistical techniques along with practical computer and statistical skills to enable answering of realistic research questions. Topics include descriptive statistics, regression, exploratory data analysis and hypothesis testing.

EDUC 666  Special Problem  1-12
Second in three-course sequence on assessment and instruction of reading and writing for students with learning problems. Focuses on assessment of reading and writing problems in intermediate grades (4-6) and appropriate instruction. PREREQ: EDUC60B or EDUC620, EDUC659.
EDUC 670  PROGRAM DESIGN AND INSTRUCTIONAL STRATEGY FOR ADULTS  3
Topics related to designing academic programs and developing instructional strategies for working with adult students, including theories on transformative dimensions of adult learning, active learning process, learner-centered vs. text-centered approaches, and facilitating problem-based learning. Curriculum design, delivery and assessment also covered.

EDUC 671  PRACTICUM IN SCHOOL PSYCHOLOGY  3-6
Closely supervised experiences in various school and clinical settings. Opportunity to develop and practice skills that must be mastered prior to starting internship in school psychology.
RESTRICTIONS: Requires permission of instructor.

EDUC 673  TRANSITIONS FROM SECONDARY SPECIAL EDUCATION  3
Examines legislation, research and practices relating to school-to-adult life transition for youth with mild/moderate/severe disabilities. Emphasis on model secondary programs and instructional practices, family involvement, inter-agency collaboration and adult service systems.

EDUC 674  INSTRUCTIONAL METHODS IN SECONDARY SPECIAL EDUCATION  3
Reviews current issues and practices in curriculum and instruction for secondary students with mild/moderate disabilities. Within school-to-adult life transition framework, examines general principles of effective instruction and their application to teaching academic, vocational and life skills at middle and high school levels.
PREREQ: EDUC230 or EDUC697 and EDUC435 or EDUC680; or permission of instructor.

EDUC 675  LANGUAGE ACQUISITION  4
Examines factors which distinguish human language from animal communication as well as development of many facets of language (semantics, syntax and phonology). Emphasis on how children in first three years acquire language. May be cross-listed with LING675 and/or PSYC675.

EDUC 676  SECOND LANGUAGE ACQUISITION AND BILINGUALISM  3
See LING676 for course description.

EDUC 677  THE STRUCTURE OF ENGLISH  3
See LING677 for course description.

EDUC 678  HUMAN RESOURCE MANAGEMENT  3
Considers ways in which organizations accommodate and utilize their human resources. Focuses on personnel management functions such as selection, maintenance and development.

EDUC 679  INSTRUCTING ELEMENTARY/MIDDLE SCHOOLERS WITH MILD DISABILITIES  3
Presents principles, techniques and materials associated with effective instruction for elementary and middle school students with mild disabilities and evaluation of their efficacy.
PREREQ: EDUC230 or EDUC697 and EDUC435 or EDUC680.

EDUC 680  EDUCATIONAL DIAGNOSIS  3
Informal and standardized measures discussed and administered. Students trained to be effective participants on child study team and to administer diagnostic-prescriptive protocol. Expected to interpret results from placement protocol and make recommendations for appropriate educational placement.

EDUC 681  TECHNIQUES FOR BEHAVIOR CHANGE  3
Focuses on behavioral principles and procedures for promoting acquisition of new skills, motivating performance of previously acquired skills and reducing occurrence of inappropriate behaviors. Includes strategies for analyzing effectiveness of these interventions. Participants design and conduct behavior-change project in educational setting.
PREREQ: EDUC230 or EDUC697.

EDUC 682  RESEARCH IN SPECIAL EDUCATION  3
Review of methods and procedures for analyzing and interpreting empirical research studies in special education and applying this information to questions of importance in classroom practice. Assists students to become informed consumers of findings in special education literature to design and interpret action research projects in classroom settings.
PREREQ: EDUC667 and EDUC681.

EDUC 683  CURRICULUM AND METHODS FOR TEACHING THE GIFTED CHILD  3
Focuses on development of appropriate activities for gifted children. Acquaints students with theoretical models to guide development and selection of curriculum for use with gifted and talented children. Practicum experiences included.
PREREQ: EDUC679.

EDUC 684  VOCATIONAL TRAINING AND ASSESSMENT: SEVERE DISABILITIES  3
Focuses on designing and implementing vocational assessments and task modifications for students with multiple and severe disabilities. Participants learn hands-on training techniques.

EDUC 685  MULTIMEDIA LITERACY  3
Defines multimedia and discusses impact on society. Surveys applications across curriculum and reflects on effects of multimedia on current teaching practice.
Provides multimedia toolbox and shows how to use it to create and publish multimedia applications on internet. Discusses multimedia frontiers, emerging technology, and societal issues including human impact, regulation, copyright, fair use, equity, cost and universal access.
May be cross-listed with COMM686.

EDUC 686  PROGRAMMING FOR GIFTED CHILDREN  3
Focuses on identification of gifted and talented children and development of programs to meet their needs.

EDUC 687  INTERPRETATION AND TESTING OF THE EXCEPTIONAL CHILD  3
Testing procedures including more esoteric tests administered in educational settings. Tests from areas such as gifted and learning disabilities discussed and administered. Emphasis on interpretation and test protocol for placement and programming purposes.
PREREQ: EDUC680.

EDUC 688  INTERNSHIP IN SCHOOL PSYCHOLOGY  3-6
Supervised experience in school psychology. Provides experience in variety of areas, including consultation, psychological and educational assessment, counseling and intervention.
RESTRICTIONS: Requires completion of all courses in the school psychology program. Requires permission of instructor.

EDUC 689  ADMINISTRATION OF ELEMENTARY AND MIDDLE SCHOOLS  3
Study of administrative practices and procedures in elementary schools with emphasis on role of elementary school principal.

EDUC 690  ADMINISTRATION OF SECONDARY SCHOOLS  3
Study of administrative practices and procedures in secondary school with emphasis on senior high school administrator.

EDUC 691  APPLIED STATISTICS AND RESEARCH DESIGN  3
Designed to develop students’ skills in statistics and research for use in educational practice, and designing and implementing program evaluation projects in educational settings.
PREREQ: EDUC660.

EDUC 692  SOCIAL SKILLS TRAINING FOR CHILDREN  3
Focuses on identification of gifted and talented children and development of their efficacy.

EDUC 696  METHODS OF TEACHING SECONDARY SCIENCE  3-4
Teaching science, science standards, design of curriculum, instructional strategies and assessment of student learning. Includes classroom-based practicum in middle or high school.

EDUC 699  FOUNDATIONS OF ADULT AND POSTSECONDARY EDUCATION  3
Overview of historical and philosophical foundations of postsecondary education with particular reference to United States. Key people, issues, institutions, movements, public policy and programs. Examines influence of postsecondary education’s historical evolution and philosophical roots on contemporary theory and practice.

EDUC 700  ARTC SEMINAR  1-2
Explores issues related to creating positive classroom learning and teaching environment within strong collegial support system. Content varies with participant need and interests.
RESTRICTIONS: Limited to ARTC candidates.
EDUC 701  EFFECTIVE TEACHING STRATEGIES  2-4
Develops skills in effectively designing, implementing, and assessing instruction. Topics include cognitive theories, goals and objectives, instructional models and strategies, materials, technology, tests, performance assessments, rubrics and other scoring instruments.
RESTRICTIONS: Limited to ARTC candidates.

EDUC 702  ADOLESCENT DEVELOPMENT AND CLASSROOM MANAGEMENT  2-4
Develops skills in effective classroom management and creating classroom climate conducive to learning and growth with focus on developmentally appropriate practice to adolescents.
RESTRICTIONS: Limited to ARTC candidates.

EDUC 710  READING IN THE SECONDARY CONTENT AREAS  1-3
Explores the teacher-learner-text interaction and strategies for using text to develop independent learners actively engaged in the learning process. Emphasis is on selecting, adapting, implementing and evaluating text-based strategies appropriate to different content areas and learning objectives.
RESTRICTIONS: Limited to ARTC candidates.

EDUC 711  INTRODUCTION TO SECONDARY SPECIAL EDUCATION  1-2
Introduces current issues and best practices for serving secondary students with special education needs. Topics include legal bases, transition models, school-to-work and classroom adaptations. Emphasizes familiarity with both model and local programs.
RESTRICTIONS: Limited to ARTC candidates.

EDUC 712  MULTICULTURAL EDUCATION IN SECONDARY SCHOOLS  1-2
Examines research and practice pertaining to education of culturally and racially diverse students and implications for classroom instruction, school climate and curriculum development. Reviews effective strategies for identifying and addressing behaviors and practices affecting academic achievement of under-represented populations.
RESTRICTIONS: Limited to ARTC candidates.

EDUC 719  STUDENT DIVERSITY IN THE SECONDARY CLASSROOM  3
Examines implications of student diversity for secondary content-area teachers. Explores best practice in multicultural education and inclusion of students with special learning needs in regular classrooms.
RESTRICTIONS: Restricted to teachers enrolled in the Alternative Routes to Certification program. May not be used as a program requirement in a School of Education graduate program.

EDUC 730  IMPLEMENTING MIDDLE SCHOOL MATHEMATICS USING TECHNOLOGY  3
Explores how to use technology in context of current middle school mathematics classroom materials and lessons. Features use of graphing calculators, TI-Interactive, Geometer’s Sketchpad, and Fathom. Examines the of these tools in learning of algebra, geometry, statistics, and probability.

EDUC 731  TEACHING MATHEMATICS TO SPECIAL NEEDS STUDENTS: K-12  3
Examines the nature of teaching mathematics education and pedagogy for special needs students. Topics include number and operations, algebra, geometry, measurement, and data analysis. Examines how school math curricula develop these topics and differentiation in math classroom.
RESTRICTIONS: Open to students in certification track of the M.Ed. in Exceptional Children and Youth program or with permission of instructor.

EDUC 732  COMMUNITY BASED PRACTICUM  1-3 PF
Provides graduate students with community-based field experience working with children and adolescents in varieties of non-school settings such as after-school programs, community centers, and residential facilities. Sociocultural approaches to conducting research in these settings examined.
RESTRICTIONS: Requires permission of department.

EDUC 740  LITERACY INSTRUCTION FOR ENGLISH LANGUAGE LEARNERS  3
Focuses on effective literacy instruction for English language learners in elementary and middle school levels in following areas: language development, vocabulary instruction, decoding, reading fluency, comprehension strategy instruction, and motivation and engagement.
RESTRICTIONS: MATELL or MLI Literacy.

EDUC 742  PRACTICUM IN TEACHING ENGLISH AS A SECOND LANGUAGE 3-6
Closely supervised experiences in various school and community settings. Provides opportunity to develop and practice skills in teaching English as Second Language to non-native English speakers.
PREREQ: EDUC647 and EDUC698.
RESTRICTIONS: Requires permission of instructor.

EDUC 745  COLLABORATIVE TEACHING IN SPECIAL EDUCATION  3
Examines key components of successful teams serving students with special education needs. Skills to be developed include setting common goals, identifying and solving problems creatively, communicating effectively, and implementing and evaluating education plans that address student, family, and system needs.
PREREQ: EDUC697 or equivalent.

EDUC 750  GRADUATE TEACHING INTERNSHIP  2-9 PF
Full-time extended teaching internship in classroom setting under guidance and supervision of mentor teacher in classroom and University of Delaware supervisor. PREREQ: Must show evidence of passing Praxis I and complete all other pre-requisite coursework specified in Student’s program requirements. Evidence of passing Praxis II for content area may be required in some programs.
RESTRICTIONS: Requires permission of department. Students must apply for this internship during the academic year prior to their enrollment in the internship. May be repeated for up to a total of 9 credits.

EDUC 801  SEMINAR: CHILD DISCOURSE AND EDUCATION  3
Examination of child discourse, such as children’s narrative and conversational skills, from earliest period of language development through middle school years. Investigation of literature on oral language development among children from different sociocultural backgrounds. Focus on relationship between discourse development and children’s abilities to engage in oral language and literacy activities in classroom.
RESTRICTIONS: Open only to Ph.D. and advanced master’s students.

EDUC 802  SEMINAR: READING  3
Studies significant research in reading to train in methodology of reading research and to plan needed research in reading.
PREREQ: EDUC620.
RESTRICTIONS: May be repeated for credit when topics vary. Open only to Ph.D. and advanced master’s students.

EDUC 803  INTERNSHIP IN SCHOOL, AGENCY AND COUNSELING PSYCHOLOGY  1-6
Students in school, agency and counseling psychology gain on-site experience in individual, group and family counseling as well as consulting, assessing and conducting research in variety of school and community agency settings.

EDUC 805  PROSEMINAR IN EDUCATION I  4
Required first-year seminar presents PhD students with key domains of education research and dominant quantitative research designs and statistical procedures used to investigate these domains.
COREQ: EDUC856.

EDUC 806  PROSEMINAR IN EDUCATION II  4
Required first-year seminar introduces PhD students to key domains of education research examined from perspective of qualitative analyses.
COREQ: EDUC850.

EDUC 807  WRITING PROCESSES IN EDUCATIONAL SETTINGS  3
Focuses on nature of writing system, how acquired and developed and functions and discourse forms in writing. Provides information on writing process, structures, evaluation and instruction in elementary and middle grades.
RESTRICTIONS: Open only to Ph.D. and advanced master’s students.

EDUC 808  INTERNSHIP IN EDUCATION  3-9 PF
RESTRICTIONS: Requires permission of department. Credit during any semester varies according to percentage of time spent in internship. May be repeated up to nine credits.

EDUC 809  MANAGING PK-12 STUDENT/_PARENT/COMMUNITY RELATIONS  3
Intended for PK-12 educators in leadership positions, including teachers in leadership roles. Focuses on issues of managing discipline, positive school climate, and communications and relationships with parents and community constituencies.
RESTRICTIONS: Ed.D. majors only.

EDUC 810  MODELS AND PRACTICES OF INSTRUCTIONAL LEADERSHIP: PK-12  3
Intended for PK-12 educators in leadership positions, including teachers in leadership roles. Develops knowledge and skills for planning, managing, improving and evaluating PK-12 instructional programs.
RESTRICTIONS: Ed.D. majors only.

EDUC 811  TOPICS IN EDUCATIONAL POLICY  3
In depth examination of select topics that reflect expertise of instructor.

EDUC 812  REGRESSION AND MULTIVARIATE MODELS IN EDUCATION  3
Introduces theory and application of regression and multivariate statistical models in education and social sciences. Focuses on practical understanding, with numerous opportunities to apply newly acquired understandings to substantive topics. Topics include: matrix algebra, linear regression, multiple regression, path analysis, multivariate analysis [MANOVA and discriminant analysis]. PREREQ: EDUC516 or equivalent.

EDUC 813  CHILDHOOD PSYCHOPATHOLOGY  3
Survey of various developmental and behavioral disorders in childhood. Seminar examines issues of diagnosis and treatment theoretical perspectives. Special emphasis on current major psychological research.
May be cross-listed with PSYC845.
RESTRICTIONS: Requires permission of instructor.
EDUC 814  PSYCHOLOGICAL ASSESSMENT OF CHILDREN 3
Assessment techniques used to evaluate social, emotional and behavioral wellbeing of children and adolescents. Provides instruction and experience in selecting, administering and interpreting psychological tests; use of classification systems for defining learning, behavioral, and emotional problems in public schools; training in report writing and development of educational recommendations. RESTRICTIONS: Requires permission of instructor and program area.

EDUC 816  SEMINAR: LITERACY PROBLEMS 3
Addresses complex process of literacy development and explores range of problems that can occur. Special attention devoted to how literacy development affected by instructional methods, biological factors, and demographic factors such as poverty, ethnicity, and school location. PREREQ: EDUC609 or equivalent. RESTRICTIONS: Open only to doctoral level and advanced master’s students.

EDUC 817  INDIVIDUAL INTELLIGENCE TESTING 3
Administration and interpretation of major individually administered intelligence tests used in school and child clinical psychology. Five tests highlighted: Stanford Binet, EISCR, WPPSI, WAIS-R and K-ABC. May be cross-listed with PSYC817. RESTRICTIONS: Requires permission of instructor.

EDUC 818  EDUCATIONAL TECHNOLOGY FOUNDATIONS 3
Overview of following topics related to planning and using educational technology: instructional technology models; internet resources; web design; networking and database fundamentals; educational technology standards; technology integration strategies; assessment and evaluation; societal, legal and ethical issues; and collaborative planning of technology programs. RESTRICTIONS: Open only to Ed.D. majors with specializations in curriculum, higher education, and education technology; otherwise requires permission of instructor.

EDUC 820  CONTEXTS FOR LEARNING 3
Current approaches to cognitive analysis of school subjects. Topics include theory and research in perception, memory and information processing and analysis of models and tasks for school subject matters. RESTRICTIONS: Open only to Ph.D. students in education. Requires permission of instructor.

EDUC 821  COGNITION AND INSTRUCTION 3
Current approaches to analysis of instruction and schooling. Topics include teacher decision making and effectiveness, classroom processes, instructional methods and design, models for schooling and theories of school-based learning. RESTRICTIONS: Open only to Ph.D. students in education. Requires permission of instructor.

EDUC 822  LITERACY AND EDUCATIONAL POLICY 3
Doctoral seminar using federal educational policy to frame examination of literacy research, advocacy, and policy. Readings include research targeted in legislation as well as critiques of that research. RESTRICTIONS: Open only to Ph.D. and Ed.D. majors.

EDUC 823  LEARNING AND DEVELOPMENT 3
Study of contemporary theory and research in human development, with emphasis on issues of educational significance and mechanisms that affect development. May be cross-listed with PSYC823.

EDUC 824  EFFECTIVE COMMUNICATION FOR LEADERSHIP IN EDUCATION 3
Focuses on improving communication skills in exercise of leadership in administrative and policy settings in education. RESTRICTIONS: Open only to Ed.D. majors.

EDUC 825  PROSEMINAR: SOCIAL AND URBAN POLICY 3
See UAPP823 for course description.

EDUC 827  DATA ANALYSIS FOR PK-12 SCHOOL IMPROVEMENT 3
Intended for PK-12 educators in leadership roles, including teachers in leadership roles. Covers management and statistical analysis of PK-12 student achievement data and related student, staff, program, and community data for purposes of instructional planning and school improvement. RESTRICTIONS: Open only to Ed.D. majors in PK-12 system.

EDUC 828  PERFORMANCE ASSESSMENT AND ACCOUNTABILITY IN SCHOOLS 3
Concepts, practices, and data requirements of performance measurement in schools at different levels (student, staff, program, school) and uses of measurement results for purposes of professional and organizational improvement and accountability. PREREQ: EDUC827.

EDUC 829  RESEARCH ON TEACHING 3
Survey of scientific studies of classroom teaching. Teacher characteristics, teaching methods, learning environments, models of teaching, research methods and results of recent research.

EDUC 830  CONSULTATION AND INTERVENTION 3
Surveys major theoretical approaches and research related to consultation and intervention involving the school-age child. Provides skills in consultation and intervention techniques employed by school psychologists, counselors and other professionals working with teachers, parents and administrators. PREREQ: EDUC681.

EDUC 831  ADVANCED COUNSELING TECHNIQUES WITH CHILDREN AND ADOLESCENTS 3
Application of brief therapy techniques with children and adolescents from diverse backgrounds. Attention given to solution-focused perspective and specific intervention strategies for frequently encountered school problems. PREREQ: EDUC663. COREQ: EDUC671 or EDUC669. RESTRICTIONS: Requires permission of instructor.

EDUC 832  ADVANCED PRACTICUM IN SCHOOL PSYCHOLOGY 3-12
Work in school, clinic or community settings under supervision to further develop applied skills. RESTRICTIONS: Permission of instructor; enrollment limited to Ph.D. students in school psychology or closely related field of study.

EDUC 833  RESEARCH/THEORY OF MATHEMATICS CURRICULUM 3
Examines current issues in mathematics education from methodological and conceptual perspectives. Design and critique local research projects. PREREQ: Admission to doctoral program.

EDUC 834  RESEARCH/THEORY OF MATHEMATICS TEACHING 3
Examines research and theories of mathematics teaching in grades K-12. Explores components of classroom teaching, relationships between methods of teaching and students’ learning, and factors that influence selection of teaching methods. PREREQ: EDUC633 or permission of instructor.

EDUC 835  RESEARCH/THEORY OF MATHEMATICS CURRICULUM 3
Examines research and theories of mathematics curriculum, grades K-12. Examines factors that influence effectiveness of mathematics teacher education programs and factors that support teacher learning in schools. RESTRICTIONS: Open only to Ed.D. majors with A&P concentration; otherwise instructor permission required.

EDUC 836  RESEARCH ISSUES IN MATHEMATICS EDUCATION 1 PF
Examines current issues in mathematics education from methodological and conceptual perspectives. Design and critique local research projects. RESTRICTIONS: Open only to Ed.D. majors with A&P concentration; otherwise instructor permission required.
EDUC 848  Seminar in Language Development  
Covers aspects of semantic, syntactic and phonological development through examination of current research and theory in field. Treats educational implications of language development. 
May be cross-listed with LING848 and/or GSOSC848.

EDUC 849  Governance, Planning, and Finance in Higher Education  
Program development, planning, budgeting, and management in higher education settings; resource acquisition; alumni/trustee relations. RESTRICTIONS: Open only to Ed.D. majors.

EDUC 850  Qualitative Research in Educational Settings  
Theory and practice combined as students critique exemplary qualitative studies, explore theoretical frameworks and conduct short-term field research activities designed to develop students' capacity to collect and analyze qualitative data. First part of two-semester introduction to qualitative research.

EDUC 851  Practicum: Qualitative Research  
Provides practical experience in qualitative data collection, analysis and writing. Topics include research design, formal and informal interviewing, community and classroom observations, life history, case study, analytic induction, ethics and style in qualitative research reporting. PREREQ: EDUC850.

EDUC 852  Critical and Interpretive Methods in Education Research  
Introduction to non-social science approaches to educational inquiry such as philosophy, history, legal studies and others. Stresses epistemological and normative assumptions underlying education research programs. Selected relevant controversies examined.

EDUC 853  Topics: Culturally Relevant Pedagogies  
Focuses on diverse pedagogical theories, practices, and research discussing how to provide culturally relevant guidance to diverse students. Involves investigation of role of local community, popular culture, dialogue, and collaboration in establishing culturally relevant pedagogies.

EDUC 854  Topics: Equity in Education  
Focuses on diverse theories, practices, and research discussing issues of equity in education. Involves discussion of race, ethnicity, gender, sexual orientation, policy, economy, and structural and dynamic forces of power that promote or inhibit educational equity.

EDUC 855  Topics: Sociocultural Theories of Education  
Focuses on sociocultural approaches to education focusing on how cultures, institutions, and practices shape participants' learning. Involves situated cognition, dialogic pedagogy, activity theory, cultural-historical approach, ecological approach, and neo-Vygotskian approaches.

EDUC 856  Introduction to Statistical Inference  
Quantitative analysis topics include describing univariate and bivariate data distributions, calculating and interpreting summary statistics, logic of least squares estimation, rudiments of probability theory, selected probability models and their interrelationships, logic of null hypothesis testing, interval estimation and selected inferential techniques. PREREQ: EDUC665 or equivalent. RESTRICTIONS: Requires admission to doctoral program.

EDUC 857  Preparing to Teach Education or Related Courses in Academia  
Designed for graduate students planning on becoming university professors and who must meet SCE teaching requirement. Design or redesign course, teach lessons from course in form of micro-teaching, and discuss issues pertaining to academic life. RESTRICTIONS: Open to doctoral students in CHEP, otherwise instructor permission required.

EDUC 860  Curriculum Theory  
Introduces curriculum theory and history of curriculum as field of study. Topics include societal forces influencing curriculum, assumptions underlying curriculum decisions and conflicting views of curriculum.

EDUC 861  Curriculum Development and Evaluation  
Major curriculum theories and their relationships to planning, improvement and evaluation of school programs. Consideration of strategies for affecting curriculum change.

EDUC 862  Design and Analysis of Experiments  
Intermediate topics in design of experiments and quasi-experiments, including analysis of variance, factorial designs, analysis of covariance, repeated measures, non-parametric statistics and selected multivariate techniques. Organized by Campbell- Stanley framework for planning and critiquing experimental efforts. PREREQ: EDUC665 or equivalent. RESTRICTIONS: Requires admission to doctoral program. Offered once every two years.

EDUC 863  Program Evaluation in Education  
Focuses on models, theories and practice of program evaluation and applied research in education. Topics include experimental and quasi-experimental designs, validity, political and ethical issues of evaluation and implementation and practice of process and outcome program evaluation. RESTRICTIONS: Ed.D. majors or permission of instructor.

EDUC 865  Educational Measurement Theory  
Focuses on both classical and modern test theory including scaling, scoring, reliability, validity, generalizability theory, bias, item analysis, item response theory and equating with applications to norm-referenced and criterion-referenced assessment frameworks. PREREQ: EDUC665 or equivalent.

EDUC 869  Master's Thesis  
1-6

EDUC 870  Child Neuropsychology  
Examines approaches to neuropsychological assessment and application to childhood learning and neurodevelopmental disorders. RESTRICTIONS: Requires permission of instructor.

EDUC 872  Advanced Educational Measurement  
Focuses on theories of measurement with special emphasis on item response theory. First two classes devoted to classical test theory and remaining class sessions emphasize item response theory. PREREQ: EDUC856 and EDUC865.

EDUC 873  Multilevel Models in Education  
Introduction to multilevel modeling. Considers analysis of growth and change as special case of multilevel modeling. PREREQ: EDUC812 and EDUC856, or equivalent.

EDUC 874  Multivariate Data Analysis in Education  
Introduces models for analysis of categorical data with specific applications to education and social science research. Topics include logistic regression, polytomous logic regression, log-linear modeling, event history analysis, manifest Markov chain modeling. Advanced methods such as latent transition analysis and general growth mixture modeling also covered. PREREQ: EDUC812 or equivalent.

EDUC 876  Latent Variables for Educational Research  
Introduces models for latent variables with applications to educational and social science research. Topics divided into models for continuous and categorical latent variables. Continuous latent variables models include confirmatory factor analysis, structural equation modeling, and growth curve modeling. Models for categorical latent variables include latent class analysis and latent Markov chain modeling. Advanced methods such as latent transition analysis and general growth mixture modeling also covered. PREREQ: EDUC812 or equivalent.

EDUC 877  Practicum in Special Education  
Demonstration, directed observation and practice teaching with consultation and access to advisory seminar to discuss experiences and problems under faculty supervision. PREREQ: EDUC679, EDUC680 and EDUC681.

EDUC 879  Internship in Education  
Supervised, on-the-job experience in one specific area of education (i.e., administration, guidance, etc.), in which such internships required as part of graduate degree programs. RESTRICTIONS: Credit during any semester varies according to time spent in internship.

EDUC 883  Administration of Adult and Continuing Education Programs  
Considers administration, design and implementation, and evaluation of programs for postsecondary students in formal and informal training, degree or nondegree programs. Considers factors influencing administration and design of programs such as institutional demands.

EDUC 885  Educational Technology Topics  
In-depth study of major problem in educational technology. RESTRICTIONS: May be repeated for credit when topics vary.

EDUC 888  Doctoral Internship in School Psychology  
Full-time internship in school settings under supervision. Final field-based experience for doctoral students in which they integrate and apply skills learned throughout their course of study. RESTRICTIONS: By permission of instructor only; enrollment limited to school psychology Ph.D. students who have completed their course work.

EDUC 890  Leadership: Theory and Research  
Theories and research relating to leadership and management style. Fundamental principles of leadership as viewed from fields of philosophy, sociology, psychology and applied behavioral science discussed. Emphasis on analysis of personal style. RESTRICTIONS: Open only to students in the Ed.D. program in educational leadership.
EDUC 891 ORGANIZATIONAL PROBLEM ANALYSIS/PLANNING IN EDUCATION 3
Focuses on conceptualizing, designing, and reporting decision-oriented studies for education administrators and policymakers.
RESTRICTIONS: Core requirement for all Ed.D. majors in SOE educational leadership program.

EDUC 894 ADVANCED ORGANIZATIONAL THEORY 3
Survey of historical and contemporary macro-organizational theory with focus on schools as organization. Topics include power in organizations, Weberian and neo-Weberian theory, coordination and control, decision-making and organizational culture.
RESTRICTIONS: Open only to students in the Ed.D. program in educational leadership.

EDUC 895 IMPROVEMENT STRATEGIES 3
Focuses on philosophies of change, assessing need for change in educational setting, educational leader as agent of change and analysis of numerous approaches successful in improving instructional programs.
RESTRICTIONS: Open only to students in the Ed.D. program in educational leadership.

EDUC 896 EDUCATION REFORM: TOPICS AND STRATEGIES 3
Intended for PK-12 educators in leadership roles, including teachers in leadership roles. Covers different perspectives on and issues in education reform and impacts at school and district level. Flexible in content to enable study of current and changing education reform initiatives and to engage students in academic and work-related projects documenting leadership knowledge and competencies in their study of and response to these initiatives.
RESTRICTIONS: Open to Ed.D. majors with PK-12 concentration: otherwise by permission of instructor.

EDUC 897 CURRICULUM INQUIRY 3
Study of emerging concepts and radical policy options found in significant writings that influenced curriculum theory and practice during 20th century.
RESTRICTIONS: Open only to students in the Ed.D. program in educational leadership.

EDUC 964 PRE-CANDIDACY STUDY 3-12 PF
Research and readings in preparation of dissertation topic and/or qualifying examinations for doctoral students before admission to candidacy but after completion of all required course work.
RESTRICTIONS: Not open to students who have been admitted to candidacy.

EDUC 969 DOCTORAL DISSERTATION 1-12 PF

ENGINEERING GRAPHICS AND GENERAL

EGGG 101 INTRODUCTION TO ENGINEERING 2 PF
Introduction to profession, including disciplines of chemical, civil, computer, electrical, environmental, and mechanical engineering. Prepares students for success through integration of following: technical problem solving and engineering design, ethical decision-making, teamwork, and communicating to diverse audiences.

ENGINEERING TECHNOLOGY

EGTE 103 LAND AND WATER MANAGEMENT 3
Topics covered are land application of wastes, hazardous waste management, acid rain, nonpoint source pollution, water treatment, wetlands, rainfall, runoff, groundwater rise, erosion control, irrigation and drainage.
RESTRICTIONS: Open to non-majors only.

EGTE 104 INTRODUCTION TO LAND SURVEYING 1
Topographic surveying, mapping and measurement of distance, area and earth volume for applications in natural resource management, land surveying and construction.

EGTE 107 WELDING AND METALS 2
Arc welding, gas welding, soldering, sheet metal layout and fabrication, and properties of metals.

EGTE 108 UTILITIES 2
Domestic water supply and waste disposal, house wiring, heating systems.

EGTE 112 PERSONAL COMPUTERS AND TECHNOLOGY 3
Introduction to personal computers, PC operation systems, programming, and software packages such as spreadsheets and word processing. Statistical and numerical analysis techniques applied to production problems in engineering technology.

EGTE 115 INTRODUCTION TO COMPUTER BASED PROBLEM SOLVING 4
Provides foundation in application of computers and engineering principles for agriculture, industry and environmental sciences. Emphasizes fundamentals of computer programming, problem solving and practical applications within field. Includes design project and laboratory.
COREQ: MATH 117 or higher.

EGTE 165 FRESHMAN SEMINAR 0 PF
Focuses on academic services, career exploration and preparation, campus resources, and practical skills helpful in mastering freshman year.
RESTRICTIONS: Limited to freshmen in College of Agriculture and Natural Resources.

EGTE 209 TECHNICAL AND COMPUTER AIDED DRAFTING 3
Two dimensional drafting including layouts, geometric constructions, lettering, dimensioning, multiview projections, sectional and auxiliary views using AutoCAD for drafting, entity creation and modification and data management.

EGTE 215 APPLIED FLUID MECHANICS 4
Fluid properties, fluid statics, conservation of mass, energy, and momentum as applied to engineering systems. Pipe flow, distribution systems, pumps, open channel flow, hydraulics structures. Laboratory includes flow measurements, energy measurements and analysis of data.
PREREQ: EGTE 115, MATH 221/241 and PHYS 201/207.

EGTE 231 FUNDAMENTALS OF STATICS AND STRENGTH OF MATERIALS 4
Analysis of forces and equilibrium on bodies in two and three dimensions and forces on building components. Stresses, displacement and failure in beams and columns. Strength of wood, steel, concrete and masonry.
PREREQ: MATH 221/241, PHYS 201/207.

EGTE 244 ELECTRICITY FOR ENGINEERING TECHNOLOGY 4
Electrical power systems for buildings, including distribution equipment and motor selection. Fundamentals of alternating current, single phase and three phase circuits. Laboratory emphasizes control logic and electro-mechanical devices.

EGTE 245 ANALOG ELECTRONICS 3
Foundation in analysis, selection and integration of analog electronics to meet modern industrial challenges. Selected applications include diodes, field effect and bipolar transistors, amplifiers, thyristors and introduction to frequency analysis.
PREREQ: EGTE 244.

EGTE 306 COST ESTIMATING 3
Building components, bill of materials and cost estimating using cost of materials plus labor system.
PREREQ: EGTE 209.

EGTE 311 FUNDAMENTALS OF THERMODYNAMICS 3
PREREQ: EGTE 215.
COREQ: MATH 222 or MATH 242.

EGTE 312 FUNDAMENTALS OF SOIL MECHANICS 3
Engineering properties of soils, soil testing and classification, permeability and drainage, soil stresses, shear strength, bearing capacity, compaction, slope stability, and design of foundations.
PREREQ: EGTE 231.

EGTE 321 STORM WATER MANAGEMENT 4
Hydrology for small (urban/suburban/rural) watersheds. Design of culverts, storm drains, spillways, vegetated waterways, and storm-water management systems.
PREREQ: EGTE 215.

EGTE 328 WASTEWATER TREATMENT SYSTEMS 3
Properties of municipal and food processing wastes. Wastewater treatment, biosolids management and wastewater utilization.
PREREQ: CHEM 101 or 102, and MATH 221.

EGTE 366 INDEPENDENT STUDY 1-3

EGTE 416 PROJECT ECONOMIC ANALYSIS 3
Fundamentals of engineering economic analysis. Topics include cash flow, time value of money, equivalence, compound interest formulas, annual cost, present worth, capitalized cost, rate of return, future worth, break even analysis, depreciation and income taxes. Use of computer applications and differential calculus in economic analysis.
PREREQ: MATH 221 or equivalent, EGTE 115.
EGTE 417  PROJECT MANAGEMENT 3  
Basic procedures for finding limiting sequence of events, constructing flow network describing project steps, and project planning and control for optimum scheduling. Project analysis using Critical Path Method (CPM), Project Evaluation and Review Technique (PERT) and linear programming.  
PREREQ: EGTE115.  
RESTRICTIONS: Junior or senior standing.  

EGTE 418  MANUFACTURING 3  
Basic processes, technologies, and process systems. Processes include metal cutting, forming, plastic molding, packaging, and food processing. Current advances and technologies include lean manufacturing, robotics, just-in-time inventory control, ergonomics, controls and quality management.  
RESTRICTIONS: Junior or senior standing in engineering technology or engineering or permission of instructor.  

EGTE 420  SAFETY AND HEALTH IN THE WORKPLACE 3  
Managing safety and health issues, including laws (OSHA) and standards, accident investigations, injury prevention techniques, job safety analysis, and ethical aspects. Case study method used to develop corporate safety plan. Developing safety inspection sheets, analyzing incident data, and designing hazard control programs.  
PREREQ: Statistics, biology, chemistry, and computer use.  
RESTRICTIONS: Intended for juniors, seniors and graduates.  

EGTE 435  MACHINE DESIGN 3  
Various aspects of machine design including static and fatigue failure, and design of machine elements including fasteners, welded joints, bearings, shafts, and power transmission components. Projects include semester-long design problem with customer, design-draw-build exercise in machine shop, and programming of computer-based design tool.  
PREREQ: MATH243/222, EGTE115, EGTE209, EGTE231.  

EGTE 440  PLANT LAYOUT AND MATERIALS HANDLING 3  
Fundamentals of spatial relationships, work flow patterns, equipment selection, conveyor sizing and motion economy applied to production and production facilities.  
PREREQ: EGTE115, EGTE209, EGTE215, EGTE231, and EGTE244.  

EGTE 443  INSTRUMENTATION 3  
Selection, operating principles and application of physical and chemical devices for indicating, recording and controlling laboratory and field conditions or processes.  
PREREQ: PHYS202 or 208, EGTE244 or equivalent.  

EGTE 444  PROGRAMMABLE LOGIC CONTROL APPLICATIONS 3  
Teaches application of PLCs and how to use them effectively. Major topics include control systems and terminology, PLC structure and instruction sets, control of sequential processes, and safety and implementation. Applications programmed and tested on actual PLCs.  
PREREQ: EGTE115, EGTE209, EGTE215, EGTE231, and EGTE244.  

EGTE 444  FOOD ENGINEERING TECHNOLOGY 4  
See FOSC445 for course description.  

EGTE 449  APPLIED CONTROLS 3  
Selection, operating principles and application of electrical, mechanical and mechatronic systems for industrial, agricultural and environmental applications. Includes laboratory and design project.  
RESTRICTIONS: Requires junior or senior status in major or approval of department.  

EGTE 450  TECHNICAL PRACTICUM IN INDUSTRY 1-3  
Structured experience in industry. Minimum of 40 hours of technical activities per credit hour. Upon completion, students present results to department faculty and industrial sponsor through written reports and oral presentations. Proposals approved in advance by the department faculty, and a designated faculty advisor is required.  
RESTRICTIONS: Junior standing. May be repeated twice for credit.  

EGTE 451  SENIOR DESIGN 3  
Work with engineering and technology advisors from industry, state agencies, and faculty on design projects requiring knowledge and skills acquired in previous courses.  
RESTRICTIONS: Requires senior status in engineering technology.  

EGTE 454  WOOD AND STEEL STRUCTURES 3  
Analysis and design of structures using wood and steel for building materials.  
PREREQ: EGTE231, PHYS201/207.  

EGTE 455  CONCRETE AND MASONRY STRUCTURES 3  
Use of concrete and masonry in building structures. Includes analysis and design with concrete and masonry.  
PREREQ: EGTE231, PHYS201/207.  

EGTE 456  FUNDAMENTALS OF HEATING, VENTILATION AND AIR CONDITIONING 3  
Heating, ventilating and air conditioning of rural, residential and light commercial buildings. Heat transmission in structures, space heating and cooling loads, air distribution, piping and fluid flow, heat and water production in livestock and poultry structures, environmental systems for specific plant and animal structures.  
PREREQ: EGTE115, EGTE215 and EGTE311.  

EGTE 466  INDEPENDENT STUDY 1-3  

ELECTRICAL ENGINEERING  

ELEG 205  ANALOG CIRCUITS I 4  
Laws of electric circuit, analysis of DC and AC circuits, network equations and network theorems.  
PREREQ: MATH242 and PHYS207.  

ELEG 212  SIGNALS AND COMMUNICATIONS 4  
Introduction to signals, systems and communications. Covers discrete and continuous time systems, sampling, and conversion between analog and digital signals. Example systems studied may include voice coding, telephony, television and digital audio.  
PREREQ: MATH242.  

ELEG 240  PHYSICAL ELECTRONICS 4  
Introduction to semiconductor devices, electromagnetic fields and waves, and optics. Covers basic electronic devices including diodes, transistors, lasers, antennas and optical elements.  
PREREQ: MATH243, ELEG205.  
COREQ: MATH341.  

ELEG 302  INTRODUCTION TO DEVICES AND MATERIALS 3  
Emphasizes concepts and properties of materials important in modern solid state electronics. Topics include structure and processing of electrical materials, band structure, carrier concentration and dynamics, junction phenomena and optical and magnetic phenomena.  
PREREQ: MATH243 and PHYS208.  

ELEG 305  SIGNAL PROCESSING I 3  
Continuous and discrete time signals and systems at introductory and intermediate levels. Covers transforms, filtering, sampling, and reconstruction. Applications discussed may include digital signal processing, communications and multimedia.  
PREREQ: ELEG212.  

ELEG 306  SIGNAL PROCESSING II 3  
Continues topics introduced in ELEG305 at more advanced level. Introduces filter design, transmission line analysis, discrete Fourier transform, fast Fourier transform and roundoff effects.  
PREREQ: ELEG305.  

ELEG 309  ELECTRONIC CIRCUIT ANALYSIS I 4  
Introduction to physical principles of solid state electronic devices. Quantitative study of elementary circuits including biasing, linear power amplifiers, low-frequency small signal analysis, multiple transistor circuits and feedback.  
PREREQ: ELEG205.  

ELEG 310  RANDOM SIGNALS AND NOISE 3  
Introduction to probability and estimation as applied to random signals and noise. Includes random variables, densities, distributions, random processes, spectral representations and statistics.  
PREREQ: ELEG305.  

ELEG 312  ELECTRONIC CIRCUIT ANALYSIS II 4  
Low-frequency and high-frequency response of RC-coupled amplifiers, Class A tuned amplifiers, tuned power amplifiers, frequency response and stability of feedback amplifiers, oscillators, modulation and demodulation circuits.  
PREREQ: ELEG309.  

ELEG 314  ELECTRONICS AND INSTRUMENTATION 4  
Steady state circuit analysis, diode, power supplies and filters. Rotating machinery. Integrated circuits, operational amplifiers, A to D converters and digital building blocks with applications to information handling.  
PREREQ: PHYS208 and MATH302.  
RESTRICTIONS: Not for major credit.  

399
ELEG 320  Field Theory I 4
Study of theory and problems in electrostatic and magnetostatic fields. Maxwell's equations.
PREREQ: PHYS208 and ELEG205.
COREQ: MATH243 can be either a prerequisite or a corequisite.

ELEG 340  Solid State Electronics I 3
Introduction to the concepts necessary to establish electronic phenomena in solids. Application to electronic devices such as diodes, transistors, FETs and integrated circuits. Emphasis on the reduction of the physical device to a circuit model. PREREQ: ELEG240.
COREQ: MATH342.

ELEG 341  Solid State Electronics II 3
Theory of multi-terminal semiconductor devices, with emphasis on bipolar junction transistors (BJTs) and field-effect transistors (FETs). Applications extended to charge-coupled devices (CCDs), floating-gate devices including flash memory, and high-frequency and high-power devices. PREREQ: ELEG340.

ELEG 366  Independent Study 1-6
ELEG 370  Engineering Electromagnetics 4
Electromagnetic fields and waves. Static and dynamic solutions of Maxwell's equations, transmission lines, waves and radiating systems. Associated computational methods. PREREQ: MATH342, ELEG240.

ELEG 403  Communication Systems Engineering 3
Review of signal theory, Fourier transforms, linear and time-invariant systems; review of probability and random signals; information theory, source entropy, channel capacity; baseband data transmission, modulation, noise in analog systems and digital carrier modulation. PREREQ: ELEG305.

ELEG 409  Signals and Communication Design I 4
Part I of two semester design course, ELEG/CEPG409/410. Covers background material for development of major design project in signal processing or communications. May be cross-listed with CPEG409. PREREQ: ELEG305, CISC181.

ELEG 410  Signals and Communications Design II 4
Design of signal processing, control and communications systems. Major design project required. Students study, design, build and test their projects. Periodic oral and written reports are required. May be cross-listed with CPEG410. PREREQ: ELEG409.

ELEG 413  Field Theory II 3

ELEG 415  Electric Power and Renewable Energy Systems 3
Introduction to electric power systems and interfaces with renewable energy sources. Covers electric power generation, transmission, distribution, residential, commercial, and industrial systems; components, operation, losses, metering and load management. PREREQ: ELEG205.

ELEG 418  Digital Control Systems 3
Study of closed-loop digital control systems. Emphasis on simulation methods and pole placement techniques for controller development. Both root-locus and input/output pole placement using Diphantine equation used to generate designs. MATLAB used for computer aided design.

ELEG 419  Multimedia Communications 3
Theory and principles of multimedia communications, including data compression, CD-ROMs, multimedia networking and standards (JPEG, MPEG, H261, H263, RTP, etc.).

ELEG 420  Electronic Circuit Design 4
Design with and application of operational amplifiers using integrated circuit units. Design of discrete element clamping and clipping circuits, logic circuits, multivibrators, etc. Analysis and simulation of digital integrated circuits. Laboratory studies involve extensive use of analog and digital computers. PREREQ: ELEG312.

ELEG 421  Solid State Nanotechnology 3
Introduces principles of solid state physics for electronics and photonics. Topics include material structure; states and statistics of charge carriers; and properties of conductors, insulators, and semiconductors. Provides foundation for understanding nanotechnology applications and nanophase materials. PREREQ: Senior standing.

ELEG 422  Semiconductor Materials Processing 3
Basic goals, principles and techniques of semiconductor materials processing discussed. Emphasis on physical explanations of how devices and processes work rather than on elaborate mathematical models.

ELEG 423  Electrical Properties of Matter 3
Provides basic understanding of electronic behavior in materials used for fabricating semiconductor devices. Introduces fundamentals of electron theory; elementary quantum mechanics (as applied to semiconductors); concept of energy bands; electronic behavior in crystals; electrical conduction in metals, alloys, semiconductors and insulators; metal-semiconductor contacts and metallization. PREREQ: ELEG340, ELEG370.

ELEG 424  Quantum Mechanics 3
See PHYS424 for course description.

ELEG 426  Photonic Crystal Devices 3
Introduces design and fabrication tools required for photonic crystal structures. Begins with working knowledge of their basic operation physics and then introduces mathematical and computational methods for their design. Various fabrication methods discussed such as lithographic and self-assembly methods. PREREQ: ELEG370.

ELEG 427  Terahertz and Millimeter-Wave Light Generation and Detection 3
Light treated as antenna phenomenon at radio wavelengths and a quantum effect near the visible. Terahertz frequencies and millimeter-wavelengths, these distinctions are blurred and both technologies exist. These technologies are described and unified view of their principles described. PREREQ: ELEG240.

ELEG 428  Systems Analysis and Control 3

ELEG 429  Low Power Electronics and Lighting 3
Presents various techniques whereby electronics can be designed for lower power consumption. Considers various lighting devices available, from incandescent to light emitting diodes, showing their principles of operation and their energy efficiency. PREREQ: ELEG205, ELEG240.

ELEG 430  Microwave Circuit Design Principles 4
Provides comprehensive introduction to time and frequency domain integrated circuit design in picosecond/GHz regime. Major design project required. PREREQ: ELEG312 and ELEG370.

ELEG 438  Theory and Design of Diffractive Optics 4
Applications of Fourier analysis to diffraction, imaging optical data processing and holography. Major design project required. PREREQ: ELEG305, ELEG370.

ELEG 439  Magnetism and Spintronics 3
Surveys field with focus on fundamentals of magnetism in solids, magnetic materials, thin film spintronics devices (such as magnetic tunnel junctions and Giant Magneto-Resistance (GMR) sensors), metal-semiconductor spintronics devices, and semiconductor spin transport and optical methods.

ELEG 440  Opto-electronics 3
Introduction to operating principles of optoelectronic devices used in various digital transmission and information processing systems. Emphasis on generation (via lasers) and detection of optical signals. PREREQ: Senior standing with completion of all core physics and math courses required or permission of instructor.

ELEG 441  Antenna Theory and Design 3
Radiation characteristics of antennas, numerical and analytical antenna analysis methods and design techniques for many types of antenna. Topics include wire antennas, antenna arrays, broadband antennas and microstrip antennas. PREREQ: ELEG370.

ELEG 442  Biomedical Nanotechnology 3
Applications of nanotechnology in biomedical engineering. Topics include nanomedicine in medical diagnostics, molecular manufacturing and transduction, nanoscale manipulation, nanomaterials and nano-sensors for medical applications.

ELEG 444  Micro-Electro-Mechanical Systems 3
Explores world of silicon-based micromachines. Topics include lithography, pattern transfer with etching and additive techniques, bulk and surface micromachining, LIGA, scaling laws and applications.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEG 445</td>
<td><strong>Optical Communication Systems</strong></td>
<td>3</td>
<td>Studies components and system design issues of fiber optic based communications systems. Topics include propagation of lightwaves in fibers, coupling of light into fibers, review of sources and detectors used in fiber-based systems, link analysis, and overall architecture issues. PREREQ: ELEG440 or permission of instructor.</td>
</tr>
<tr>
<td>ELEG 446</td>
<td><strong>Nanoelectronic Device Principles</strong></td>
<td>3</td>
<td>Introduction to operating principles of nanoscale optical and electronic devices, with emphasis on how nanotechnology and quantum mechanics affect devices with reduced sizes and dimensions. Develops performance and limitations of devices based on quantum wells, wires, dots, and nanophase materials. PREREQ: ELEG240.</td>
</tr>
<tr>
<td>ELEG 447</td>
<td><strong>Optical Properties of Solids</strong></td>
<td>3</td>
<td>Techniques for design of optical filters and optoelectronic devices with thin films and fundamental electromagnetic and solid state physics that determine optical properties of solids. PREREQ: ELEG240.</td>
</tr>
<tr>
<td>ELEG 449</td>
<td><strong>Nanomaterials and Applications</strong></td>
<td>3</td>
<td>Practical introduction to various areas of nanomaterials with applications in engineering and science. Includes details of processing and characterization of materials for nanotechnology such as nanoparticles, carbon nanostructures, nanostructured ferromagnetism, quantum wires, organic compounds and polymers, and biological materials. PREREQ: PHYS208.</td>
</tr>
<tr>
<td>ELEG 450</td>
<td><strong>Semiconductor Device Design and Fabrication</strong></td>
<td>4</td>
<td>Instruction in design and fabrication of simple bipolar and MOS integrated circuits. Specific topics include semiconductor device and integrated circuit design, photolithographic mask design and fabrication, photolithography, N-diffusion and P-diffusion, P-MOS, metallization and device and integrated circuit testing.</td>
</tr>
<tr>
<td>ELEG 454</td>
<td><strong>Sensor and Data Wireless Networks</strong></td>
<td>3</td>
<td>Design of sensor and data wireless networks and design protocols for these networks. Implementation of wireless protocols required. Topics include wireless propagation, energy usage in wireless terminals, MAC, routing, transport, localization, and standards for sensor, data, and mesh wireless networks. PREREQ: Background in networking with knowledge of routing and transport layer protocols as well as a strong background in programming.</td>
</tr>
<tr>
<td>ELEG 460</td>
<td><strong>High Technology Entrepreneurship</strong></td>
<td>3</td>
<td>See ENTR460 for course description.</td>
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<tr>
<td>ELEG 466</td>
<td><strong>Independent Study</strong></td>
<td>1-6</td>
<td></td>
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<tr>
<td>ELEG 470</td>
<td><strong>Biophysics of Excitable Membranes</strong></td>
<td>3</td>
<td>Includes passive and active membrane properties, temporal/spatial integration of synaptic inputs, saltatory conduction, and relationship between molecular structure and conduction properties of major classes of voltage-gated and ligand-gated ion channels. PREREQ: ELEG471, or BISC306, or PSYC320, or PSYC626, or instructor’s permission. RESTRICTIONS: Open to all seniors and graduate students.</td>
</tr>
<tr>
<td>ELEG 471</td>
<td><strong>Introduction to Biomedical Engineering</strong></td>
<td>3</td>
<td>Introduction to human physiology at all hierarchical levels including molecular, biochemical, cellular, tissue, organ, and integrated systems. RESTRICTIONS: Seniors only.</td>
</tr>
<tr>
<td>ELEG 472</td>
<td><strong>Cell and Molecular Biology for Engineers</strong></td>
<td>3</td>
<td>Overview of cell biology and molecular mechanisms. Covers some intercellular interactions, but main focus on intracellular structure, organization, and function.</td>
</tr>
<tr>
<td>ELEG 473</td>
<td><strong>Signal Processing in Neural Systems</strong></td>
<td>3</td>
<td>Signal processing in real neural systems, with emphasis on mammalian/human sensory systems. Stimulus transduction, complex receptive fields, encoding, feature binding, and experimental techniques in visual, somatosensory, auditory and olfactory systems. PREREQ: ELEG471 or instructor’s permission.</td>
</tr>
<tr>
<td>ELEG 474</td>
<td><strong>Nonlinear Dynamics in Neural Systems</strong></td>
<td>3</td>
<td>Introduction to mathematical tools, theory, and experimental observations that concern nonlinear dynamics of biological nervous systems. Classical methods employed to develop unified approach to study and understanding of nonlinear dynamics, chaos, synchronicity, bifurcation, and self-organization. PREREQ: MATH245.</td>
</tr>
<tr>
<td>ELEG 475</td>
<td><strong>Image Processing with Biomedical Applications</strong></td>
<td>3</td>
<td>Fundamentals of digital image processing, including image formation, acquisition, transforms, enhancement, restoration, coding, and reconstruction from projections. Attention is given to biomedical imaging modalities, including X-ray, computed tomography (CT), magnetic resonance (MR) imaging, and ultrasound. PREREQ: ELEG305.</td>
</tr>
<tr>
<td>ELEG 477</td>
<td><strong>Biological Processing</strong></td>
<td>3</td>
<td>Biomedical signal characteristics, biomedical systems and models, applications of Fourier transform, wavelet transforms, and joint-time frequency analysis of biomedical signals. Systems studies include ultrasounds, EKG’s, CAT scans, MRI’s, X-rays, and others. PREREQ: ELEG305, ELEG310, or equivalent.</td>
</tr>
<tr>
<td>ELEG 478</td>
<td><strong>Introduction to Nano and Biophotonics</strong></td>
<td>3</td>
<td>Multidisciplinary approach covers fundamentals of lightmatter interactions and nanoscale materials and discusses their use in understanding, characterizing and manipulating biological systems. Covers several applications including laser manipulation and dissection, bio-imaging, flow cytometry and biosensors, optical biopsy and spectroscopy and photodynamic therapy.</td>
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<tr>
<td>ELEG 490</td>
<td><strong>Career Skills for Engineers</strong></td>
<td>1</td>
<td>See CPEG490 for course description.</td>
</tr>
<tr>
<td>ELEG 491</td>
<td><strong>Engineering Career Skills I</strong></td>
<td>1</td>
<td>Covers variety of skills engineers need in their careers, including ethics, need for life-long learning, societal and global impact of engineering solutions, teaming and team dynamics, resume writing, interviewing and communications. RESTRICTIONS: Open to engineering seniors, or by permission of instructor.</td>
</tr>
<tr>
<td>ELEG 606</td>
<td><strong>Ocean and Atmosphere Remote Sensing</strong></td>
<td>3</td>
<td>See MAST606 for course description.</td>
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<tr>
<td>ELEG 611</td>
<td><strong>Linear Systems Theory</strong></td>
<td>3</td>
<td>Reviews fundamentals of matrix and linear algebra, introduces ideas around state-space representations of linear systems and demonstrates application areas in signal processing including estimation and control of dynamic systems.</td>
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<tr>
<td>ELEG 615</td>
<td><strong>Electric Power and Renewable Energy Systems</strong></td>
<td>3</td>
<td>Introduction to electric power systems and interfaces with renewable energy sources. Covers electric power generation, transmission, distribution, residential, commercial, and industrial systems; components, operation, losses, metering and load management. PREREQ: ELEG205.</td>
</tr>
<tr>
<td>ELEG 616</td>
<td><strong>Kinetic Theory and Thermodynamics</strong></td>
<td>3</td>
<td>See PHYS616 for course description.</td>
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<tr>
<td>ELEG 619</td>
<td><strong>Multimedia Communications</strong></td>
<td>3</td>
<td>Theory and principles of multimedia communications, including data compression, CD-ROMs, multimedia networking and standards (JPEG, MPEG, H261, H263, RTP, etc.).</td>
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<tr>
<td>ELEG 620</td>
<td><strong>Solar Electric Systems</strong></td>
<td>3</td>
<td>Examines issues critical to deployment of photovoltaic systems. Focuses on systems that have electricity generating capacity of three kilowatts and larger.</td>
</tr>
<tr>
<td>ELEG 621</td>
<td><strong>Solid State Nanotechnology</strong></td>
<td>3</td>
<td>Introduces principles of solid state physics for electronics and photonics. Topics include material structure, states and statistics of charge carriers, and properties of conductors, insulators, and semiconductors. Provides foundation for understanding nanotechnology applications and nanophase materials.</td>
</tr>
<tr>
<td>ELEG 622</td>
<td><strong>Electronic Materials Processing</strong></td>
<td>3</td>
<td>Theory and current technology of semiconductor fabrication processes, including crystal growth, wafer preparation, lithography, liquid and vapor phase epitaxy, molecular-beam epitaxy of ultra-thin layers and superlattices, oxide growth, thin-film deposition, diffusion, ion implantation, etching and metallization.</td>
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<tr>
<td>ELEG 623</td>
<td><strong>Ultrafast Optics</strong></td>
<td>3</td>
<td>Introduction to techniques and applications involving femtosecond and picosecond lasers. Topics include: temporal and spectral properties of ultrashort pulses, linear propagation in bulk media, dispersion control, nonlinear optical propagation, active and passive modelocking, chirped pulse amplification, and pulse measurement techniques.</td>
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<tr>
<td>ELEG 624</td>
<td><strong>Fundamental Device Principles</strong></td>
<td>3</td>
<td>Introduces fundamental principles of semiconductor devices and derives operating characteristics of several important device examples. Topics include semiconductor basics, equilibrium and nonequilibrium properties, Fermi levels, transport, injection, generation, recombination, p-n junctions bias, Fermi potentials, capacitance, I-V characteristics, bipolar transistors, junction field effect transistors, MOS transistors, ideal MOS structure, microwave and optoelectronic devices.</td>
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<tr>
<td>ELEG 625</td>
<td><strong>Optical Fiber Communications</strong></td>
<td>3</td>
<td>Introduces fundamental aspect of optical fiber communications as well as advanced topics, such as all optical communications and networks. Topics include optical fiber structure, characteristics and fabrications, wave propagation in dispersive medium, optical sources and coupling, optical detectors, communication systems and advanced system techniques. RESTRICTIONS: Undergraduate students require permission of instructor.</td>
</tr>
</tbody>
</table>

401
ELEG 626  PHOTONIC CRYSTAL DEVICES
Introduces design and fabrication tools required for photonic crystal structures. Begins with working knowledge of their basic operation physics and then introduces mathematical and computational methods for their design. Various fabrication methods discussed such as lithographic and self-assembly methods. 
PREREQ: ELEG648.

ELEG 627  TERAHERTZ AND MILLIMETER-WAVE LIGHT GENERATION AND DETECTION
Light treated as antenna phenomenon at radio wavelengths and quantum effect near the visible. At terahertz frequencies and millimeter-wavelengths, these distinctions are blurred and both technologies exist. These technologies described and unified view of their principles described.
PREREQ: ELEG624.

ELEG 628  SOLAR ENERGY TECHNOLOGY AND APPLICATION
Introduces basics of solar cell technology, applications, and systems. Presents critical issues in research, manufacturing, cost and performance. Compares Si wafer and thin film solar technology. Analyzes off-grid, residential, building integrated, centralized power systems. Discusses other solar energy concepts.

ELEG 629  LOW POWER ELECTRONICS AND LIGHTING
Presents various techniques whereby electronics can be designed for lower power consumption. Considers various lighting devices available, from incandescent to light emitting diodes, showing their principles of operation and their energy efficiency.
PREREQ: ELEG205, ELEG240.

ELEG 630  INFORMATION THEORY
Information theory establishes theoretical limits that can be achieved in communications systems, and provides insights about how to achieve these limits in practical systems. Covers lossless and lossy compression, and studies maximum information rate achievable in communications over noisy channels.

ELEG 631  DIGITAL SIGNAL PROCESSING
Theory of discrete-time signals and systems with emphasis on frequency domain description of digital filtering and discrete spectrum analysis, fast Fourier transform, z-transform, digital filter design, relationship to analog signal processing.
PREREQ: ELEG305.

ELEG 632  MATHEMATICAL METHODS FOR SIGNAL PROCESSING
Application of mathematics to signal processing. Topics include, among others, applications of linear and matrix algebra, iterative and recursive methods, and optimization techniques. Example applications include: Karhunen-Loeve approximation, subspace techniques, steepest descent, expectation maximization and Hidden Markov Models, Viterbi algorithm.
PREREQ: Linear and matrix algebra and digital signal processing.
RESTRICTIONS: Undergraduates need permission of the instructor.

ELEG 633  IMAGE PROCESSING
Review of concepts of linear systems and spectral analysis, human visual response, scanning and display of images, Fourier optics, image enhancement and feature extraction, design of digital filters for image processing, 2D fast Fourier transform algorithms and computed tomography.
RESTRICTIONS: Requires permission of instructor.

ELEG 634  SIGNALS AND SYSTEMS
Reviews basic concepts of discrete and continuous time signals, control systems, and linear algebra. Transforms, sampling, aliasing, linear algebra and systems of equations, matrix factorizations, eigenvalues and eigenvectors, least squares, and Covley-Hamilton theorem studied.
PREREQ: ELEG305 and MATH342 or MATH349 or equivalents.

ELEG 635  DIGITAL COMMUNICATION
Theory and applications of digital communications including modulation, pulse shaping, and optimum receiver design for additive, white gaussian noise and bandlimited channels.
PREREQ: Undergraduate course in probability, signals and linear systems.

ELEG 636  STATISTICAL SIGNAL PROCESSING AND DETECTION
PREREQ: Undergraduate courses in probability and signals and linear systems.

ELEG 638  THEORY AND DESIGN OF DIFFRACTIVE OPTICS
Applications of Fourier analysis to diffraction, imaging, optical data processing and holography. Major design project required.
PREREQ: ELEG305, ELEG306 and ELEG320.

ELEG 639  MAGNETISM AND SPINTRONICS
Surveys field with focus on fundamentals of magnetism in solids, magnetic materials, thin film spintronics devices such as magnetic tunnel junctions and giant magneto-resistance (GMR) sensors, metal-semiconductor spintronics devices, and semiconductor spin transport and optical methods.

ELEG 640  OPTO-ELECTRONICS
Introduction to operating principles of optoelectronic devices used in various digital transmission and information processing systems. Emphasis on generation (via lasers) and detection of optical signals.

ELEG 641  ANTENNA THEORY AND DESIGN
Radiation characteristics of antennas, numerical and analytical antenna analysis methods and design techniques for many types of antenna. Topics include wire antennas, antenna arrays, broadband antennas and microstrip antennas.
PREREQ: ELEG370 or ELEG413.

ELEG 642  BIOMEDICAL NANOENGINEERING
Applications of nanotechnology in biomedical engineering. Topics include nanomedicine in medical diagnostics, molecular manufacturing and transport, nanoscale manipulation, nanomaterials and nanosensors for medical applications.

ELEG 643  COMPUTATIONAL METHODS FOR ELECTROMAGNETICS
Develop and apply numerical techniques for solving Maxwell's equations as they apply to radiation, propagation and scattering problems. Techniques such as finite-difference time and frequency-domain methods, finite element method, method of moments and the boundary element method introduced.

ELEG 644  MICRO-ELECTRO-MECANICAL SYSTEMS
Explores world of silicon-based micromachines. Topics include lithography, pattern transfer with etching and additive techniques, bulk and surface micromachining, LIGA, scaling laws and applications.

ELEG 645  OPTICAL COMMUNICATIONS
Studies components and system design issues of fiber optic based communications systems. Topics include the propagation of lightwaves in fibers, coupling of light into fibers, review of sources and detectors used in fiber-based systems, link analysis, and overall architecture issues.
PREREQ: ELEG640 or permission of instructor.

ELEG 646  NANOELECTRONIC DEVICE PRINCIPLES
Introduction to operating principles of nanoscale optical and electronic devices, with emphasis on how nanotechnology and quantum mechanics affect devices with reduced sizes and dimensions. Develops performance and limitations of devices based on quantum wells, wires, dots, and nanophase materials.

ELEG 647  OPTICAL PROPERTIES OF SOLIDS
Techniques for design of optical filters and optoelectronic devices with thin films and fundamental electromagnetic and solid state physics that determine optical properties of solids.
PREREQ: ELEG240 or equivalent.

ELEG 648  ADVANCED ENGINEERING ELECTROMAGNETICS
Development and application of Maxwell's equations as they apply to analysis of guided wave, radiation, and scattering problems. Topics include wave propagation, reflection and transmission, vector potentials, transmission lines and cavities, and special emphasis on antennas and scattering structures.

ELEG 649  NANOMATERIALS AND APPLICATIONS
Introduction to various areas of nanomaterials with practical applications in engineering and science. Includes details of processing and characterization of materials for nanotechnology such as nanoparticles, carbon nanostructures, nanostructured ferromagnetism, quantum wires, organic compounds and polymers, and biological materials.
PREREQ: PHYS207, PHYS208 or equivalent.

ELEG 650  SEMICONDUCTOR DEVICE DESIGN AND FABRICATION
Instruction in design and fabrication of simple bipolar and MOS integrated circuits. Specific topics include semiconductor device and integrated circuit design, photolithographic mask design and fabrication, photolithography, N-diffusion and P-diffusion, PMOS, metalization, and device and integrated circuit testing.
PREREQ: ELEG340.

ELEG 651  COMPUTER NETWORKING COMMUNICATIONS
Basic concepts in computer network analysis and design. Emphasizes generic principles developed over last two decades in specification, implementation and evaluation of modern computer networks and networking systems.
RESTRICTIONS: Requires undergraduate mathematical maturity, including calculus, analytical geometry and infinite series and courses in operating systems and computer architecture.
ELEG 652 PRINCIPLES OF PARALLEL COMPUTER ARCHITECTURES 3
Introduction to principles of parallel computer architecture. Assumes experience in
introductory undergraduate courses such as digital system design, computer
architecture, and microprocessor based systems.

ELEG 653 COMPUTER SYSTEM SECURITY 3
Surveys current topics in computer network security, including technology to protect
networks, protocols and applications from intrusion and theft. Topics include
techniques for authentication, privacy, denial of service and non-repudiation.
PREREQ: ELEG653 or CISC650 or permission from the instructor.

ELEG 654 SENSOR AND DATA WIRELESS NETWORKS 3
Design of sensor and data wireless networks and design protocols for these
networks. Implementation of wireless protocols required. Topics include wireless
propagation, energy usage in wireless terminals, MAC, routing, transport,
localization, and standards for sensor, data, and mesh wireless networks.
PREREQ: Background in networking with knowledge of routing and transport layer
protocols as well as strong background in programming.

ELEG 660 HIGH TECHNOLOGY ENTREPRENEURSHIP 3
Focuses on critical financial, legal, scientific and engineering issues confronted
during initial planning stages of start-up enterprise. Students work in teams to
develop business plan for real world/business product offering.

ELEG 661 MATERIALS AND DEVICES SEMINAR 0 PF
Lectures and discussions by faculty and students on specialized topics in materials
and devices.

ELEG 662 DIGITAL SYSTEMS SEMINAR 0 PF
Lectures and discussions by faculty and students on specialized topics in digital
systems.

ELEG 663 SIGNAL PROCESSING SEMINAR 0 PF
Lectures and discussions by faculty and students on specialized topics in signal
processing and communications.

ELEG 664 BIOMEDICAL ENGINEERING SEMINAR 0
Lectures and discussions by guest speakers, faculty, and students on specialized
topics in biomedical engineering.

ELEG 670 BIOPHYSICS OF EXCITABLE MEMBRANES 3
Includes passive and active membrane properties, temporal/spatial integration of
synaptic inputs, ionic conductance, and relationship between molecular structure
and conduction properties of major classes of voltage-gated and ligand-gated ion
channels.
PREREQ: ELEG471, or BISC306, or PSYC320, or PSYC626, or instructor’s
permission.
RESTRICTIONS: Open to all seniors and graduate students.

ELEG 671 INTRODUCTION TO BIOMEDICAL ENGINEERING 3
Introduction to human physiology at all hierarchical levels including molecular,
biochemical, cellular, tissue, organ, and integrated systems.
RESTRICTIONS: Seniors, graduate students only.

ELEG 672 CELL AND MOLECULAR BIOLOGY FOR ENGINEERS 3
Overview of cell biology and molecular mechanisms. Covers some intercellular
interactions, but main focus on intracellular structure, organization, and function.
Emphasis on application of cell properties to analysis of common biological data
sets, including genomic, proteomic data.

ELEG 673 SIGNAL PROCESSING IN NEURAL SYSTEMS 3
Signal processing in real neural systems, with emphasis on mammalian/human
sensory systems. Stimulus transduction, complex receptive fields, encoding, feature
binding, and experimental techniques in visual, somatosensory, auditory and
olfactory systems.
PREREQ: ELEG471/671 or instructor’s permission.

ELEG 674 NONLINEAR DYNAMICS IN NEURAL SYSTEMS 3
Introduction to mathematical tools, theory, and experimental observations that
concern nonlinear dynamics of biological nervous systems. Classical methods
employed to develop unified approach to study and understanding of nonlinear
dynamics, chaos, synchronicity, bifurcation, and self-organization.
PREREQ: MATH243.

ELEG 675 IMAGE PROCESSING WITH BIOMEDICAL APPLICATIONS 3
Fundamentals of digital image processing, including image formation, acquisition,
transforms, enhancement, restoration, coding, and reconstruction from projections.
Attention given to biomedical imaging modalities, including X-ray, computed
tomography (CT), magnetic resonance (MR) imaging, and ultrasound.
PREREQ: ELEG305 or equivalent.

ELEG 676 BIOINFORMATICS AND BIOSYSTEMS ANALYSIS I 3
Examines basic principles and methodology in algorithm/system design used in
bioinformatics. Topics include: biological sequence comparison, dynamic
programming and heuristic methods, phylogenetic analysis, hidden Markov
models, Bayesian techniques, statistical methods, microarray analysis and gene
prediction.

ELEG 677 BIOSENSORS 3
Biomedical signal characteristics, biomedical systems and models, applications of
Fourier transform, wavelet transforms, and joint-time frequency analysis of
biomedical signals. Systems studies include ultrasounds, EKG’s, CAT scans, MRI’s,
X-rays, and others.
PREREQ: ELEG305, ELEG310, or equivalent.

ELEG 678 INTRODUCTION TO NANO AND BIOPHOTONICS 3
Multidisciplinary approach covers fundamentals of light-matter interactions and
nano-sized materials and discusses their use in understanding, characterizing and
manipulating biological systems. Covers several applications including laser
manipulation and dissection, bio-imaging, flow cytometry and biosensors, optical
biopsy and spectroscopy and photodynamic therapy.

ELEG 681 REMOTE SENSING OF ENVIRONMENT 3
See MAST661 for course description.

ELEG 689 ELECTROMAGNETIC THEORY 3
See PHYS689 for course description.

ELEG 805 DIGITAL SYSTEMS SEMINAR 0 PF
Lectures and discussions by faculty and students on specialized topics in digital
systems.

ELEG 810 ELECTROMAGNETIC THEORY 3
See PHYS610 for course description.

ELEG 811 CHANNEL CODING THEORY AND PRACTICE 3
Standard and modern developments in channel coding. Reviews information
theory topics, then introduces convolutional codes and trellis-coded modulation,
iterative decoding, including turbo codes and low-density parity check codes.

ELEG 812 WIRELESS DIGITAL COMMUNICATIONS 3
Fundamentals and current techniques in wireless digital communications, including
propagation, modern design, fading countermeasures, and multiple access
techniques, such as FDMA, TDMA, and CDMA.
PREREQ: Probability and linear systems.

ELEG 813 STATISTICAL MECHANICS AND THERMODYNAMICS 3
See PHYS513 for course description.

ELEG 819 TOPICS IN NETWORKING I 3
Examines standard routing protocols for wired networks such as OSPF and BGP,
protocols for wireless mesh and ad hoc networks. Includes theoretical analysis of
protocols and examination of data collected from networks. Topics such as load
balancing, multicasting, and cross-layer interactions covered.
PREREQ: CPEG419, CISC450, CISC650, or ELEG681.

ELEG 820 TOPICS IN NETWORKING II 3
Examines standard and recently proposed transport layer protocols for wired
single-hop wireless, and multi-hop wireless networks. Includes analysis of transport
layer protocols based on hybrid-systems models, stochastic models, and utility-
based models. Examines contemporary active queue management algorithms.
Traffic analysis and network provisioning are covered.
PREREQ: CPEG419, CISC450, CISC650, or ELEG681.

ELEG 832 WAVELETS AND FILTER BANKS 3
Systematically studies wavelets, wavelet transforms, multi rate filter bank theory
and their applications in digital communications and signal and image processing.
Applications considered include wavelet denoising and wavelet subband
image/video compression.
PREREQ: ELEG681 and linear algebra.

ELEG 833 NONLINEAR SIGNAL PROCESSING 3
Fundamental theory and applications of nonlinear signal processing. Topics
include stable random processes, order statistics, fractional lower order statistics,
maximum likelihood estimation and filtering problem, weighted order-statistic
filters, medianization of linear FIR filters, myriad filters and adaptive optimization
of nonlinear filters. Applications of nonlinear signal processing include digital
imaging and video, digital communications and time-frequency analysis.
PREREQ: Statistical digital signal processing.

ELEG 840 ADVANCED COMPUTATIONAL ELECTROMAGNETICS I 3
Studies finite-difference time-domain (FDTD) method. Various properties for
electromagnetic modeling such as incorporation of symmetry aspects to reduce
computational costs introduced. Also, several applications including
electromagnetic scattering, antenna design, micro-optical modeling explored.
PREREQ: ELEG681.
ELEG 841 ADVANCED COMPUTATIONAL ELECTROMAGNETICS II 3
Introduces the major modern computational methods for the analysis of frequency domain electromagnetics problems. Finite element method and method of moments covered. Students apply these techniques to radiation and scattering problems involving metal and dielectrics.
PREREQ: ELEG648.

ELEG 842 RADIO FREQUENCY AND MICROWAVE TECHNOLOGY 3
Modern telecommunications and datacom systems operate at frequencies in radio frequency (RF) and microwave range. Basic concepts and technologies required to design RF and microwave devices and circuits explained. Examples of applications to wireless and lightwave systems discussed.
RESTRICTIONS: Undergraduates require permission from the instructor.

ELEG 843 FOURIER OPTICS 3
Provides understanding of basic principles underlying field of optical information processing. Emphasis on coherent optical image processing based on Fourier optics, holography, and acousto-optics.
PREREQ: ELEG640 and ELEG648 or permission of instructor.

ELEG 844 NANO-ELECTRO-MECHANICAL SYSTEMS 3
Explores world of quantum controlled nano-electro-mechanical systems (NEMS). Topics such as quantum mechanics, scaling laws, principles for NEMS, modeling of NEMS devices and structures, nanoelectromagnetics, nanomaterials and nanofabrication for NEMS sensors.

ELEG 845 HIGH SPEED HETEROJUNCTION DEVICES 3
Develops operating principles of heterojunction devices and describes their performance using microwave techniques.

ELEG 853 INTEGRATED OPTICS 3
Explains basic goals, principles and techniques of integrated optics. Includes applications of optical integrated circuits. Emphasis on physical explanations of how devices and systems work rather than on elaborate mathematical models.

ELEG 855 MICROWAVE AND MILLIMETER-WAVE TECHNOLOGY 3
Principles of device operation and circuit characteristics for microwave/millimeter-wave FET, IMPATT, TRAPPATT, Gunn diode, varactor diode, p-i-n diode, tunnel diode. Sub-millimeter-wave and terahertz-frequency devices also described. Covers both waveguide circuits and microwave integrated circuits. Emphasis on physical explanations of how devices and systems work rather than on elaborate mathematical models.

ELEG 868 RESEARCH 1-6
Laboratory study conducted for purpose of contributing new data and theory in some fields of electrical engineering in which information lacking. Although supervised, work independent in character to encourage development of initiative.

ELEG 876 BIOINFORMATICS AND BIOSYSTEMS ANALYSIS II 3
Focuses on machine learning techniques and microarray analysis. Students work on recent research papers and engagement in a project allows them to acquire hands-on-experience in applying biological information to real biocomputational problems.
PREREQ: ELEG676, CISC689, or permission of instructor.

ENGL 011 ENGLISH ESSENTIALS 3 RP
Required of students whose admissions credentials indicate need for additional training in fundamentals of composition prior to enrollment in ENGL110. Individual (tutorial) conferences and small-group instruction.

ENGL 015 PREPARATORY ENGLISH 3 RP
English fundamentals for students inadequately prepared for college composition.

ENGL 101 TOOLS OF TEXTUAL ANALYSIS 3
Gateway introduction to basic tools and strategies used in critical engagement with poetry fiction, drama, and nonfiction. Includes fundamental concepts of textual analysis.
RESTRICTIONS: Offered in two formats, one coupled with a section of ENGL110 and another that is writing intensive with an enrollment cap of 22 students.

ENGL 102 TEXTS IN TIME 3
How texts are shaped by social, political, scientific, technological, artistic, religious, and economic concerns of a given period and how texts, in turn, shape these concerns. Topics vary according to expertise of instructor.
PREREQ: ENGL101, 110.
RESTRICTIONS: Enrollment limited to 22 students.

ENGL 110 CRITICAL READING AND WRITING 3
Expository and argumentative composition through analysis of selected readings.
RESTRICTIONS: Required of all freshmen.

ENGL 116 SPECIAL PROBLEM 1-3

ENGL 183 GRAMMAR FOR ENGLISH TEACHERS 2 PF
Prepares English education majors for student teaching by providing them with comprehensive, systematic coverage of traditional and non-traditional approaches to grammar, punctuation, usage, and spelling.
PREREQ: ENGL110.
RESTRICTIONS: Open only to English education majors.

ENGL 200 APPROACHES TO LITERATURE 3
Dual emphasis on reading and writing. Offers introduction to poetry, fiction and drama, and provides for extensive practice in writing about literary subjects.
PREREQ: ENGL110.

ENGL 202 BIBLICAL AND CLASSICAL LITERATURE 3
Study of Greek, Roman, and Biblical literatures, set in their mythical, historical and cultural contexts, introducing appropriate critical concepts. May be cross-listed with CMLT212, FLIT202 and/or JWST202.
PREREQ: ENGL110.

ENGL 204 AMERICAN LITERATURE 3
Study of representative nineteenth and twentieth century works, set in their historical and cultural contexts, introducing appropriate critical concepts.
PREREQ: ENGL110.
RESTRICTIONS: Not for major credit.

ENGL 205 BRITISH LITERATURE TO 1660 3
Study of representative Medieval and Renaissance British works, set in their historical and cultural contexts, introducing appropriate critical concepts.
PREREQ: ENGL110.

ENGL 206 BRITISH LITERATURE 1660 TO PRESENT 3
Study of representative eighteenth through twentieth century British works, set in their historical and cultural contexts and introducing appropriate critical concepts.
PREREQ: ENGL110.

ENGL 207 INTRODUCTION TO POETRY 3
Representative masterworks of English, American and world verse.
PREREQ: ENGL110.

ENGL 208 INTRODUCTION TO DRAMA 3
Representative masterworks from classical era to present. May be cross-listed with CMLT218.
PREREQ: ENGL110.

ENGL 209 INTRODUCTION TO THE NOVEL 3
Representative masterworks of fiction, emphasizing those of Europe and America. May be cross-listed with CMLT219.
PREREQ: ENGL110.

ENGL 210 INTRODUCTION TO SHORT STORY 3
Study of short story as narrative form, with readings from American and foreign short story traditions.
PREREQ: ENGL110.
RESTRICTIONS: Not for major credit.

ENGL 211 GREAT WRITERS OF THE WESTERN WORLD I: 1100-1700 3
See CMLT207 for course description.

ENGL 212 GREAT WRITERS OF THE WESTERN WORLD II: 1650-1950 3
See CMLT208 for course description.

ENGL 214 LITERATURE AND GENDER 3
Specific concepts of gender in society, as manifested in literature of writers of both sexes.
PREREQ: ENGL110.

ENGL 217 INTRODUCTION TO FILM 3
Focuses on different techniques of acting, mise-en-scene, cinematography, editing, sound and color to assess how films encourage audiences to respond in ways they do.
May be cross-listed with CMLT217.
PREREQ: ENGL110.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 266</td>
<td>Special Problem</td>
<td>1-3</td>
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<tr>
<td>ENGL 278</td>
<td>Studies in Diversity</td>
<td>3</td>
<td>ENGL 110</td>
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<tr>
<td>ENGL 280</td>
<td>Approaches to Literature for Non-Majors</td>
<td>3</td>
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<td>ENGL 281</td>
<td>British Literature to 1660 for Non-Majors</td>
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<td>ENGL 282</td>
<td>British Literature 1660 to Present for Non-Majors</td>
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<td>ENGL 283</td>
<td>American Literature for Non-Majors</td>
<td>3</td>
<td>ENGL 110</td>
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<td>ENGL 284</td>
<td>Shakespeare for Non-Majors</td>
<td>3</td>
<td>ENGL 110</td>
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<td>ENGL 285</td>
<td>Introduction to Poetry for Non-Majors</td>
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<td>ENGL 286</td>
<td>Introduction to Drama for Non-Majors</td>
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<td>ENGL 287</td>
<td>Introduction to Short Story for Non-Majors</td>
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<td>ENGL 288</td>
<td>Introduction to the Novel for Non-Majors</td>
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<td>ENGL 289</td>
<td>Introduction to Film for Non-Majors</td>
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<td>ENGL 290</td>
<td>Studies in Literature for Non-Majors</td>
<td>3</td>
<td>ENGL 110</td>
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<tr>
<td>ENGL 294</td>
<td>English Language: Grammar and Usage</td>
<td>3</td>
<td>ENGL 110</td>
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<td>ENGL 300</td>
<td>Texts and Contexts</td>
<td>3</td>
<td>ENGL 202, ENGL 205 and ENGL 206.</td>
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<td>ENGL 301</td>
<td>Expository Writing</td>
<td>3</td>
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<td>ENGL 302</td>
<td>Advanced Composition</td>
<td>3</td>
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<td>ENGL 303</td>
<td>Script Writing</td>
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<td>Poetry Writing</td>
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<td>Fiction Writing</td>
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<td>ENGL 306</td>
<td>Topics in Writing</td>
<td>3</td>
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<td>ENGL 307</td>
<td>News Writing and Editing</td>
<td>3</td>
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<td>ENGL 308</td>
<td>Reporter's Practicum</td>
<td>3</td>
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<td>ENGL 309</td>
<td>Feature and Magazine Writing</td>
<td>3</td>
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<td>ENGL 310</td>
<td>Copy Editing and Layout</td>
<td>3</td>
<td>ENGL 110</td>
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<td>ENGL 312</td>
<td>Written Communications in Business</td>
<td>3</td>
<td>ENGL 110</td>
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<td>ENGL 316</td>
<td>Peer Tutoring/Advanced Composition</td>
<td>3</td>
<td>ENGL 110</td>
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<td>ENGL 317</td>
<td>Film History</td>
<td>3</td>
<td>ENGL 110</td>
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<td>ENGL 318</td>
<td>Studies in Film</td>
<td>3</td>
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<td>ENGL 320</td>
<td>The Bible as Literature</td>
<td>3</td>
<td>ENGL 110</td>
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<td>ENGL 321</td>
<td>Medieval Literature and Culture</td>
<td>3</td>
<td>ENGL 110</td>
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<td>ENGL 322</td>
<td>Chaucer</td>
<td>3</td>
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<td>Studies in Medieval Literature</td>
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<td>Shakespeare</td>
<td>3</td>
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<td>ENGL 325</td>
<td>Renaissance Literature</td>
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<td>Studies in Renaissance Literature</td>
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<tr>
<td>ENGL 327</td>
<td>Milton</td>
<td>3</td>
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<td>ENGL 330</td>
<td>The Detective in Film and Fiction</td>
<td>3</td>
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<td>ENGL 331</td>
<td>The Age of Satire</td>
<td>3</td>
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<tr>
<td>ENGL 332</td>
<td>Studies in Restoration and Eighteenth Century Literature</td>
<td>3</td>
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<tr>
<td>ENGL 333</td>
<td>British Romanticism</td>
<td>3</td>
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<td>ENGL 334</td>
<td>Victorian Poetry</td>
<td>3</td>
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<tr>
<td>ENGL 335</td>
<td>Victorian Prose</td>
<td>3</td>
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<td>ENGL 336</td>
<td>Dickens</td>
<td>3</td>
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<td>ENGL 337</td>
<td>American Literature to the Civil War</td>
<td>3</td>
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<td>ENGL 338</td>
<td>American Literature: Civil War to World War II</td>
<td>3</td>
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<td>ENGL 339</td>
<td>American Literature Since World War II</td>
<td>3</td>
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<tr>
<td>ENGL 340</td>
<td>African American Literature I</td>
<td>3</td>
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<td>ENGL 341</td>
<td>African American Literature II</td>
<td>3</td>
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<tr>
<td>ENGL 342</td>
<td>Contemporary Jewish-American Literature</td>
<td>3</td>
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<tr>
<td>ENGL 343</td>
<td>Introduction to Jewish Sources: Text and Interpretation</td>
<td>3</td>
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<td>ENGL 344</td>
<td>Twentieth Century British Literature</td>
<td>3</td>
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<td>ENGL 345</td>
<td>Studies in Modern/Contemporary Literature</td>
<td>3</td>
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<td>ENGL 346</td>
<td>King Arthur in Literature</td>
<td>3</td>
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<tr>
<td>ENGL 347</td>
<td>Literature of London</td>
<td>3</td>
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<tr>
<td>ENGL 348</td>
<td>Literature and Medicine</td>
<td>3</td>
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<tr>
<td>ENGL 349</td>
<td>Literature and Science</td>
<td>3</td>
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</table>
ENGL 371  STUDIES IN FICTION  3
Special topics in the novel and short story. Topics may emphasize an author or
authors, a type or types of fiction, a period or theme.
PREREQ: ENGL110.
RESTRICTIONS: May be repeated for credit when topics vary.

ENGL 372  STUDIES IN DRAMA  3
Special topics in an author or authors, a type or types of drama, a period or theme.
PREREQ: ENGL110.
RESTRICTIONS: May be repeated for credit when topics vary.

ENGL 373  STUDIES IN POETRY  3
Special topics in a poet or poets, a type or movement, a period or theme.
PREREQ: ENGL110.
RESTRICTIONS: May be repeated for credit when topics vary.

ENGL 376  WORLD LITERATURE  3
Introduction to and appreciation for broad range of literatures written in English.
Encompasses both Western and non-Western literature, with some emphasis on
post-Colonial literature.
PREREQ: ENGL110.

ENGL 378  CARIBBEAN LITERATURE  3
Multicultural survey of Anglogphone, Francophone, and Hispanic Caribbean
literature in its historical and cultural contexts. Emphasis on contemporary novels,
short stories, drama, and poems.
PREREQ: ENGL110.

ENGL 379  INTRODUCTION TO ETHNIC AND CULTURAL STUDIES  3
Focuses on representations of ethnicity, social class, race, gender, and other
constructions of identity in literature, arts, and folk culture.
PREREQ: Any two of the following: ENGL202, ENGL205, ENGL206, ENGL324.
RESTRICTIONS: Required for concentrations in ethnic and cultural studies.

ENGL 380  WOMEN WRITERS  3
Study of a variable set of women writers. Addresses such topics as the idea of a
woman's tradition, formation of the canon, use of genre, language and form.
May be cross-listed with WOMS380.
PREREQ: ENGL110.

ENGL 381  WOMEN IN LITERATURE  3
Cultural representations of women by male as well as female writers. Variable in
historical range, geography, and genre. May be cross-listed with WOMS381.
PREREQ: ENGL110.

ENGL 382  STUDIES IN MULTICULTURAL LITERATURE IN ENGLISH  3
Consideration of multiculturalism as it pertains to American culture or literature in
English from Africa and other non-European societies. Variable in historical range,
geography, and genre. May be cross-listed with BAMS382, JWST382 and/or WOMS382.
PREREQ: ENGL110.
RESTRICTIONS: May be repeated once for credit when topics vary.

ENGL 385  STUDIES IN LITERARY CRITICISM AND THEORY  3
Studies in selected topics in literary criticism and critical theory.
May be cross-listed with CMLT385.
PREREQ: ENGL110.
RESTRICTIONS: May be repeated once for credit when topics vary.

ENGL 390  ENGLISH LINGUISTICS  3
General introduction to study of English language, with emphasis on modern
linguistic approaches.
May be cross-listed with LING390.
PREREQ: ENGL110.

ENGL 391  HONORS COLLOQUIUM  3
PREREQ: ENGL110.

ENGL 403  LITERATURE FOR ADOLESCENTS  3
See EDUC403 for course description.

ENGL 404  ADVANCED POETRY WRITING  3
Intensive practice in composition. Group discussion and individual conferences.
Wide reference to professional poems as well as models. Emphasis on student
competence in traditional prosody as well as exploring freer forms.
PREREQ: ENGL304.
RESTRICTIONS: Final enrollment set after first class and submission of five poems.
May be repeated once for credit.

ENGL 405  ADVANCED FICTION WRITING  3
PREREQ: ENGL305.
RESTRICTIONS: Final enrollment set after first class and submission of a short story.
May be repeated once for credit.

ENGL 407  ADVANCED REPORTING  3
In-depth reporting, research methods, ethics, and other topics.
PREREQ: ENGL307 and either ENGL308 or ENGL309 or both.
RESTRICTIONS: Maximum of three credits for any registration with no more than
six credits toward graduation. Counts toward English major only as part of
journalism concentration.

ENGL 408  SPORTS WRITING  3
Training and covering all major sports including both women's and men's sports.
Topics include keeping statistics, game coverage, player profiles, and sports
columns.
PREREQ: ENGL307.

ENGL 409  TOPICS IN JOURNALISM  3
Special studies and writing in selected kinds of journalism (opinion writing, science
journalism) or in an aspect of the profession (history of American journalism, ethics
of journalism). Variable content.
PREREQ: ENGL110.
RESTRICTIONS: May be repeated once for credit when topics vary. Counts toward
English major only as part of the journalism concentration.

ENGL 410  TECHNICAL WRITING  3
Selected problems in technical communications, the preparation of reports and
technical editing.
PREREQ: ENGL110.
RESTRICTIONS: Counts toward English major only as part of concentration in
business and technical writing.

ENGL 411  RHETORIC FOR BUSINESS AND TECHNICAL WRITERS  3
Study of rhetorical theories and strategies within the context of business and
technical skills.
PREREQ: ENGL415 or equivalent.

ENGL 412  BUSINESS AND TECHNICAL PUBLICATION  3
Advanced instruction in production of business publications and technical
documents; team projects provide practical experience in preparing instruction
manuals, research proposals, formal reports, brochures and newsletters.
PREREQ: ENGL415 or equivalent.

ENGL 413  TOPICS IN TECHNICAL WRITING  3
Special studies and writing in selected kinds of business and technical
communication (e.g., computer software documentation) or in an aspect of
business and technical communication profession (e.g., ethics of business and
technical communication).
PREREQ: ENGL312, ENGL410, or ENGL415.
RESTRICTIONS: Counts toward English major only as part of concentration in
business and technical writing. May be repeated for credit when topics vary.

ENGL 414  TECHNICAL EDITING  3
Practical work and study of the editorial procedures essential in editing technical
publications and documentation.

ENGL 415  WRITING IN THE PROFESSIONS  3
Designed to improve communications skills of students aiming toward careers in
any of the professions.
PREREQ: ENGL110.

ENGL 416  DESIGNING ONLINE INFORMATION  3
Focuses on design of information displayed on websites including theory of
information design and its practical application. Lecture sessions cover such topics
as user and task analysis, interface design, website navigation, information
architecture, and usability. The laboratory sessions provide instruction on
Dreamweaver and Fireworks, as well as some HTML.

ENGL 417  FILM THEORY AND CRITICISM  3
Survey of major theories of film.
PREREQ: ENGL217.

ENGL 446  INTERNSHIP IN BUSINESS/TECHNICAL WRITING  3 PF
Students work on writing projects at local corporations, government divisions, or
public agencies, under joint supervision of the Department of English and the
sponsoring organization. Internship involves approximately ten hours of work a week.
PREREQ: ENGL415, ENGL411 and ENGL412 or permission of instructor.
RESTRICTIONS: Open to qualified students on the basis of a portfolio review by all
concentration faculty.

ENGL 466  INDEPENDENT STUDY  1-9
ENGL 468  UNDERGRADUATE RESEARCH  1-6
Faculty sponsored research.

ENGL 469  INTERNSHIP  3-6
Internship experiences that have been arranged or are currently sponsored by
English Department faculty member.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
<th>Prerequisites</th>
<th>Restrictions</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 621</td>
<td><strong>MEDIEVAL LITERATURE AND CULTURE</strong></td>
<td>3</td>
<td>ENGL 110</td>
<td>May be repeated once for credit when topics vary.</td>
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<td>ENGL 625</td>
<td><strong>STUDIES IN THE RENAISSANCE</strong></td>
<td>3</td>
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<td>ENGL 627</td>
<td><strong>SEVENTEENTH CENTURY LITERATURE</strong></td>
<td>3</td>
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<td>ENGL 631</td>
<td><strong>EIGHTEENTH CENTURY LITERATURE</strong></td>
<td>3</td>
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<td>ENGL 641</td>
<td><strong>AMERICAN LITERATURE: PERIOD STUDIES</strong></td>
<td>3</td>
<td>PREREQ: ENGL 110</td>
<td>Historical survey of American literature of the Colonial, Romantic, or Realistic period, emphasizing &quot;canonical&quot; works of major writers along with selected &quot;non-canonical&quot; writings. Restrictions: May be repeated for credit when topics vary.</td>
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<tr>
<td>ENGL 648</td>
<td><strong>SEMINAR IN TEACHING ENGLISH I</strong></td>
<td>3</td>
<td>COREQ: ENGL 483</td>
<td>Preparers English education seniors and graduate students to teach oral and written composition at the secondary school level. Restrictions: Enrollment limited to English education seniors.</td>
</tr>
<tr>
<td>ENGL 651</td>
<td><strong>IRISH LITERATURE: PERIOD STUDIES</strong></td>
<td>3</td>
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<td>Topics may emphasize an author or authors or a type or period. Restrictions: May be repeated for credit when topics vary.</td>
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<td>ENGL 654</td>
<td><strong>STUDIES IN NINETEENTH CENTURY LITERATURE</strong></td>
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<td>Topics may emphasize an author or authors, a type or period, or a style. Restrictions: May be repeated for credit when topics vary.</td>
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<td>ENGL 656</td>
<td><strong>TWENTIETH CENTURY LITERATURE</strong></td>
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<td>Topics may emphasize an author or authors, a type or period, or a style. Restrictions: May be repeated for credit when topics vary.</td>
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<tr>
<td>ENGL 660</td>
<td><strong>METHODS OF RESEARCH</strong></td>
<td>3</td>
<td>ENGL 110</td>
<td>Preparers English education seniors and graduate students to teach oral and written composition at the secondary school level. Restrictions: Enrollment limited to English education seniors.</td>
</tr>
<tr>
<td>ENGL 664</td>
<td><strong>POETRY WRITING WORKSHOP</strong></td>
<td>3</td>
<td></td>
<td>Preparers English education seniors and graduate students to teach oral and written composition at the secondary school level. Restrictions: Enrollment limited to English education seniors.</td>
</tr>
<tr>
<td>ENGL 668</td>
<td><strong>LITERARY THEORY AND CRITICISM</strong></td>
<td>3</td>
<td></td>
<td>Topics may emphasize an author or authors, a type or period, or a style. Restrictions: May be repeated for credit when topics vary.</td>
</tr>
<tr>
<td>ENGL 672</td>
<td><strong>STORIES IN THE DRAMA</strong></td>
<td>3</td>
<td></td>
<td>Topics may emphasize an author or authors, a type or period, or a style. Restrictions: May be repeated for credit when topics vary.</td>
</tr>
<tr>
<td>ENGL 677</td>
<td><strong>THE STRUCTURE OF ENGLISH</strong></td>
<td>3</td>
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<td>Topics may emphasize an author or authors, a type or period, or a style. Restrictions: May be repeated for credit when topics vary.</td>
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<tr>
<td>ENGL 680</td>
<td><strong>SEMIAIRN IN TEACHING ENGLISH II</strong></td>
<td>3</td>
<td></td>
<td>Topics may emphasize an author or authors, a type or period, or a style. Restrictions: May be repeated for credit when topics vary.</td>
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<tr>
<td>ENGL 683</td>
<td><strong>SEMIAIRN IN TEACHING ENGLISH II</strong></td>
<td>3</td>
<td></td>
<td>Topics may emphasize an author or authors, a type or period, or a style. Restrictions: May be repeated for credit when topics vary.</td>
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<tr>
<td>ENGL 687</td>
<td><strong>THE STRUCTURE OF ENGLISH</strong></td>
<td>3</td>
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<td>Topics may emphasize an author or authors, a type or period, or a style. Restrictions: May be repeated for credit when topics vary.</td>
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<tr>
<td>ENGL 688</td>
<td><strong>TEACHING COMPOSITION</strong></td>
<td>3</td>
<td></td>
<td>Topics may emphasize an author or authors, a type or period, or a style. Restrictions: May be repeated for credit when topics vary.</td>
</tr>
<tr>
<td>ENGL 694</td>
<td><strong>HISTORY OF THE ENGLISH LANGUAGE</strong></td>
<td>3</td>
<td></td>
<td>Topics may emphasize an author or authors, a type or period, or a style. Restrictions: May be repeated for credit when topics vary.</td>
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<tr>
<td>Course Code</td>
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<tr>
<td>ENGL 802</td>
<td>STUDIES IN OLD AND MIDDLE ENGLISH</td>
<td>3</td>
<td>Study of English language either from before 1100 or between 1100 and 1400.</td>
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<td>May be cross-listed with LING802.</td>
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<td>RESTRICTIONS: May be repeated once for credit when topics vary.</td>
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<tr>
<td>ENGL 804</td>
<td>STUDIES IN MEDIEVAL LITERATURE AND CULTURE</td>
<td>3</td>
<td>Intensive study of literature and language in Old English or Middle English.</td>
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<td>RESTRICTIONS: May be repeated once for credit when topics vary.</td>
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<tr>
<td>ENGL 806</td>
<td>STUDIES IN RENAISSANCE LITERATURE</td>
<td>3</td>
<td>Focuses on one or two authors (e.g., Shakespeare or Spenser), genres (e.g., narrative verse and prose, the lyric, drama) or specific periods (Elizabethan, Jacobean, the Civil War).</td>
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<td>RESTRICTIONS: May be repeated once for credit when topics vary.</td>
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<tr>
<td>ENGL 815</td>
<td>STUDIES IN SEVENTEENTH CENTURY LITERATURE</td>
<td>3</td>
<td>Research seminars on writers (Donne and Jonson; Bacon, Browne, Hobbes, and Locke; the Fletchers, Cowley, and Milton), genres (classical, metaphysical, and neo-classical poetry; Jacobean, Caroline, and Restoration drama); or topics and themes (empiricism; skepticism; gender and society; literature of the civil wars; Puritan culture).</td>
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<td>RESTRICTIONS: May be repeated once for credit when topics vary.</td>
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<tr>
<td>ENGL 820</td>
<td>STUDIES IN EIGHTEENTH CENTURY LITERATURE</td>
<td>3</td>
<td>Variable content. Possible topics include: Restoration Theatre; English Neoclassicism; The Rise of the Novel; individual writers or groups of writers; applications of theory.</td>
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<td>RESTRICTIONS: May be repeated once for credit when topics vary.</td>
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<tr>
<td>ENGL 830</td>
<td>STUDIES IN NINETEENTH CENTURY LITERATURE</td>
<td>3</td>
<td>Seminar in Romantic and/or Victorian literature with emphasis on selected writers, genres, and/or topics. Possible course topics: women and nature poetry; Dickens; religious doubt; the provincial novel.</td>
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<tr>
<td>ENGL 840</td>
<td>STUDIES IN TWENTIETH CENTURY LITERATURE</td>
<td>3</td>
<td>Variable content. Concentrated study of an aspect of twentieth century British, European, American and/or post-colonial literatures. Possible focuses: a genre, a set of writers, cultural issues (e.g., gender, race, the Holocaust, aesthetics vs. politics).</td>
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<tr>
<td>ENGL 844</td>
<td>SEMINAR: SPECIAL TOPICS IN AMERICAN LITERATURE</td>
<td>3</td>
<td>RESTRICTIONS: May be repeated for credit when topics vary.</td>
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<tr>
<td>ENGL 846</td>
<td>SEMINAR: SPECIAL TOPICS IN ENGLISH LITERATURE</td>
<td>3</td>
<td>RESTRICTIONS: May be repeated for credit when topics vary.</td>
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<tr>
<td>ENGL 848</td>
<td>SPECIAL TOPICS IN COMPARATIVE LITERATURE</td>
<td>3</td>
<td>Variable content. Possible topics include: The Avant-Garde, Literature and Aesthetics, The Novel in a Global Context.</td>
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<td>RESTRICTIONS: May be repeated once for credit when topics vary.</td>
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<tr>
<td>ENGL 850</td>
<td>STUDIES IN COLONIAL AMERICAN LITERATURE</td>
<td>3</td>
<td>Topics may include New England Puritanism, Southern Colonial Literature, and Major Early American Authors.</td>
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<td>RESTRICTIONS: May be repeated for credit when topics vary.</td>
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<tr>
<td>ENGL 852</td>
<td>AMERICAN REALISM AND NATURALISM</td>
<td>3</td>
<td>Classic works by Clemens, James, Crane, Chopin, Dreiser, Stein, and Wharton, with focus on theoretical and aesthetic assumptions or on general categories for the period (Realism, Naturalism).</td>
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<td>RESTRICTIONS: May be repeated for credit when topics vary.</td>
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<tr>
<td>ENGL 853</td>
<td>MODERN/POSTMODERN AMERICAN LITERATURE</td>
<td>3</td>
<td>Modern American novelists (Fitzgerald, Hemingway, Faulkner); modern and postmodern American novelists (Fitzgerald, Hemingway, Faulkner, Bellow, Barth, Heller, Morrison, Pynchon); modernist poetry (Pound, Eliot, Stevens); Drama of the Absurd.</td>
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<td>RESTRICTIONS: May be repeated for credit when topics vary.</td>
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<tr>
<td>ENGL 868</td>
<td>RESEARCH</td>
<td>3</td>
<td>Close examination of a single topic or a closely related group of topics (e.g., psychoanalysis and interpretation, genre theory, literary historiography, feminist critique) in textual study.</td>
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<tr>
<td>ENGL 869</td>
<td>MASTER'S THESIS</td>
<td>1-6</td>
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<tr>
<td>ENGL 884</td>
<td>STUDIES IN LITERARY AND CULTURAL THEORY</td>
<td>3</td>
<td>See LING890 for course description.</td>
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<td>RESTRICTIONS: May be repeated for credit when topics vary.</td>
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<tr>
<td>ENGL 890</td>
<td>STUDIES IN LINGUISTICS</td>
<td>3</td>
<td>See LING890 for course description.</td>
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<td>RESTRICTIONS: May be repeated once for credit when topics vary.</td>
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**ENTREPRENEURSHIP**

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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENTR 301</td>
<td>INTRODUCTORY ENTREPRENEURSHIP</td>
<td>3</td>
<td>Introduction to entrepreneurship, focusing on development of the business idea, and communication through a business plan. Specific attention paid to market research and marketing strategy. PREREQ: ACCT200 and ECON100 or equivalent.</td>
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<td>RESTRICTIONS: Requires junior status.</td>
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<tr>
<td>ENTR 364</td>
<td>ENTREPRENEURSHIP IN PRACTICE</td>
<td>3</td>
<td>Requires completion of at least 120 hours of an entrepreneur-related internship with verification by the hiring company. Term paper relating real-world duties and experiences to principles learned in classroom also required. PREREQ: ENTR301.</td>
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<td>RESTRICTIONS: Requires approval of entrepreneurial studies director.</td>
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<tr>
<td>ENTR 410</td>
<td>BUSINESS VENTURE COMPETITION I</td>
<td>3</td>
<td>Focuses on the identification of business opportunities, market research, and analysis. PREREQ: ENTR301.</td>
</tr>
<tr>
<td>ENTR 411</td>
<td>BUSINESS VENTURE COMPETITION II</td>
<td>3</td>
<td>Focuses on development of business model, financial analysis, and creation of formal business plan. PREREQ: ENTR410 or equivalent.</td>
</tr>
<tr>
<td>ENTR 460</td>
<td>HIGH TECHNOLOGY ENTREPRENEURSHIP</td>
<td>3</td>
<td>Focuses on critical financial, legal, scientific and engineering issues confronted during initial planning stages of start-up enterprise. Students work in teams to develop a real world business product offering. May be cross-listed with ELEG460. RESTRICTIONS: Requires senior status and permission of instructor.</td>
</tr>
<tr>
<td>ENTR 860</td>
<td>HIGH TECHNOLOGY ENTREPRENEURSHIP</td>
<td>3</td>
<td>Focuses on critical financial, legal, scientific and engineering issues confronted during initial planning stages of start-up enterprise. Work in teams to develop a business plan for real world business product offering.</td>
</tr>
</tbody>
</table>
ENWC 105 INSECTS IN OUR WORLD 3
Nature and importance of insects: what makes them unique, how they have survived so long, why they are important to ecosystems, why we hate them, and why we need them.
RESTRICTIONS: Only 3 credits from ENWC105 and ENWC205 may count toward graduation. Not for credit for entomology or wildlife conservation majors.

ENWC 165 NEW STUDENT SEMINAR 1
Study and careers in entomology and wildlife conservation: opportunities, expectations, duties and preparation, including skills for success in college.
Readings, discussions, written and oral assignments, speakers and field trips.
RESTRICTIONS: First term majors.

ENWC 201 WILDLIFE CONSERVATION AND ECOLOGY 3
Basic principles of ecology. Ecological and sociopolitical problems and solutions in conservation of biodiversity (i.e., habitat, species, and genetic variety).
RESTRICTIONS: Should precede BISC302.

ENWC 205 ELEMENTS OF ENTOMOLOGY 3
Lives of insects, emphasizing interactions with humans. Basic insect identification, structure, function, behavior, ecology, evolution, pest control and impact on human society, history and culture.

ENWC 214 APIDIOLOGY AND APICULTURE 2
Scientific study of life of honey bees, including their biology, behavior and communication; introduction to techniques of culturing and managing honey bees for honey production and crop pollination.

ENWC 215 ENTOMOLOGY LABORATORY 1
Insect structure, physiology, behavior, taxonomy, evolution and ecology studied through field trips, dissection and experiments. Insect collection (with identification to orders) required.
COREQ: ENWC205.

ENWC 224 APIDIOLOGY AND APICULTURE LABORATORY 1
Laboratory and field work to complement topics in ENWC214. Bee identification and culture; hive management. Work with bees in an apiary to develop confidence in keeping bee colonies.
COREQ: ENWC214.

ENWC 300 PRINCIPLES OF ANIMAL AND PLANT GENETICS 3
See ANSC300 for course description.

ENWC 310 ANIMAL AND PLANT GENETICS LABORATORY 1
See ANSC310 for course description.

ENWC 314 COMPARATIVE TERRITORIAL AND MARINE ECOLOGY 3
Comparative overview of similarities and dissimilarities of life in terrestrial and marine environments. Topics include geological history, subsistence, growth and development, life history, reproduction, dispersal, population regulation, and impact of humans. May be cross-listed with MAST314.
PREREQ: BISC208.

ENWC 315 INSECT CONSERVATION ECOLOGY 3
Conservation biology with emphasis on insect component of biodiversity. Rationale for insect and biodiversity conservation; island biogeography; and endangered species and mechanisms of species loss.
PREREQ: ENWC201 and ENWC205.

ENWC 325 WILDLIFE MANAGEMENT 3
Introduction to solving wildlife management problems. Development of management plans with consideration of habitat, human and animal population components.
PREREQ: ENWC201 and BISC302.
RESTRICTIONS: Requires junior status.

ENWC 340 PLANTS OF ECUADOR 3
See PLSC340 for course description.

ENWC 341 TROPICAL FOREST ECOLOGY 3
Ecology of major forest types in Ecuador and Galapagos Islands. Lectures and field trips to demonstrate techniques and provide field experience in forest ecology. Guest experts used for their experience in particular forest types. May be cross-listed with PLSC341.
PREREQ: BISC207 and BISC208.
COREQ: PLSC340.
RESTRICTIONS: Taught in Ecuador in Winter Session.

ENWC 344 FOREST ECOLOGY 2
Dendrology, measurement techniques, tree biology, forest ecology, and concepts of forest management. Field work, demonstrations and guest lecturers in major forest types of the mid-Atlantic region. May be cross-listed with PLSC344.
PREREQ: BISC208.

ENWC 351 NATURE AND WILDLIFE PHOTOGRAPHY 3
Basic principles and techniques of nature and wildlife photography. Students execute projects that demonstrate their technical skill and knowledge of exposure, composition and content.
RESTRICTIONS: Students must have own camera equipment. Usually offered as part of international or domestic trips in Winter or Summer Sessions.

ENWC 366 INDEPENDENT STUDY 1-6

ENWC 405 INSECT STRUCTURE AND FUNCTION 4
Comparative functional anatomy and evolution of arthropods, especially insects.
Emphasis on structures and their functions as adaptive responses to selective pressures. Laboratory dissections emphasizing anatomical variation within external and internal systems.
PREREQ: ENWC215.

ENWC 406 INSECT IDENTIFICATION - TAXONOMY 3
Lecture and laboratory; collection, preservation and classification of common insect families.
PREREQ: ENWC205.

ENWC 408 INSECT FIELD TAXONOMY 3
Collection, preservation and classification of common insect families. Includes lecture and laboratory.
PREREQ: ENWC406.

ENWC 410 MEDICAL, VETERINARY AND FORENSIC ENTOMOLOGY 3
Ecology, transmission, and control of diseases carried by insects, ticks and mites; interactions of vectors, animal hosts, and humans. Biting and stinging arthropods and forensic entomology, including evidence collection and species succession. Laboratories and field trips emphasize identification and field assessment of medically important arthropods.
PREREQ: BISC208, ENWC205, or permission of instructor.

ENWC 411 INSECT PEST MANAGEMENT 3
Principles of managing insect populations in environmentally compatible manner to reduce losses caused by insects attacking our food, fiber, buildings, domestic animals and human populations. Diagnostic recognition, control and habits of major pest species.
PREREQ: ENWC205.

ENWC 413 HUMAN DIMENSIONS IN WILDLIFE CONSERVATION 3
Review and analysis of social and natural science information and theory needed for sustainable conservation strategies. Integrates traditional conservation principles with ecosystem approach, emphasizing human aspects in conservation and land management.
PREREQ: ENWC201.
RESTRICTIONS: Open only to seniors. Offered in Winter Session only.

ENWC 415 WILDLIFE RESEARCH TECHNIQUES 3
Research design, field sampling techniques, data analysis and interpretation, and preparation of publication quality manuscripts.
PREREQ: ENWC325; FREC408 or STAT200; and two courses from ENWC318, ENWC418, ENWC424 or ENWC425.
COREQ: PLSC212 or PLSC402 or ENWC344.
RESTRICTIONS: Open only to seniors.

ENWC 416 WILDLIFE HABITAT MANAGEMENT 3
Basic principles and methods of habitat modeling and management to enhance wildlife habitat in forests, grasslands, agriculture, and wetlands. Laboratories include field trips and hands-on habitat manipulation across mid-Atlantic region.
Field clothes required.
PREREQ: ENWC325.

ENWC 418 ORNITHOLOGY 3
Avian biology: diversity, evolution, form and function, behavior and communication, reproduction and development, and conservation. Natural history and identification of taxa. Laboratories with frequent field trips.
PREREQ: BISC208.

ENWC 419 BIOLOGICAL CONTROL 3
Use of beneficial organisms to manage and control populations of other organisms. Theory, practices, and case histories for manipulation of natural enemies to minimize impact of pests.
PREREQ: ENWC205 or equivalent.
ENWC 424 HERPETOLOGY 3
Biology and ecology of reptiles and amphibians. Evolution, feeding behavior, life history, reproduction, physiology, population structure and dynamics, migration and movements, and conservation.
PREREQ: BISC302.
RESTRICTIONS: Requires junior status.

ENWC 425 MAMMALOGY 3
PREREQ: BISC208.
RESTRICTIONS: Requires junior status.

ENWC 426 AQUATIC INSECTS 3
Biological and systematics of aquatic insects with emphasis on fauna of North America. Collection of immature aquatic insects required.
PREREQ: ENWC215.
RESTRICTIONS: Requires junior status.

ENWC 430 CLOSE-UP NATURE PHOTOGRAPHY 3
Introduction to principles of close-up and ultra close-up photography of natural history subjects. Lens and electronic flash systems for biological photography, plus field and indoor techniques. In-class analysis of assigned student slides.
RESTRICTIONS: Requires permission of instructor.

ENWC 435 WILDLIFE POPULATION DYNAMICS 3
Understand population processes by combining discussion of theory and practical applications. Studies exponential, logistic, and age specific growth as well as predation, competition, disease, harvest, and metapopulations. Model building exercises actively used to understand wildlife population dynamics.
PREREQ: ENWC325.

ENWC 440 INTEGRATED PEST AND DISEASE MANAGEMENT 3
Introduction to theory and practice of integrated pest management (IPM), especially of insects and plant pathogens. Integration of cultural, biological, host resistance, and other management strategies to achieve control in economically and environmentally sound manner. May be cross-listed with PLSC440.
PREREQ: ENWC205 and PLSC303.

ENWC 444 CONSERVATION OF TROPICAL BIODIVERSITY 3
Three week intensive, field-based experience in mechanics of conserving tropical biodiversity. Focuses on group projects quantifying and comparing diversity of montane cloud forests, lowland rainforests and tropical dry forests. May be cross-listed with BISC440.
RESTRICTIONS: Winter or Summer Session only. Taught in Costa Rica or Peru.

ENWC 450 DEBATES IN CONSERVATION BIOLOGY 3
Global debate about anthropocentric use and misuse of earth’s biological and physical resources.

ENWC 451 ADVANCED NATURE AND WILDLIFE PHOTOGRAPHY 3
Builds on basic principles and skills learned in ENWC351. Students develop journal of technical aspects and intended outcome of each image and complete projects to demonstrate increased technical skill and knowledge of exposure, composition, content.
PREREQ: ENWC351.
RESTRICTIONS: Students must have own camera equipment. Usually offered as part of international and domestic trips in Winter and Summer Sessions.

ENWC 452 CONSERVATION OF AFRICAN WILDLIFE 3
RESTRICTIONS: Offered only during Winter Session in Tanzania.

ENWC 453 COMMUNITY-BASED CONSERVATION 3
Basic philosophical, economic, and ecological aspects of bottom-up approach to conservation. This form of conservation experienced firsthand by living with aboriginal people and seeing how they conserve natural resources.
RESTRICTIONS: Offered only during Winter Session in Tanzania.

ENWC 455 CONSERVATION GENETICS 3
Principles of genetics applied to conservation of animal and plant populations. Fundamentals of basic and population genetics. Examination of case studies of species from variety of taxonomic groups.
PREREQ: BISC208.

ENWC 464 FIELD EXPERIENCE 1-3 PF
Faculty-supervised employment (usually parttime) or volunteer service at entomology, ecology, or wildlife conservation-related site such as research laboratory, pest control firm, museum, government agency or nature center. Signed agreement with faculty sponsor prior to placement and journal or written report required.
RESTRICTIONS: Maximum of six credits may count toward degree. Only three credits among Independent Study, Research, ENWC464 and UNIV401 count toward entomology or wildlife conservation major requirements.

ENWC 465 SENIOR CAPSTONE EXPERIENCE 1
Preparation, presentation, and discussion, both oral and written, of an issue based in entomology, wildlife conservation, natural resource management, or related area for peers in manner similar to that in scientific communication.
Preparation includes reading and assessment of research articles.
RESTRICTIONS: Must be taken as a senior in last fall term.

ENWC 466 INDEPENDENT STUDY 1-6

ENWC 468 RESEARCH 1-6

ENWC 501 NATURAL HISTORY FOR TEACHERS 3
Background knowledge, methods and materials for teaching basic concepts of ecology, environmental problems and field natural history, particularly as applicable to Delaware. Includes outdoor studies in field, forest, stream and estuarine environments.

ENWC 601 INSECT PHYSIOLOGY 4
Physiology and biochemistry of major organs and tissues of insects. Laboratory demonstrates basic tools of insect physiology through original and classical experiments.
PREREQ: ENWC215.

ENWC 602 LARVAL TAXONOMY 3
Lecture-laboratory treating collection, preservation and classification of immature stages of insects. Emphasis on holometabolous orders, with special attention to aquatic insects.
PREREQ: ENWC215 and ENWC406.

ENWC 605 INSECT STRUCTURE AND FUNCTION 4
Comparative functional anatomy and evolution of arthropods, especially insects. Emphasis on structures and their functions as adaptive responses to selective pressures. Laboratory dissections emphasizing anatomical variation within external and internal systems.
PREREQ: ENWC215.

ENWC 606 INSECT IDENTIFICATION - TAXONOMY 3
Collection, preservation and classification of common insect families. Includes laboratory and lecture.

ENWC 608 INSECT FIELD TAXONOMY 3
Collection, classification, preservation and curation of insects. Insect collection required.
PREREQ: ENWC606.

ENWC 610 MEDICAL, VETERINARY, AND FORENSIC ENTOMOLOGY 3
Ecology, transmission, and control of diseases carried by insects, ticks and mites; interactions of vectors, animal hosts, and humans. Biting and stinging arthropods and forensic entomology, including evidence collection and species succession. Laboratories and field trips emphasize identification and field assessment of medically important arthropods.
PREREQ: BISC208, ENWC205, or permission of instructor.

ENWC 611 INSECT PEST MANAGEMENT 3
Principles of managing insect populations in environmentally compatible manner to reduce losses caused by insects attacking our food, fiber, buildings, domestic animals, and human population. Diagnostic recognition, control and habits of major pest species.
PREREQ: ENWC205.

ENWC 615 WILDLIFE RESEARCH TECHNIQUES 3
Research design, field sampling techniques, data analysis and interpretation, and preparation of publication quality manuscripts. Class and individually designed field projects focus on regional wildlife and their habitats.
PREREQ: ENWC325; FREC408 or STAT200; and two courses from ENWC318, ENWC418, ENWC424, or ENWC425.
COREQ: PLSC212 or PLSC402 or ENWC344.
RESTRICTIONS: Open to graduate students only or by permission of instructor.

ENWC 616 WILDLIFE HABITAT MANAGEMENT 3
Basic principles and methods of habitat modeling and management to enhance wildlife habitat in forests, grasslands, agriculture, and wetlands. Laboratories include field trips and hands-on habitat manipulation across mid-Atlantic region.
Field clothes required.
PREREQ: ENWC325.
ENWC 617  FIELD NATURAL HISTORY  1-3
Extended field trip or several shorter trips to natural and managed areas. Emphasis on identification and observation of biota, field notes, knowledge of natural habitats, ecological processes and wildlife conservation issues and practices. Individual projects.
RESTRICTIONS: Requires junior status and consent of instructor. Credit depends on extent of travel; maximum of three credits allowed toward major.

ENWC 618  ORNITHOLOGY  3
Avian biology: diversity, evolution, form and function, behavior and communication, reproduction and development, and conservation. Natural history and identification of taxa. Laboratories with frequent field trips.
PREREQ: BISC208.

ENWC 619  BIOLOGICAL CONTROL  3
Use of beneficial organisms to manage and control populations of other organisms. Theory, practices, and case histories for manipulation of natural enemies to minimize the impact of pests.

ENWC 620  BEHAVIORAL ECOLOGY  3
Theoretical treatment of factors that have dominated evolution of animal behavior; hypothesis testing emphasized.
PREREQ: BISC302.

ENWC 622  TOXICOLOGY OF INSECTicides  3
Principles of insecticide toxicochemistry. Classification, biochemical and physiological bases of toxic action, animal and plant metabolism, and environmental dynamics of insecticides.
PREREQ: CHEM213.

ENWC 624  HERPETOLOGY  3
Biology and ecology of reptiles and amphibians. Evolution, feeding behavior, life history, reproduction, physiology, population structure and dynamics, migration and movements, and conservation.
PREREQ: BISC302.

ENWC 625  MAMMALOGY  3
PREREQ: BISC208.
RESTRICTIONS: Open to graduate students only or by permission of instructor.

ENWC 626  AQUATIC INSECTS  3
Biology and systematics of aquatic insects with emphasis on fauna of North America. Collection of immature aquatic insects required.
PREREQ: ENWC215.
RESTRICTIONS: Requires junior status.

ENWC 630  CLOSE-UP NATURE PHOTOGRAPHY  3
Introduction to principles of close-up and ultra close-up photography of natural history subjects. Lenses and electronic flash systems for biological photography, plus field and indoor techniques. In-class analysis of assigned student slides.
RESTRICTIONS: Requires permission of instructor.

ENWC 635  WILDLIFE POPULATION DYNAMICS  3
Studies exponential, logistic, and age specific growth as well as predation, competition, disease, and metapopulations. Model building exercises actively used to understand wildlife population dynamics.
PREREQ: ENWC235.

ENWC 640  INTEGRATED PEST AND DISEASE MANAGEMENT  3
Introduction to theory and practice of integrated pest management (IPM), especially as it applies to insects and plant pathogens. Integration of cultural, biological, host resistance and other management strategies to achieve control in economically and environmentally sound manner.
May be crosslisted with PLS5640.
PREREQ: ENWC205 and PLSC303.

ENWC 652  CONSERVATION OF AFRICAN WILDLIFE  3
RESTRICTIONS: Offered only during Winter Session in Tanzania.

ENWC 655  CONSERVATION GENETICS  3
Principles of genetics applied to conservation of animal and plant populations. Fundamentals of basic and population genetics. Examination of case studies of species from variety of taxonomic groups. Presentation of cases by students.
PREREQ: BISC208.

ENWC 803  WRITING RESEARCH PROPOSALS  1
Conception, design and composition of M.S. and Ph.D. research proposals for professional granting agencies in biological sciences.

ENWC 805  INSECT-PLANT CHEMICAL ECOLOGY  2
Chemically mediated interactions between insects and plants and other organisms involved in the relationship. Perceptual organs, behavioral and physiological response, plant-insect interactions, insect and plant defense, and intraspecific interactions that relate to natural chemicals produced by plants and insects. Presentation-discussion format.
May be crosslisted with PLS5805.

ENWC 814  ADVANCED ECOLOGY  3
Interaction of animals with their environment as it influences their distribution, abundance, life history and evolution. Emphasis on primary research literature.
PREREQ: BISC302 or equivalent.

ENWC 815  READINGs IN ECOLOGY  1 PF
Discussion-based seminar on current text and/or topic in ecological sciences.

ENWC 868  RESEARCH  1-9

ENWC 869  MASTER'S THESIS  1-6

ENWC 870  GRADUATE RESEARCH SEMINAR  0 PF
Students give oral scientific presentation that describes theory and development of their individual research projects.

ENWC 888  TOPICS IN ENTOMOLOGY AND WILDLIFE ECOLOGY  0 PF
Seminar with lectures on variety of topics related to entomology and wildlife ecology.

ENWC 964  PRE-CANDIDACY STUDY  1-12 PF
Research and readings in preparation of dissertation topic and/or qualifying examinations for doctoral students before admission to candidacy but after completion of all required course work.
RESTRICTIONS: Not open to students who have been admitted to candidacy.

ENWC 969  DOCTORAL DISSERTATION  1-12 PF

FASH 110  SEEING AND BEING IN A VISUAL WORLD  3
Focuses on how people see, process and respond to visual information embedded in the world, from immediate personal environments to larger places in which we live. Creative problem solving and innovation highlighted.

FASH 114  FASHion, STYLE AND CULTUre  3
Introduces concepts of fashion, style, and culture as they relate to how products are conceived and developed. Impact of cultural contexts and societal diversity on apparel industry practices considered.

FASH 122  APPAREL PRODUCT ASSEMBLY  3
Basic clothing construction procedures, fitting techniques and methods of evaluation for apparel.

FASH 213  TWENTIETH CENTURY DESIGN: ETHNIC INFLUENCE  3
Examines culture and clothing practices of various ethnic groups and their influences on Western apparel fashion and textile arts during twentieth century.

FASH 214  COSTUME HISTORY BEFORE 1600  3
Costume as mirror of civilization in Western Europe and Middle East from antiquity through sixteenth century. Influence of societal, economic and aesthetic factors upon development of costume.

FASH 215  FUNDAMENTALS OF TEXTILES I  3
Fundamental concepts related to textile materials. Emphasis on structure/property relationships in fibers. Related chemical concepts included.
PREREQ: CHEM102.
RESTRICTIONS: Limited to majors only.

FASH 217  ACCOUNTING PRACTICE FOR MERCHANDISE  3
Introduction to basic accounting principles used in retailing of apparel and other fashion products. Emphasis on retail method of inventory, perpetual and periodic systems, LIFO, FIFO, development of gross margin statement and effects of cash/trade discounts and cumulative mark-up on profitability.
FASH 218  FASHION MERCHANDISING 3
Overview of fashion industry which examines interrelationship between primary, auxiliary and retail fashion markets; trends in fashion retailing, promotion and manufacturing.

FASH 220  FUNDAMENTALS OF TEXTILES II 3
Fundamental concepts relating to yarns, fabric structures coloration and finishes. Emphasis placed upon structural properties as they relate to end-use characteristics and finishing processes.
PREREQ: FASH215.
RESTRICTIONS: Fashion merchandising and apparel design majors only

FASH 221  APPAREL STRUCTURES 3
Comparative study of foundation principles and processes of apparel design utilizing draping, flat pattern, drafting and computer-aided design techniques. Includes development of master patterns. Execution of advanced garment assembly processes.
PREREQ: FASH122.

FASH 222  APPAREL PRODUCT ANALYSIS 3
Concepts of apparel product development: standards of quality and value, anthropometrics, sizing, fit evaluation, specification writing, costing and overview of computer practices in apparel product development processes.
PREREQ: FASH122 for APD majors.

FASH 224  CLOTHING DESIGN AND PRODUCTION: 1600 TO THE EDWARDIAN PERIOD 3
Clothing design and production in America and Western Europe since 1600. Study of craft skills, growth of ready-to-wear industry, and Haute Couture.

FASH 233  FASHION DRAWING AND RENDERING 3
Drawing from fashion model; emphasis on rendering clothing character, fabrics and fashion details using various media; introduction to flat sketching via computer; translation of drawings to finished fashion illustrations.
PREREQ: ART129.

FASH 311  MULTICULTURAL FASHION ACCESSORIES 3
Examines design and production of accessory apparel and body adornment objects created by cultures throughout the world. Ornamental and functional accessories from African, Asian, Indian, American and Far Eastern cultures emphasized. Students produce accessories inspired by self-conducted research.
PREREQ: FASH122.

FASH 314  APPAREL DESIGN BY FLAT PATTERN 3
Advanced pattern making techniques using both traditional and computer-aided design methods. Design and execution of apparel based on variations of torso block. Execution of apparel utilizing dressmaker tailoring techniques.
PREREQ: FASH221.

FASH 318  FASHION MERCHANDISE PRODUCTS 3
Examines various types of fashion merchandise including range of characteristics, sources and manufacturing processes. Emphasis on leather, furs, jewelry, kitchen and home furnishings, and allied merchandise areas.

FASH 319  DRESS AND CULTURE 3
Examination of similarities and differences in dress of culturally distinct groups; analysis of functions served by dress and factors influencing changes in cultural forms of dress.
PREREQ: PSYC100 and SOCI201.

FASH 320  FASHION AND APPAREL INTERNSHIP 3-6
Off-campus supervised and coordinated field study program in fashion/apparel related areas.
RESTRICTIONS: Requires permission of instructor. Students may register for 3 or 6 credits. May be repeated once for a maximum of 6 credits total.

FASH 321  TRAVEL STUDY PROGRAM 1-6
Study of domestic and/or international textiles, apparel, interior and allied fashion industries through visits and research projects.
RESTRICTIONS: Requires FASH faculty approval through an application process. Offered at regular intervals.

FASH 322  RETAIL DESIGN AND CONSUMER BEHAVIOR 3
Exploration of effects of retail design on consumer behavior. Logos, packaging, point-of-purchase display, signage, personnel and store layout examined. May be cross-listed with HRIM322.

FASH 324  APPAREL DESIGN BY DRAPING 3
Exploration of three dimensional methods of apparel design. Design and execution of draped garment structures required.
PREREQ: FASH314.

FASH 325  PRESENTATION TECHNIQUES 3
Development of oral, written, graphic, problem-solving and personal skills for professional presentations. Techniques include computer graphics, photography, as well as audio and video applications as they relate to professional presentations.

FASH 328  FASHION ADVERTISING AND PROMOTION 3
Introduction to advertising and promotion in fashion industry. Emphasis on role of advertising and other promotional mix elements that support integrated marketing communications (IMC) program in textiles and apparel industry.
PREREQ: FASH218, FASH318, BUAD301.

FASH 333  FASHION FORECASTING AND DESIGN 3
Introduction to trend research, presentation, and collection design for targeted markets. Utilizes advanced techniques in computer graphics and web development for fashion design, emphasizing concept development, visualization, storyboard layout, and design presentation.
PREREQ: FASH233.

FASH 365  FASHION MERCHANDISING AND APPAREL DESIGN SEMINAR 1 PF
Creates awareness of career opportunities and develops techniques for success in apparel design and textile clothing career options.
RESTRICTIONS: APD and FM majors only.

FASH 366  INDEPENDENT STUDY 1-6

FASH 380  PRODUCT DEVELOPMENT 3
Introduces concepts and methods used by buyers/merchandisers to create store-branded merchandise for targeted customer segments. Studies process of developing products from trend research to production to distribution.
PREREQ: FASH218, FASH222.

FASH 415  TOPICS IN TEXTILES 3
One topic covered each semester; either fiber science, textile analysis, or textile dyeing and finishing.

FASH 416  MULTI-CHANNEL MERCHANDISING 3
Examines scope and application of retail delivery systems including direct marketing technologies. Target market segmentation and product fulfillment examined as they apply to fashion industry.
PREREQ: FASH218, FASH318.

FASH 418  MERCHANDISE PLANNING 4
Focuses on computer applications related to mathematical concepts and calculations used in developing merchandise budgets. Spreadsheets used to develop merchandise plans for sales, inventories, markdowns, shrinkage, receipts, open-to-buy and gross margin. Other industry-related planning systems examined.
PREREQ: FASH218, BUAD301, ACC201 or FASH217, and MSY160.

FASH 419  SOCIAL PSYCHOLOGICAL ASPECTS OF CLOTHING 3
Study of clothing and appearance as contributors to human interactions; consideration of importance of clothing in individual and collective behavior. Analysis of how dress reflects self-feelings, establishes social identities and affects interpersonal encounters.
PREREQ: FASH114, PSYC100 and SOCI201.

FASH 420  ASSORTMENT PLANNING AND BUYING STUDIO 2
Explores how merchandise budgets translate into buying decisions. Emphasis on assortment planning and purchasing. Involves computer applications.
PREREQ: FASH418.

FASH 421  PROFESSIONAL PORTFOLIO DEVELOPMENT 1
Conceptualization and development of professional portfolio of design work. Design conceptualization, fashion illustration, and photo documentation techniques emphasized.
PREREQ: FASH424.
RESTRICTIONS: Open to apparel design seniors only.

FASH 424  APPAREL COLLECTION DEVELOPMENT 3
Conceptualization, design and execution of coordinated apparel collection. Advances and expands knowledge and skills from previous courses.
PREREQ: FASH324.

FASH 426  FUNDAMENTALS OF TEXTILE CONSERVATION 3
Introduces scientific principles relevant to cleaning, repair, storage and exhibition of antique textiles. Evaluates treatment procedures that eliminate damaging agents, retard their effects, or shield textiles from them.

FASH 430  TOPICS IN FASHION MARKETING AND PROMOTION 3
Topics related to aspects of marketing and promotional activities in fashion industry. Current practices and trends within industry explored. Topics vary.
PREREQ: FASH218, BUAD301.
 Examines role of consumers in improving working conditions, labor standards, and effects of culture on business practices addressed.

 FASH 694 Apparel Consumers and Social Responsibility 1
 Examines role of consumers in improving working conditions, labor standards, and environmental stewardship in apparel factories worldwide. Factors and groups motivating consumer action explored, including influence of personal characteristics, market opportunities, and activist and other pressure groups.

 FASH 695 Bringing Social Responsibility to Apparel Corporate Culture 1
 Importance of leadership, role of inspirational leadership, and opportunities for making difference explored, analyzed and applied. Emphasis on social change - how individuals can help build socially responsible workplace.

 FASH 696 Current Initiatives for Apparel Industry Labor Compliance 1
 Evaluates effectiveness of current initiatives for improving working conditions and labor standards in factories around world. Explores codes of conduct and new trends for achieving long-term improvements in compliance to internationally recognized labor standards.

 FASH 697 Worker-Centric Social Responsibility for Apparel Industry 1
 Examines rights of workers. Explores obstacles in meeting and methods for assuring worker rights, including freedom of association. Consideration given to how to effectively engage with workers.

 FASH 698 Redesigning Green Apparel: Design, Sourcing and Packaging 1
 Examines challenges to environmental stewardship in design, sourcing, and packaging of apparel, textiles, and footwear products. Explores innovative practices, visionary leadership, and social change strategies for redesigning ‘green’ in context of design and sourcing roles of apparel business.

 FASH 699 Producing Environmentally Responsible Apparel 1
 Examines environmentally responsible apparel production and practices as philosophy, process, and competitive business strategy. Analyzes sustainable production in context of business’ physical plant, materials, and resource use.
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
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</tr>
</thead>
<tbody>
<tr>
<td>FINC 416</td>
<td>Derivative Securities and Risk Management</td>
<td>3</td>
<td>Examines trading, valuation and theory of pricing futures and forward contracts, options, swaps and other derivative securities. Emphasis placed on use of derivatives for hedging and risk management.</td>
<td>FINC 314</td>
</tr>
<tr>
<td>FINC 417</td>
<td>Real Estate Finance</td>
<td>3</td>
<td>Introduces real estate theory and management. Topics include financing, evaluation and property management, housing policy, and governmental regulation and participation.</td>
<td>FINC 313</td>
</tr>
<tr>
<td>FINC 418</td>
<td>Seminar in Corporate Governance</td>
<td>3</td>
<td>Examines current issues in corporate governance. Topics include executive compensation, shareholder resolutions and board of director ownership and accountability.</td>
<td>FINC 311</td>
</tr>
<tr>
<td>FINC 850</td>
<td>Financial Management</td>
<td>3</td>
<td>Introduction to fundamental concepts of the finance function with emphasis on decision-making techniques relevant to financial and nonfinancial managers. Topics include valuation, risk and return, capital budgeting, cost of capital, financial analysis and planning, and working capital management.</td>
<td>FINC 850</td>
</tr>
<tr>
<td>FINC 851</td>
<td>Corporate Financial Analysis</td>
<td>3</td>
<td>Examines major policy-making areas in corporate finance and impact of alternative policies on value at the firm. Emphasis placed on strengthening financial decision-making skills. Advanced topics include capital investment policy, financing and capital structure policies, dividend policy, and corporate control.</td>
<td>FINC 850</td>
</tr>
<tr>
<td>FINC 852</td>
<td>Investment Analysis and Portfolio Management</td>
<td>3</td>
<td>Examines role and functioning of securities markets, valuation techniques, and theory and practice of portfolio management. Topics include portfolio construction and evaluation metrics, relative valuation techniques and an introduction to derivative security pricing.</td>
<td>FINC 850</td>
</tr>
<tr>
<td>FINC 853</td>
<td>International Financial Management</td>
<td>3</td>
<td>Examines financial management of multinational firms and interrelationships between financial planning and international economic environment. Topics include direct investment theory, capital budgeting, financing trade and investments, risk management and working capital management.</td>
<td>FINC 850</td>
</tr>
<tr>
<td>FINC 854</td>
<td>Special Topics in Finance</td>
<td>1-3</td>
<td>Examines selected topics of current interest in various areas of finance, including corporate financial management, investment analysis and portfolio management, or financial institutions and markets.</td>
<td>FINC 850</td>
</tr>
<tr>
<td>FINC 855</td>
<td>Financial Institutions and Markets</td>
<td>3</td>
<td>Examines nature, purpose, and management of financial institutions and markets.</td>
<td>FINC 850</td>
</tr>
<tr>
<td>FINC 856</td>
<td>Financial Engineering and Risk Management</td>
<td>3</td>
<td>Introduces pricing, trading and use of derivative securities (forwards, futures, swaps and options contracts), emphasizing the management of risk arising from volatility of exchange rates, interest rates and commodity and equity prices.</td>
<td>FINC 850</td>
</tr>
<tr>
<td>FINC 858</td>
<td>Corporate Governance</td>
<td>3</td>
<td>Introduces issues pertaining to corporate governance and oversight, and examines topics of current interest concerning relationships between corporate boards, company management, and shareholders.</td>
<td>FINC 850</td>
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<tr>
<td>FINC 859</td>
<td>Seminar in Finance</td>
<td>3</td>
<td>Emphasis on financial research and application of alternative research methods to a project of current interest. Involves individual inquiry, written communication of results, and presentation of findings.</td>
<td>Requires 24 M.B.A. credit hours.</td>
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<tr>
<td>FINC 860</td>
<td>Financing New Ventures</td>
<td>1</td>
<td>Explores issues associated with financing new ventures, focusing on economics explaining the returns to and characteristics of private equity and bank financing deals involving private companies. Designed for those planning to manage start-up firms as well as those who plan to work in private equity industry.</td>
<td>FINC 850</td>
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<td>RESTRICTIONS: May be taken only as part of the New Venture Creation Concentration.</td>
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**FOREIGN LANGUAGES AND LITERATURES**

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<thead>
<tr>
<th>Course Code</th>
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<th>Credits</th>
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<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLLT 100</td>
<td>Essential Foreign Language: Language</td>
<td>1 PF</td>
<td>Basic, practical vocabulary and idiomatic expressions for beginners in the Foreign Language (e.g., French, Spanish, Chinese, Hungarian) during Winter or Summer Session abroad.</td>
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<tr>
<td>FLLT 101</td>
<td>Essential Foreign Language: Language</td>
<td>2 PF</td>
<td>Basic, practical vocabulary and idiomatic expressions for beginners in the Foreign Language (e.g., French, Spanish, Chinese, Hungarian, Swedish, etc.), and introduction to the foreign culture.</td>
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<tr>
<td>FLLT 105</td>
<td>Modern Language I - Elementary</td>
<td>4</td>
<td>Completion of the basic modern language. Increasing mastery of the basic skills (speaking, listening, reading and writing).</td>
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<tr>
<td>FLLT 106</td>
<td>Modern Language II - Elementary/Intermediate</td>
<td>4</td>
<td>Review of grammar, continued practice in speaking and writing, and reading texts of average difficulty.</td>
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<tr>
<td>FLLT 202</td>
<td>Biblical and Classical Literature</td>
<td>3</td>
<td>See ENGL202 for course description.</td>
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<tr>
<td>FLLT 203</td>
<td>Languages of the World</td>
<td>3</td>
<td>See LING203 for course description.</td>
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<tr>
<td>FLLT 309</td>
<td>Political Culture By Country</td>
<td>3</td>
<td>See POSC309 for course description.</td>
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<tr>
<td>FLLT 316</td>
<td>Classical Mythology</td>
<td>3</td>
<td>Cosmological myths and heroic sagas in the literature and art of Greece and Rome. The influence of the mythology in later art and literature. May be cross-listed with CMST316.</td>
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<tr>
<td>FLLT 320</td>
<td>Varying Authors and Genres</td>
<td>3</td>
<td>Cultural, especially cross-cultural and/or interdisciplinary studies with primary emphasis on the aesthetic context of the announced topic, e.g., Nordic Saga and Myth; Courtly Love; and the European Postwar Novel.</td>
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<tr>
<td>FLLT 321</td>
<td>Topics: Chinese Literature in Translation</td>
<td>3</td>
<td>Study of the works of one or more outstanding authors or of a special theme. Taught in English. Topics vary and are announced in registration booklet. May be cross-listed with WOMS321.</td>
<td></td>
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<tr>
<td>FLLT 322</td>
<td>Topics: Classical Literature in Translation</td>
<td>3</td>
<td>Special topics in Greek and Roman culture and civilization. Particular areas and writers to be announced, e.g., ancient epic, ancient drama, Greek literature in translation. May be cross-listed with CMST322 and/or WOMS322.</td>
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<tr>
<td>FLLT 324</td>
<td>Topics: French Literature in Translation</td>
<td>3</td>
<td>Study of the works of one or more outstanding authors or of a special theme. Taught in English. Topics vary and are announced in registration booklet. May be cross-listed with WOMS322.</td>
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<tr>
<td>FLLT 325</td>
<td>Topics: German Literature in Translation</td>
<td>3</td>
<td>Study of the works of one or more outstanding authors or of a special theme. Taught in English. Topics may vary and are announced in registration booklet. May be cross-listed with WOMS325.</td>
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<tbody>
<tr>
<td>FLLT 326</td>
<td>Topics: Hispanic Literature in Translation</td>
<td>3</td>
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<td>Study of the works of one or more outstanding authors or of a special theme.</td>
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<td>Taught in English. Topics vary and are announced in registration booklet.</td>
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<td>May be cross-listed with WOMS 326.</td>
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<td>RESTRICTIONS: May be repeated for credit when topics vary.</td>
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<tr>
<td>FLLT 327</td>
<td>Topics: Russian Literature in Translation</td>
<td>3</td>
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<td>Study of the works of one or more outstanding authors or of a special theme.</td>
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<td>RESTRICTIONS: May be repeated for credit when topics vary.</td>
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<tr>
<td>FLLT 328</td>
<td>Topics: Japanese Literature in Translation</td>
<td>3</td>
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<td>Study of the works of one or more outstanding authors or of a special theme.</td>
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<td>Taught in English. Topics vary and are announced in registration booklet.</td>
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<td>May be cross-listed with WOMS 328.</td>
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<td>RESTRICTIONS: May be repeated for credit when topics vary.</td>
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<tr>
<td>FLLT 329</td>
<td>Topics: Italian Literature in Translation</td>
<td>3</td>
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<td>Study of the works of one or more outstanding authors or of a special theme.</td>
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<td>Taught in English. Topics vary and are announced in registration booklet.</td>
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<td></td>
<td>May be cross-listed with WOMS 329.</td>
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<td>RESTRICTIONS: May be repeated for credit when topics vary.</td>
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<tr>
<td>FLLT 330</td>
<td>Varying Authors, Themes and Movements</td>
<td>3</td>
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<td>Cultural, especially cross-cultural, study with primary emphasis on the historical development of the announced area, e.g., The Faust Theme in Western Literature, Dante Through the Ages, Don Juan, and the Transformation of a Myth. Topics vary and are announced in registration booklet. May be cross-listed with CMLT 330 and/or WOMS 330. RESTRICTIONS: May be repeated for credit when topics vary.</td>
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<tr>
<td>FLLT 331</td>
<td>Introduction to Chinese Films</td>
<td>3</td>
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<td></td>
<td>Inquiry into Chinese films from the prewar period to the present. Both aesthetic and technical elements of film production and reception featured. Discussion intensive.</td>
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<tr>
<td>FLLT 338</td>
<td>Light and Shadow: Japanese Films</td>
<td>3</td>
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<td></td>
<td>Inquiry into Japanese films from the immediate postwar period to the present. Both aesthetic and technical elements of film production and reception featured. Discussion intensive.</td>
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<tr>
<td>FLLT 360</td>
<td>Humanities Colloquium</td>
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<tr>
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<td>Papers and discussion by faculty members and students participating in Humanities Semester offerings. Interdisciplinary approach.</td>
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<tr>
<td>FLLT 366</td>
<td>Independent Study</td>
<td>1-6</td>
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<tr>
<td>FLLT 375</td>
<td>Topics: Russian and Soviet Culture in Translation</td>
<td>3</td>
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<tr>
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<td>Special topics in Russian and Soviet culture. Taught in English. Topics vary and are announced in registration booklet. May be cross-listed with WOMS 375. RESTRICTIONS: May be repeated for credit when topics vary.</td>
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<tr>
<td>FLLT 380</td>
<td>Topics: Japanese Culture in Translation</td>
<td>3</td>
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<td></td>
<td>Special topics in Japanese culture. Taught in English. Topics vary and are announced in registration booklet. May be cross-listed with WOMS 383. RESTRICTIONS: May be repeated for credit when topics vary.</td>
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<tr>
<td>FLLT 383</td>
<td>Topics: Chinese Culture in Translation</td>
<td>3</td>
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<td></td>
<td>Special topics in Chinese culture. Taught in English. Topics vary and are announced in registration booklet. May be cross-listed with WOMS 383. RESTRICTIONS: May be repeated for credit when topics vary.</td>
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<tr>
<td>FLLT 390</td>
<td>Honors Colloquium</td>
<td>3</td>
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<td>First year interdisciplinary Honors seminar. May be team taught. Specific topics vary. RESTRICTIONS: Open to first year Honors students only.</td>
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<tr>
<td>FLLT 401</td>
<td>Historical Linguistics</td>
<td>3</td>
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<td>See LING 401 for course description.</td>
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<td></td>
<td>PREREQ: Completion of two years of a college language.</td>
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<tr>
<td>FLLT 421</td>
<td>Methods of Teaching Foreign Languages</td>
<td>3</td>
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<tr>
<td></td>
<td>Description, discussion and analysis of techniques pertinent to the teaching and learning of foreign languages. Emphasis on contributions of contemporary linguistic science. Includes demonstrations and practical exercises. May be cross-listed with LING 421.</td>
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<tr>
<td>FLLT 422</td>
<td>Language Syllabus Design</td>
<td>3</td>
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<tr>
<td></td>
<td>Study of approaches to language syllabus design and materials development, including grammatically sequenced, situational, national-functional, and task-based approaches. Topics: materials development, textbook evaluation and adaptation, design and implementation of learning units for second-language special purpose and bilingual learners. Includes one and a half hour weekly practicum and 25 hours of observation in high school classrooms. May be cross-listed with LING 422.</td>
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<tr>
<td>FLLT 424</td>
<td>Second Language Testing</td>
<td>3</td>
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<td></td>
<td>Study of the principles and techniques of second-language testing, including measurement of the four skills and of communicative competence. Bilingual measures. Practice in item construction and analysis. May be cross-listed with LING 424.</td>
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<tr>
<td>FLLT 425</td>
<td>Technology-Enhanced Language Learning</td>
<td>3</td>
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<td></td>
<td>Study of the practical and theoretical aspects of using technology in second language learning. Taught in English. PREREQ: FLLT 421. RESTRICTIONS: Open to teachers of foreign languages.</td>
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<tr>
<td>FLLT 429</td>
<td>Methods of Teaching Foreign/Second Languages in Elementary Schools</td>
<td>3</td>
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<tr>
<td></td>
<td>Familiarizes students with appropriate teaching methods and techniques for the elementary foreign language classroom. Includes demonstrations by experienced FLES teachers, peer-analysis of video-taped model lessons prepared by participants, and an introduction to testing, materials and course design. May be cross-listed with EDUC 429.</td>
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<tr>
<td>FLLT 436</td>
<td>Politics and Literature</td>
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<td>See POSC 436 for course description.</td>
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<tr>
<td>FLLT 466</td>
<td>Independent Study</td>
<td>1-6</td>
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<tr>
<td>FLLT 475</td>
<td>Varying Topics: Literary Criticism in a Foreign Language Context</td>
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<td>Overview of literary criticism with special emphasis on criticism important to French, Spanish, Italian, Russian and German literatures. May be organized as an historical survey or as a survey of a particular period, including the contemporary period. PREREQ: A 300-level survey of literature course in French, Spanish, Italian, Russian, or German.</td>
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<tr>
<td>FLLT 601</td>
<td>Historical Linguistics</td>
<td>3</td>
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<td></td>
<td>See LING 601. PREREQ: Completion of two years of a college language.</td>
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<tr>
<td>FLLT 621</td>
<td>Methods of Teaching Foreign Languages</td>
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<td></td>
<td>Description, discussion and analysis of techniques pertinent to the teaching and learning of foreign languages. Emphasis on contributions of contemporary linguistic science. Includes demonstrations and practical exercises. May be cross-listed with LING 621.</td>
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<tr>
<td>FLLT 622</td>
<td>Language Syllabus Design</td>
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<td></td>
<td>Study of approaches to language syllabus design and materials development, including grammatically sequenced, situational, national-functional, and task-based approaches. Topics: materials development, textbook evaluation and adaptation, design and implementation of learning units for second-language special purpose and bilingual learners. May be cross-listed with LING 622.</td>
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<tr>
<td>FLLT 623</td>
<td>Principles of Foreign Language</td>
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<td></td>
<td>Current perspectives on foreign language instruction and extensive hands-on experience with the implementation of effective language teaching strategies. Emphasis given to the enhancement of students' proficiency in class planning, syllabus design and materials preparation. RESTRICTIONS: Graduate students only.</td>
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<tr>
<td>FLLT 624</td>
<td>Second Language Testing</td>
<td>3</td>
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<td></td>
<td>Study of the principles and techniques of second-language testing, including measurement of the four skills and of communicative competence. Bilingual measures. Practice in item construction and analysis. May be cross-listed with LING 624.</td>
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<tr>
<td>FLLT 625</td>
<td>Technology-Enhanced Language Learning</td>
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<td></td>
<td>Study of the practical and theoretical aspects of using technology in second language learning. Taught in English. PREREQ: FLLT 621 or FLLT 623. RESTRICTIONS: Open to teachers of foreign languages.</td>
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<tr>
<td>FLLT 629</td>
<td>Methods of Teaching Foreign/Second Languages in Elementary Schools</td>
<td>3</td>
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<tr>
<td></td>
<td>Appropriate teaching methods and techniques for the elementary foreign language classroom. Includes demonstrations by experienced FLES teachers, peer-analysis of video-taped model lessons prepared by participants, and an introduction to testing, materials and course design. May be cross-listed with EDUC 626.</td>
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<tr>
<td>FLLT 675</td>
<td>Varying Topics: Literary Criticism in a Foreign Language Context</td>
<td>3</td>
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<tr>
<td></td>
<td>Overview of literary criticism with special emphasis on criticism important to French, Spanish, Italian, Russian and German literatures. May be organized as an historical survey or as a survey of a particular period, including the contemporary period.</td>
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</tbody>
</table>
FOSC 102 Food for Thought 3
Overview of popular aspects of foods and beverages, including food composition, safety, processing and chemistry. Effect of cultural and social influences on food choice, factors directing marketing and development of new food products, and different food professions discussed. Some group work expected.

FOSC 166 Special Problem 1-3

FOSC 230 Foodborne Diseases: Investigating Outbreaks 3
Introduction to basic epidemiology and critical review of contemporary food- and waterborne outbreaks. Presents current issues in light of developments related to food safety and public health. Emphasis on emerging pathogens, virulence factors, epidemiological techniques, rapid detection methods, and quantitative risk assessment. May be cross-listed with ANSC230.

FOSC 265 Seminar on Food Science 1
Overview of world food supplies, sources of raw materials, broad compositional components of foods, overview of food safety and food processing methods. Introduction to career opportunities and orientation to profession.

FOSC 266 Special Problem 1-3
RESTRICTIONS: Contract must have department chair signature. Independent study to involve library or lab research.

FOSC 305 Food Science 3
Composition, structure and functional properties of food and fundamentals of commercial food processing. Discussion and video demonstrations of various food processing and preservation methods and effects of ingredient manipulation. May be cross-listed with ANSC305.

FOSC 315 Food Safety from Farm to Fork 3
Examines safety issues in major food production systems in plants and animals (dairy, beef, swine, poultry, seafood). Study of government regulation, use of antimicrobials and pesticide residues. Explores consumer's perception of biotechnology, organic farming, and postharvest handling of agricultural commodities. May be cross-listed with ANSC315.

FOSC 328 Food Chemistry 4
Composition of food materials, reaction mechanisms leading to deterioration; and interaction of food components to form desirable and undesirable products, pigments, characterization of food polymers. Effect of physical and chemical factors on structure and functionality of food. May be cross-listed with ANSC328.

FOSC 329 Food Analysis 4
Theory and practice of food analysis. Determine chemical composition and characteristics of food. Introduction to instrumentation, spectroscopy, chromatography, electrophoresis, enzyme analysis and titration. Critically examine food analytical methods and data from journal articles including official AOAC and AACC methods and prepare scientific reports and presentations including scientific poster. May be cross-listed with ANSC329.

FOSC 359 Topics in Food Science 1
Students select topic in food science, search literature or other sources for information on topic, critically examine information and prepare presentation to class. Work done in groups or individually. Opportunities to discuss careers provided.

FOSC 366 Independent Study 1-6
RESTRICTIONS: Contract must have department chair signature. Independent study to involve library or lab research.

FOSC 399 Teaching Assistant 1-2 PF
Practical teaching experience. Students participate and assist in instruction of undergraduate course.

FOSC 409 Food Processing 4
Covers rationale and history of food processing; organizing unit operations; maintenance of food quality including food palatability and nutritious value; separation technology including initial operations, size reduction, mixing, filtration, centrifugation and crystallization; and preservation methods including fresh food storage, low temperature and high temperature methods. May be cross-listed with ANSC409.

FOSC 411 Food Science Capstone 4
Team-taught capstone for seniors to complete food science learning experience by participating in a food product development team that simulates real-world operation and requires integrated knowledge in areas of general food science, food chemistry, food analysis, food microbiology and food processing. PREREQ: FOSC328, FOSC329, FOSC409 and FOSC439.

FOSC 439 Food Microbiology 4
Role and significance of microorganisms in foods with particular reference to food spoilage, preservation, fermentation, sanitation and poisoning. Current methodology used in microbiological examination of foodstuffs. PREREQ: BISC300.

FOSC 445 Food Engineering Technology 4
Engineering fundamentals for processing of food materials, including applied thermodynamics and heat transfer principles and operations. May be cross-listed with EGTE445. PREREQ: MATH222, and PHYS104 or PHYS201. RESTRICTIONS: Not open to majors in mechanical or chemical engineering.

FOSC 449 Food Biotechnology 4
Traditional food biotechnology and biotechnology based on genetic engineering explored through in-depth study of current examples. Technical, economic and social aspects of biotechnology researched and analyzed through individual and group assignments and lectures. Field trips provide view of local biotechnology enterprises. PREREQ: BISC300, CHEM214 or CHEM257, or FOSC439.

FOSC 464 Practicum in the Food Industry 1-3
Provides hands-on supervised field experience in research, processing equipment and methodology, product development and testing, and/or other activities in food industry. RESTRICTIONS: May be repeated once for credit. Separate application form for industry (off campus) or campus courses.

FOSC 466 Independent Study 1-6
RESTRICTIONS: Contract must have department chair signature. Independent study to involve library or lab research.

FOSC 609 Food Processing 4
Rationale and history of food processing; organizing unit operations; maintenance of food quality including food palatability and nutritious value; separation technology including initial operations, size reduction and screening, mixing, filtration, centrifugation and crystallization; and preservation methods including fresh food storage, low temperature and high temperature methods.

FOSC 611 Food Science Capstone 4
Team-taught capstone for graduate students to advance food science training by participating in food product development team that simulates real-world operation and requires integrated knowledge in areas of general food science, food chemistry, food analysis, food microbiology and food processing.

FOSC 628 Food Chemistry 4
Composition of food materials, reaction mechanisms leading to deterioration; interaction of food components to form desirable and undesirable products, pigments, characterization of food polymers. Effect of physical and chemical factors on the structure and functionality of food.

FOSC 629 Food Analysis 4
Theory and practice of food analysis. Determine chemical composition and characteristics of food. Introduction to spectroscopy, chromatography, electrophoresis, enzyme analysis and titration. Examine food analytical methods and data from journal articles including official AOAC and AACC methods. Prepare scientific reports and presentations including scientific poster. May be cross-listed with ANSC629.

FOSC 639 Food Microbiology 4
Role and significance of microorganisms in foods with particular reference to food spoilage, preservation, fermentation, sanitation and poisoning. Current methodology used in microbiological examination of foodstuffs. May be cross-listed with ANSC639. PREREQ: BISC300.


FOOD AND RESOURCE ECONOMICS

FREC 100  SUSTAINABLE DEVELOPMENT  3
Surveys pressing issues in management of natural resources, environmental protection, and international development. Requires critical evaluation of these issues by applying basic policy analysis, considering ethical dimensions of policy, and drawing on economic indicators of environmental quality and human health. RESTRICTIONS: Students with majors in College of Agricultural and Natural Resources cannot use this course to satisfy Agricultural and Biological Sciences requirement in their major.

FREC 110  INTRODUCTION TO FOOD AND AGRIBUSINESS INDUSTRY  1
Introduction to food and agribusiness industry. Economic structure and importance of industry discussed.

FREC 135  INTRODUCTION TO DATA ANALYSIS  3
Introduction to computer systems, with emphasis on microcomputer systems, and their use in process and analyze data. Emphasis on application programs used in agricultural sciences including spreadsheets, graphics, database management, electronic communications and word processing.

FREC 150  ECONOMICS OF AGRICULTURE AND NATURAL RESOURCES  3
Introduction to economic and management principles and their applications to agriculture, including agribusiness, natural resources and environment.

FREC 201  RECORDS AND ACCOUNTS  3
Introductory course. Emphasis on concepts and principles and uses of accounting for control and decision-making purposes. RESTRICTIONS: Designed for non-business and non-accounting majors.

FREC 212  FOOD RETAILING AND CONSUMER BEHAVIOR  3
Topics include consumer market environment, demographic characteristics of population, food retail marketing and financial strategies, product merchandising planning, new product development strategies and site location analysis.

FREC 240  QUANTITATIVE METHODS IN AGRICULTURAL ECONOMICS  3
Basic quantitative applications of agricultural economics principles and theory. Determination of market equilibria and optimization of static models. PREREQ: MATH115; and FREC150 or ECON151.

FREC 270  BIOTECHNOLOGY: SCIENCE AND SOCIOECONOMIC ISSUES  3
See ANSC270 for course description.

FREC 302  MANAGEMENT OF AGROBUSINESS FIRMS  3
Principles and practical problems of firm management [decision-making] and planning. PREREQ: FREC150 or ECON151. RESTRICTIONS: Not open to freshmen or sophomores except by permission of instructor.

FREC 305  MANAGEMENT AND LEADERSHIP DEVELOPMENT  3
Exposes students to food and agribusiness human resource management and employee development. Emphasis on functions of management, leadership principles, effective supervision, training programs, employee and management appraisal systems, role of minorities in management and ethics in management.

FREC 316  ECONOMICS OF BIOTECHNOLOGY AND NEW TECHNOLOGIES  3
Introduction to economic explanations for new technologies, innovation and adoption. Biotechnology issues include consumer acceptance, labeling, risk assessment, market structure, trade, patents and environment. Other current technologies and future examined.

FREC 335  ADVANCED DATA MANAGEMENT  3
Advanced use of microcomputer systems and application software used in agricultural sciences. PREREQ: FREC135.

FREC 343  ENVIRONMENTAL ECONOMICS  3
Analyzes benefits and costs of environmental policy; reviews valuation techniques; assesses efficiency of decentralized, regulatory, tax and marketable permit policies to protect the environment. Uses graphical (non-calculus) economic analysis. May be crosslisted with ECON243. PREREQ: ECON115 or FREC150.

FREC 345  STRATEGIC SELLING AND BUYER COMMUNICATION  3
Application of strategic selling techniques to actual selling situations. Focus on technical and personal sales. Involves extensive use of videos, case problems, sales presentations and traveling with sales professionals.

FREC 350  FARM MANAGEMENT  3
Basics and conditions for agricultural production, farm planning and analysis, management of crop and production, investments and financial problems and management of labor. PREREQ: FREC150, and FREC201 or ACCT207. RESTRICTIONS: Designed for students without farm background.

FREC 366  INDEPENDENT STUDY  1-6

FREC 404  FOOD AND FIBER MARKETING  3
System approach to food and fiber marketing analysis: consumer, retail, processor, wholesale and farm level. Domestic and foreign demand and supply analysis, pricing, marketing costs, food safety, market power and its sources. Physical distribution, and structure of food and fiber marketing system.

FREC 406  AGRICULTURAL AND NATURAL RESOURCE POLICY  3
Agricultural and natural resource policy formation, effects of policy on resource allocation and economics of alternative programs. Analysis of effects of various programs on producers, consumers and taxpayers, especially contemporary issues and market failures. PREREQ: FREC150 or ECON151.

FREC 408  STATISTICAL RESEARCH METHODS I  3
Descriptive and inferential statistics in agribusiness and biological applications focusing on hypothesis testing, multiple regression, and analysis of variance techniques. May be cross-listed with STAT408.

FREC 409  RESEARCH METHODS II  3
Quantitative methodologies focusing on market survey research techniques; forecasting methods including exponential smoothing, trend analysis and regression analysis; aggregate production planning; just-in-time inventory management and materials requirement planning.

FREC 410  INTERNATIONAL AGRICULTURAL TRADE AND MARKETING  3
Trade theories and market analysis techniques necessary for implementing international agribusiness marketing operations. Various trade intervention schemes, export readiness, market entry sources of market intelligence and market analysis techniques emphasized. Case studies reinforce concepts and integrate major topics presented. PREREQ: FREC150 or ECON151.

FREC 412  STRATEGIC MARKETING COMPETITION  1-3
Strategic marketing of new food or fiber product/service. Development of marketing plan and communicating the plan effectively in local and national competition. PREREQ: FREC312. RESTRICTIONS: Requires permission of instructor.

FREC 420  AGRICULTURE IN ECONOMIC DEVELOPMENT  3
Process of increasing agricultural productivity and food supply in developing nations. Rural resource adjustment problems at various stages of industrialization. Role of foreign trade in development process.

FREC 424  RESOURCE ECONOMICS  3
Theoretical allocation of exhaustible and renewable resources over time, concepts of social welfare and depletion, and review of market failures and contemporary resource management issues. PREREQ: FREC150 or ECON151.

FREC 427  AGROBUSINESS FINANCIAL MANAGEMENT  3
Study of principles and tools of finance to identify and solve agrobusiness financial management problems through application of quantitative analytical methods and problem solving techniques. PREREQ: FREC201 or ACCT207, and a statistics course.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>FREC 429</td>
<td>Community Economic Development</td>
<td>3</td>
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<tr>
<td>FREC 430</td>
<td>Establishing and Managing a Food and Agribusiness Enterprise</td>
<td>3</td>
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<tr>
<td>FREC 444</td>
<td>Economics of Environmental Management</td>
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<tr>
<td>FREC 450</td>
<td>Topics in Environmental Law</td>
<td>3</td>
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<tr>
<td>FREC 464</td>
<td>Agribusiness Internship</td>
<td>1-3</td>
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<tr>
<td>FREC 465</td>
<td>Seminar</td>
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<td>FREC 466</td>
<td>Independent Study</td>
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<td>FREC 471</td>
<td>Futures and Options Markets</td>
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<td>FREC 480</td>
<td>Geographic Information Systems in Natural Resource Management</td>
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<td>FREC 608</td>
<td>Statistical Research Methods</td>
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<td>FREC 611</td>
<td>Regional Watershed Management</td>
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<td>FREC 615</td>
<td>Advanced Prices and Statistics</td>
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<td>FREC 674</td>
<td>Applied Data Base Management</td>
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<tr>
<td>FREC 682</td>
<td>Spatial Analysis of Natural Resources</td>
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<tr>
<td>FREC 801</td>
<td>Applied Demand and Marketing Analysis</td>
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<td>FREC 802</td>
<td>Research Techniques and Procedures</td>
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<tr>
<td>FREC 806</td>
<td>Research Techniques and Procedures</td>
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<tr>
<td>FREC 810</td>
<td>International Agricultural Trade Special Topics</td>
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<tr>
<td>FREC 826</td>
<td>Issues in Domestic and Foreign Rural Development</td>
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<td>FREC 834</td>
<td>Seminar in Resource Economics</td>
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<td>FREC 868</td>
<td>Research</td>
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<tr>
<td>FREC 869</td>
<td>Master's Thesis</td>
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**French**

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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>FREN 101</td>
<td>Elementary French I</td>
<td>3</td>
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<tr>
<td>FREN 102</td>
<td>Elementary French II</td>
<td>3</td>
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<tr>
<td>FREN 105</td>
<td>French I - Elementary</td>
<td>4</td>
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<tr>
<td>FREN 106</td>
<td>French II - Elementary/Intermediate</td>
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<td>FREN 107</td>
<td>French III - Intermediate</td>
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<tr>
<td>FREN 111</td>
<td>Intermediate French I</td>
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<tr>
<td>FREN 112</td>
<td>Intermediate French II</td>
<td>3</td>
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<tr>
<td>FREN 200</td>
<td>Grammar and Composition</td>
<td>3</td>
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<tr>
<td>FREN 205</td>
<td>French Conversation</td>
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</tbody>
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**FREN 101**  
Introduction to the French language and development of speaking, listening, and reading/writing skills through the use of basic texts.

**FREN 102**  
Completion of basic French.  
PREREQ: FREN101 or FREN105.

**FREN 105**  
Introduction to the French language and development of speaking, listening, and reading/writing skills through the use of basic texts.

**FREN 106**  
Completion of basic French. Increasing mastery of the basic skills of speaking, listening, and reading/writing.  
PREREQ: FREN105.  
RESTRICTIONS: Two to three years of high school French acceptable in lieu of prerequisite.

**FREN 107**  
Review of grammar, continued practice in speaking and writing, and reading texts of average difficulty.  
PREREQ: FREN106.  
RESTRICTIONS: Four years of high school French acceptable in lieu of prerequisite. Satisfies College of Arts and Sciences language requirement.

**FREN 111**  
Review of grammar. Increasing mastery of the basic skills of speaking, listening, and reading/writing.  
PREREQ: FREN102 or FREN106.  
RESTRICTIONS: Three years of high school French acceptable in lieu of prerequisite.

**FREN 112**  
Continued practice in speaking and writing, reading texts of average difficulty. Grammar review as needed.  
PREREQ: FREN111.  
RESTRICTIONS: Four years of high school French acceptable in lieu of prerequisite. Satisfies Arts and Sciences foreign language requirement.

**FREN 200**  
Intensive grammar review of all major verb tenses and grammatical concepts (such as object pronouns). Emphasis on grammar improvement through reading and writing.  
PREREQ: FREN107 or FREN112.

**FREN 205**  
Practical use of French by means of oral reports and discussions. Emphasis on improvement of basic conversational skills. Grammar review where appropriate, and/or some written work.  
PREREQ: FREN107 or FREN112 or one 200-level course.  
FREN 206: CULTURE THROUGH CONVERSATION 3
Discussion of topics drawn from contemporary French life. Designed for students who wish to broaden their knowledge of French culture while improving their oral and aural language skills.
PREREQ: FREN 107 or FREN 112.
RESTRICTIONS: Taught in France.

FREN 207: FRENCH CARIBBEAN PAST AND PRESENT 3
Introduction to contemporary French Caribbean, its history, its culture, its people, their way of life and the issues confronting them. Focuses on Martinique.
RESTRICTIONS: Taught in English during Winter Session abroad. Not for minor credit.

FREN 208: CONTEMPORARY FRANCE I 3
Introduction to contemporary France, its culture, its people, their way of life and the issues confronting them.
RESTRICTIONS: Not for major credit. Taught abroad only, in both English and French. Does not satisfy the foreign language requirement.

FREN 209: FRENCH CONVERSATION THROUGH FILM 3
Development of oral proficiency in French through discussion and analysis of major French films. Some written work and grammar review where appropriate.
PREREQ: FREN 107 or FREN 112 or one 200-level French course.
RESTRICTIONS: Minimum grade of B required for prerequisites.

FREN 211: FRENCH READING AND COMPOSITION 3
Reading and discussion of French literature. Frequent compositions. Grammar review where appropriate.
PREREQ: FREN 200 with a minimum grade of C or FREN 107 with a minimum grade of A- or FREN 112 with a minimum grade of A.

FREN 250: INTRODUCTION TO BUSINESS FRENCH 3
Familiarizes students with characteristics of business French (terminology, syntactical patterns, etc.) and policies and practices of the French business community.
PREREQ: Any 200-level course taught in the French language.

FREN 255: FRANCE IN THE NEWS 3
Explores topics in contemporary French society, culture and politics as expressed in the news media. Emphasis on current events and issues of France. Focus of study is the French press: newspapers and magazines printed in the French language.
PREREQ: Any 200-level course taught in the French language or FREN 107 or FREN 112 with a minimum grade of A-.

FREN 301: INTRODUCTION TO FRENCH LITERATURE: PROSE 3
Selected readings, with discussion and analysis, of the various genres of prose fiction (contes, nouvelles, romans) and nonfiction (essais) from the middle ages to the present.
PREREQ: FREN 211 and any 200-level course taught in the French language.

FREN 302: INTRODUCTION TO FRENCH LITERATURE: POETRY AND THEATRE 3
Selected readings, with discussion and analysis, of the various genres of poetry (lyrical, epic, narrative) and theatre (comedy, tragedy, drama) from the middle ages to the present.
PREREQ: FREN 211 and any 200-level course taught in the French language.

FREN 305: FRENCH CONVERSATION AND COMPOSITION 3
Discussion of cultural, social and political topics in French-speaking countries. Vocabulary building, grammar exercises and compositions.
PREREQ: FREN 205 and any other 200-level course in French.
RESTRICTIONS: Not intended for native speakers of French.

FREN 306: PRACTICAL ORAL/WRITTEN EXPRESSION 3
Strengthens grammar and vocabulary skills in preparation for advanced courses. Class exercises include oral exposures, discussion of articles and videos, textual analysis and compositions.
PREREQ: Any two 200-level French courses conducted in French.
RESTRICTIONS: Taught abroad only.

FREN 308: CONTEMPORARY FRANCE 3
Discussion and study of issues related to contemporary cultural, political and social developments in France, including its people in today's European community.
PREREQ: Any two 200-level French courses taught in the French language.
RESTRICTIONS: Course taught abroad only. Taught in French.

FREN 314: FRENCH PHONETICS 3
Studies the sounds of the French language (both individual phonemes and items of connected speech, such as liaison, linking, intonation, etc.). Helps improve pronunciation of the language.
PREREQ: Any two 200-level French courses.
RESTRICTIONS: Not intended for native speakers of French.

FREN 325: FRENCH CIVILIZATION I 3
Study of French cultural history from Gaul to the French Revolution.
PREREQ: Any two 200-level French courses.

FREN 326: FRENCH CIVILIZATION II 3
Study of French cultural history from the French Revolution to 1945.
PREREQ: Any two 200-level French courses.

FREN 350: ADVANCED BUSINESS FRENCH 3
Development of strategies to initiate and maintain oral and written communication in the world of business. Acquisition of commercial vocabulary, practice in speaking French in business situations, letter writing and article reading. Functional and cultural approach.
PREREQ: Any two 200-level French courses, one preferably being FREN 250.

FREN 355: SPECIAL TOPICS 3
Focuses on special interest in French literature or culture studies. RESTRICTIONS: Taught abroad.

FREN 366: INDEPENDENT STUDY 1-3

FREN 403: STRUCTURE OF FRENCH 3
Study of the sounds, morphology and syntax of the French language, as well as of discursive phenomena. Introduces students to the science of linguistics as applied to French. Taught in French.
PREREQ: Two 300-level French courses, one of which should be FREN 314.

FREN 404: ADVANCED COMPOSITION AND GRAMMAR 3
Intensive writing practice in French (seven compositions, all to be revised), with systematic grammar review: past tenses, articles, adjectives, participles, passive voice, the conditional, the subjunctive, concordance of verb tenses, demonstrative pronouns.
PREREQ: Two 300-level French courses.

FREN 405: TRANSLATION AND STYLISTICS 3
Focuses on vocabulary and translation skills (from French into English and vice-versa).
PREREQ: Two 300-level French courses with a minimum grade of B+.

FREN 406: ADVANCED FRENCH LANGUAGE 3
Grammatical structure and stylistics with special attention given to technical vocabulary and discourse.
PREREQ: Any 300-level French course.
RESTRICTIONS: Taught abroad only.

FREN 411: GREAT AUTHORS I: 1100-1750 3
Selected readings of master authors and works from the Middle Ages to the Age of Enlightenment. Authors may include Villon, Rabelais, Montaigne, Moliere, Corneille, Mme. de Lafayette, Montesquieu, Voltaire and others.
PREREQ: Any two 300-level French literature courses.

FREN 412: GREAT AUTHORS II: 1750-PRESENT 3
Selected readings of master authors and works from the dawn of Romanticism to the present. Authors may include Prevost, Rousseau, Hugo, Flaubert, Baudelaire, Gide, Proust, Camus, Sartre, Ionesco, Beckett, Duras and others.
PREREQ: Any two 300-level French literature courses.

FREN 423: FRENCH MEDIEVAL LITERATURE 3
Survey of French literature to 1500.
PREREQ: Any two 300-level French literature courses.

FREN 424: FRENCH RENAISSANCE LITERATURE 3
Selected works by Rabelais, the poets of the Pleiade, Montaigne and others.
PREREQ: Any two 300-level French literature courses.

FREN 437: SEVENTEENTH CENTURY FRENCH THEATRE 3
Growth of French dramatic literature before 1715 and analysis of the principal plays of Corneille, Racine and Moliere.
PREREQ: Any two 300-level French literature courses.

FREN 438: SEVENTEENTH CENTURY FRENCH POETRY AND PROSE 3
Representative novelists, poets, critics and moralists from Descartes and Pascal to La Fontaine, Boileau, Mme. de La Fayette and others.
PREREQ: Any two 300-level French literature courses.

FREN 441: THE EIGHTEENTH CENTURY: THE AGE OF VOLTAIRE 3
Novels, plays, essays and poetry of such authors as Montesquieu, Marivaux, Prevost and Voltaire.
PREREQ: Any two 300-level French literature courses.

FREN 442: THE EIGHTEENTH CENTURY: THE AGE OF ROUSSEAU 3
Novels, plays, essays and poetry of such authors as Diderot, Rousseau, Beaumarchais and Chénier.
PREREQ: Any two 300-level French literature courses.

FREN 445: NINETEENTH CENTURY FRENCH NOVEL 3
The novel from Romanticism to Naturalism. Chateaubriand, Balzac, Stendhal, Flaubert, Zola and others.
PREREQ: Any two 300-level French literature courses.
FREN 446 Nineteenth Century French Poetry and Theatre 3
Poets and dramatists representative of Romanticism, Realism and the Symbolist movement.
PREREQ: Any two 300-level French literature courses.

FREN 451 Twentieth Century French Literature: The Age of Anxiety and the Absurd 3
Main trends from Gide, Celine and Malraux to Camus, Sartre and Beckett, including Surrealism, Existentialism and the Theatre of the Absurd.
PREREQ: Any two 300-level French literature courses.

FREN 452 Aspects of Contemporary French Literature 3
Study of contemporary French literature, including novels, plays, essays and poetry of such authors as Robbe-Grillet, Sarraute, Perec, Tournier, Duras, Ponge, Bonnefoy, Jaccottet and Barthes.
PREREQ: Any two 300-level French literature courses.

FREN 453 Contemporary French Civilization: 1958-Present 3
Culture, customs and political and economic life in France since 1958.
PREREQ: Any two 300-level French courses.

FREN 454 French Cinema 3
Study of modern French cultural history through the films of such masters as Vigo, Grance, Pagnol, Renoir, Bresson, Resnois, Malle and others.
PREREQ: Any two 300-level French literature courses.

FREN 455 Selected Authors, Works and Themes 3
Works of one or more outstanding authors or on a special theme.
PREREQ: Any two 300-level French literature courses.
RESTRICTIONS: May be repeated for credit when topics vary.

FREN 456 French Theater Workshop 3
Study of French theater of different periods and genres, with an emphasis on staging and performance. Class activities include dramatic readings, improvisation, and exercises to improve diction. May culminate in a public presentation of students’ work.
PREREQ: Any two 300-level French literature courses.

FREN 457 The Francophone World 3
Examines the social, cultural, political and historical aspects of various regions of the Francophone world (the Maghreb, Sub-Saharan Africa, the Caribbean, South East Asia (Vietnam) and Lebanon) as well as the Beur (descendants of the first generation of Maghrebi immigrants) phenomenon in the French banlieue (suburb). Texts and films serve as points of entry into these multicultural communities.
PREREQ: Any two 300-level French courses.

FREN 458 Topics in Francophone Literature 3
Varying aspects of Francophone studies, such as women’s writing, literature of Quebec, colonial literature, African literature and cinema, literature of immigration.
PREREQ: Any two 300-level French literature courses.

FREN 459 Negritude, Antillanite, Creolite 3
Focuses on the literary movements of Negritude, Antillanite, and Creolite, and their relation to Caribbean identity, culture and history, as well as to the field of Francophone postcolonial studies.
PREREQ: Any two 300-level French literature courses.

FREN 466 Independent Study 1-3
Basic course with emphasis on developing reading comprehension.
RESTRICTIONS: Designed for graduate students in other disciplines who have had little or no previous experience with French.

FREN 533 French Readings for Ph.D. Candidates 3 PF
Basic course with emphasis on developing reading comprehension. 

FREN 605 Translation and Stylistics 3
Focuses on vocabulary and translation skills (from French into English and vice versa). Literary, commercial and journalistic texts serve as stylistic models.

FREN 611 Great French Authors I: 1100-1750 3
Selected Readings of master authors and works from the Middle Ages to the Age of Enlightenment. Authors may include Villon, Racaille, Montaigne, Maliere, Corneille, Mme. de Lafayette, Montesquieu, Voltaire and others.

FREN 612 Great French Authors II: 1750-Present 3
Selected readings of master authors and works from the dawn of Romanticism to the present. Authors may include Prevost, Rousseau, Hugo, Flaubert, Baudelaire, Gide, Proust, Camus, Sartre, Ionesco, Beckett, Duras and others.

FREN 623 French Medieval Literature 3
Survey of French literature to 1500.

FREN 624 French Renaissance Literature 3
Selected works by Rabelais, the poets of the Pleiade, Montaigne and others.

FREN 637 Seventeenth Century French Theatre 3
Growth of French dramatic literature before 1715 and analysis of the principal plays of Corneille, Racine and Moliere.

FREN 638 Seventeenth Century French Poetry and Prose 3
Representative novelists, poets, critics and moralists from Descartes and Pascal to La Fontaine, Boileau, Mme. de La Fayette and others.

FREN 641 The Eighteenth Century: The Age of Voltaire 3
Novels, plays, essays and poetry of such authors as Montesqueu, Marivaux, Prevost and Voltaire.

FREN 642 The Eighteenth Century: The Age of Rousseau 3
Novels, plays, essays and poetry of such authors as Diderot, Rousseau, Beaumarchais and Cheronier.

FREN 645 Nineteenth Century French Novel 3
The novel from Romanticism to Naturalism. Chateaubriand, Balzac, Stendhal, Flaubert, Zola and others.

FREN 646 Nineteenth Century French Poetry and Theatre 3
Poets and dramatists representative of Romanticism, Realism and the Symbolist movement.

FREN 651 Twentieth Century French Literature: The Age of Anxiety and the Absurd 3
Main trends from Gide, Celine and Malraux to Camus, Sartre and Beckett, including Surrealism, Existentialism and the Theatre of the Absurd.

FREN 652 Aspects of Contemporary French Literature 3
Study of contemporary French literature, including novels, plays, essays and poetry of such authors as Robbe-Grillet, Sarraute, Perec, Tournier, Duras, Ponge, Bonnefoy, Jaccottet and Barthes.

FREN 655 Selected Authors, Works and Themes 3
Works of one or more outstanding authors or on a special theme.
RESTRICTIONS: May be repeated for credit when topics vary.

FREN 658 Topics in Francophone Literature 3
Varying aspects of Francophone studies, such as women’s writing, literature of Quebec, colonial literature, African literature and cinema, literature of immigration.

FREN 659 Negritude, Antillanite, Creolite 3
Focuses on the literary movements of Negritude, Antillanite, and Creolite, and their relation to Caribbean identity, culture and history, as well as to the field of Francophone postcolonial studies.

FREN 689 Master’s Thesis 1-6
Study of selected topics, authors and works in the various fields of French literature. Emphasizes preparation of seminar presentations and term paper.
RESTRICTIONS: May be repeated for credit when topics vary.

Geography

GEOG 101 Physical Geography: Climatic Processes 3
Introduction to processes responsible for weather, climate and climatic change. Implications of climate for ecosystems and human activities. Earth-sun relations, geographic coordinate systems and map interpretation. Together GEOG101 and 106 form a comprehensive introduction to physical geography and its tools.

GEOG 102 Human Geography 3
Examination of the spatial distribution of human activities worldwide. Particular attention given to those factors and processes that have led to spatial inequality and locational conflict from international scale to neighborhood scale.

GEOG 106 Physical Geography: Land Surface Processes 3
Introduction to processes responsible for development, modification, distribution and variety of landforms and soils. Implications for human activities. Analysis of topographic maps and air photo interpretation. Together GEOG101 and 106 form a comprehensive introduction to physical geography and its tools.

GEOG 111 Climatic Processes Laboratory 1
Laboratory investigation of processes responsible for weather, climate and climatic change. Implications of climate for ecosystems and human activities. Earth-sun relations, geographic coordinate systems and map interpretation.
COREQ: GEOG101.

GEOG 120 World Regional Geography 3
Introduction to the geographic regions of the world and the changing relations between regions. Emphasis is on environmental, economic, and political geographic relationships between industrial and developing nations.
GEOG 152 CLIMATE AND LIFE 4
Introduction to those physical and biological processes that shape our climatic environment. Important themes include the exchanges of energy and mass between the atmosphere and both vegetation and built environments; and the influence of climate on humans and humans on climate.

GEOG 166 SPECIAL PROBLEM 1-3

GEOG 203 INTRODUCTION TO CULTURAL GEOGRAPHY 3
Introductory study of people, landscapes and cultures through time. Emphasis is on culture, ethics and aesthetics as contexts for human perceptions and the creation of varied human habitats.

GEOG 210 ECONOMIC GEOGRAPHY 3
Real variation on earth’s surface of human activities related to producing, exchanging and consuming wealth. World distributional patterns of major economic activities.

GEOG 220 METEOROLOGY 3
Analysis of atmosphere, weather elements, air masses, fronts and storms. Principles of weather forecasting, especially as it relates to severe weather.

GEOG 226 GEOGRAPHY OF LATIN AMERICA 3
Physical, historical and cultural geography of Latin America. Examination of the historical and contemporary role of humans as major agents of biological change in the earth’s ecosystem.

GEOG 230 HUMANS AND THE EARTH ECOSYSTEM 3
Examination of historical and contemporary role of humans as major agents of biological change in the earth’s ecosystem.

GEOG 235 CONSERVATION OF NATURAL RESOURCES 3
Physical, social and economic problems involved in integrating resource management and maintaining environmental quality.

GEOG 236 CONSERVATION: GLOBAL ISSUES 3
Introduces global nature of resources management and discusses the relationships between population growth, the market economy, agricultural production and mineral and energy exploitation, worldwide.

GEOG 240 ENVIRONMENT AND BEHAVIOR 3
Interdisciplinary introduction to individual and group behavior in relation to developed and natural environments. The implications of such human environment interactions for planning.

GEOG 250 COMPUTER METHODS FOR GEOGRAPHIC AND ENVIRONMENTAL SCIENCES 4
Modern Fortran programming for application to data analysis and modeling, with examples and applications from the geographical and environmental sciences. Topics include the basics of data reduction, numerical modeling, and design and use of scientific graphics.
PREREQ: MATH115 or MATH117.

GEOG 255 APPLIED CLIMATOLOGY 3
Application of climatic information to practical problems of agriculture, irrigation and crop scheduling, health, clothing, water resources, architecture and industry.

GEOG 271 INTRODUCTION TO GEOGRAPHIC DATA ANALYSIS 4
Survey of computational, statistical, and graphical techniques used in scientific data analysis with particular emphasis on the special nature of geographic and spatial data. Includes spreadsheet and scripting language programming.

GEOG 272 MAP AND AIR PHOTO INTERPRETATION 3
Analysis of maps, aerial photos and selected remote sensing techniques to interpret physical and cultural environments. Includes measurement of phenomena on air photos, photogrammetry and maps, and cartometrics.

GEOG 310 SOCIAL GEOGRAPHY 3
Examines geographical settings of minorities - ethnic groups, women, children, elderly and the homeless - and the ways institutions, media and political processes affect the spatial location and place experiences of these groups.

GEOG 315 NEWARK, DELAWARE: PEOPLE, POLITICS AND PLACE 3
Compares college towns across the country to see how they look, feel and respond to town/gown challenges and takes a critical look at Newark, Delaware. Examines the social diversity of Newark’s population; the history and politics behind local zoning, housing policies and city ordinances; and the geography of UD students. Off-campus research and/or service-learning projects required. RESTRICTIONS: Not intended for freshmen.

GEOG 320 WATER AND SOCIETY 3
Study of the physical occurrence and distribution of water in all parts of the hydrologic cycle: introduces the nature of human demands for water, the possibilities of obtaining additional supplies and the difficult legal, economic and political questions of management of water resources.

GEOG 325 URBAN GEOGRAPHY 3
Spatial relationships of urban areas, focusing on the structure of towns, the organization of urban space and the external relationships of cities.

GEOG 328 TRANSPORTATION GEOGRAPHY 3
Geographical factors in the development of transportation and influences of transportation innovations on spatial patterns of settlement and regional growth.

GEOG 329 INTERNATIONAL MIGRATION 3
See POSC329 for course description.

GEOG 330 BIOGEOGRAPHY 3
Interactions among environmental, biological and cultural processes that have led to present landscapes. Field trip required.

GEOG 342 BIOCLIMATOLOGY 3
Influences of weather and climate on animals, plants and humans, and their distributions; adaptation to normal and extreme environments; and environmental measurement and interpretation.
PREREQ: GEOG330 and GEOG250.

GEOG 343 CLIMATIC GEOMORPHOLOGY 3
Influence of climate and vegetation elements on rock weathering and soil erosion rates. Landform assemblages and surface materials produced under present and past climatic regimes.
PREREQ: GEOG106 or GEOG115/115 or GEOG107.

GEOG 345 CULTURAL GEOGRAPHY 3
Broad principles of the field. Human mobility and stasis. Material and symbolic landscapes. Individual and group values in landscape formation and change.

GEOG 346 URBAN CULTURAL GEOGRAPHY 3
City landscapes as expressions of attitudes and ideals. Oriental and Western; classical, modern and future. Humanizing the urban landscape.

GEOG 357 PALEOClimATOLOGY 3
Survey of earth’s climatic history, with emphasis on the methods used to reconstruct that history and the relevance of past climate changes as indicators of the sensitivity of the current climate.
PREREQ: GEOG101 or GEOG152 or GEOG220.

GEOG 366 INDEPENDENT STUDY 1-6

GEOG 372 GEOGRAPHIC INFORMATION SYSTEMS 3
Introduces principles, concepts, and technical issues of geographic information systems and science. Basic cartographic principles of map design and construction covered. Provides hands-on training in use of professional grade GIS package for mapping and spatial analysis of geographic phenomena and processes.
COREQ: GEOG250 or GEOG271.

GEOG 385 GEOMORPHOLOGY 4
See GEOL385 for course description.

GEOG 390 HONORS COLLOQUIUM 3

GEOG 411 FLUVIAL COLLOQUIUM 3
See GEOG411 for course description.

GEOG 412 PHYSICAL CLIMATOLOGY 4
Energy and moisture exchange between atmosphere and land surface for characteristic natural and human-modified environments.
PREREQ: MATH241 and GEOG250.

GEOG 417 SEMINAR IN CLIMATE CHANGE 3
Examines facts and fallacies regarding global warming and climate science and assesses the current state of scientific understanding of and ability to forecast climate change.
PREREQ: GEOG101 or GEOG152 or GEOG220 or equivalent.
GEOG 420  Atmospheric Physics  3
Introduction to energy and moisture flows in the atmosphere at small scales. Includes atmospheric thermodynamics, cloud physics and radiation.
PREREQ: GEOG220 and MATH242.

GEOG 422  Resources, Development and the Environment  3
Focuses on food, resources, energy and population issues in relationship to economic development and the global environment. The main objective is to engage students in discussion and debate on sustainable development policies.

GEOG 423  Atmospheric Dynamics  3
Investigates atmospheric motion in a quantitative manner. Expands basic conservation laws to derive the equations of atmospheric motion and to develop the concepts of vorticity and circulation. Discusses atmospheric wave motion and general circulation.
PREREQ: MATH242 and GEOG220.
COREQ: MATH243.

GEOG 428  Issues in Land Use and Environmental Planning  3
Examines theory and contemporary practice in land use and environmental planning with emphasis on creating an integrative framework that balances development demands for urban, suburban, and agricultural land against the needs to conserve and enhance environmental and cultural resources.

GEOG 438  World Cities in Comparative Perspective  3
World city as a new and distinctive geographic urban form in the world economy. Case studies explore common features of internal structure and external relationships of world cities, their growing environmental problems and extent to which they have decoupled from national cultures and economies.

GEOG 445  Method and Theory in Geography  3
Nature of geography, its history, methodology and applications in research and societal problems. A pre-professional course.

GEOG 449  Environment and Society  3
Considers relationships between environmental and social processes from the theoretical, philosophical and methodological perspectives of geography. Explores the ethical and contextual implications of framing environmental questions and posing solutions. Examines approaches to the geographical analysis of environmental problems.

GEOG 451  Microclimatology  4
Introduction to instrumentation and techniques involved in microclimatic monitoring and sampling. Students have the unique opportunity to collect field data during a semester-long research project. Research results are written to the specifications of a peer-reviewed scientific journal.
PREREQ: GEOG412.

GEOG 452  Seminar in Climatology  3
General theoretical and practical considerations of research in climatology. RESTRICTIONS: Requires permission of instructor.

GEOG 453  Synoptic Climatology  3
Physical processes involved with development and transportation of weather systems, including relationships between upper atmospheric flow and surface weather phenomena, synoptic evaluation of air masses, synoptic techniques for environmental analysis.
PREREQ: GEOG220.

GEOG 454  New Europe: Culture, Geopolitics, Milieu  3
Post-Soviet Europe is examined in terms of emerging economic, cultural, and ethnic configurations; tensions between national and supra-national territories; the role of mass media in ethnic, political, and ecologic space; processes of transformation in former Soviet states; dynamics of regional cooperation on environmental issues.

GEOG 455  Water Budget in Environmental Analysis  3
Development of the climatic water budget and its use in understanding problems in hydrology, agriculture, forestry, urban planning and the distribution of environmental systems. Evaluation of the influence of different human activities on the factors of the water budget.

GEOG 456  Hydroclimatology  3
Study of the hydrologic cycle as it relates to water in the atmosphere and in and on the earth's surface. Hydrologic processes including precipitation, soil moisture, evapotranspiration, runoff and streamflow are examined.
PREREQ: MATH241 and GEOG250 or equivalent.

GEOG 460  Women in International Development  3
See SOCI460 for course description.

GEOG 464  Internship in Geography  1-6
On-the-job experience in governmental or private planning, consulting, environmental or engineering agencies.

GEOG 466  Independent Study  1-6
GEOG 469  Senior Research and Thesis  1-6
GEOG 470  Computer Cartography  4
Introduction to cartographic theory and computational methods necessary for drawing maps with the aid of a digital computer.
PREREQ: GEOG250.

GEOG 471  Advanced Geographic Information Systems  4
Expands upon principles and concepts covered in GEOG372 to examine advanced data structures and spatial analysis techniques, uncertainty, and visualization methods of geographic data and analysis results. Extensive experience using a professional grade GIS package. Experience is also gained in customizing the software and automating the processing through a scripting language.
PREREQ: GEOG250 or GEOG271, GEOG372, MATH115 or MATH117.

GEOG 474  Introduction to Environmental Remote Sensing  3
Introduces fundamental characteristics of electromagnetic radiation, energy interactions, instruments, and ways to extract meaningful geophysical information from remote sensing data to solve geographical and environmental problems. Airphoto interpretation, photogrammetry, and digital image processing techniques described through in-class demonstrations and hands on exercises using professional grade image processing system.
PREREQ: GEOG250 or GEOG271, MATH115 or MATH117.

GEOG 477  Spatial Data Analysis  3
Special approaches to analysis of data associated with points, lines and areas on the Earth's surface commonly encountered in environmental sciences. Introduces mapping, graphical and quantitative approaches to analyzing spatial data. Fortran programs developed and used.
PREREQ: GEOG250.

GEOG 482  Physical Geography of Cold Environments  3
Survey and analysis of land surface processes in polar and mountain environments. Emphasis on the ground thermal regime, permafrost, periglacial [cold climate, nonglacial] landforms and environmental problems in cold regions. May be cross-listed with GEOL482.
PREREQ: GEOG106 or GEOL105/115 or GEOL107.

GEOG 600  Prelude to Geography  1
Introduction to contemporary American geography, especially its research and educational frontiers. Also emphasizes theoretical and practical considerations in formulating, carrying out and evaluating geographic research. Students required to attend (and then discuss) the Department’s Friday afternoon guest lectures.
RESTRICTIONS: Open to graduate students in geography and climatology only.

GEOG 601  Proseminar in Geography I  2
Examines contemporary structure of geography, its theories and approaches to inquiry. Surveys the discipline’s historical development, and introduces bibliographic and electronic literature searches, how to formulate a research question and organize research into that question.
RESTRICTIONS: Open to graduate students in geography and climatology.

GEOG 602  Proseminar in Geography II  2
Deepens ability to conduct research into a thesis or dissertation problem. By the end of the course, students are expected to have a complete draft of the literature review chapter of their thesis or dissertation.
PREREQ: GEOG601.
RESTRICTIONS: Open to graduate students in geography and climatology.

GEOG 605  Computer Programming for Environmental Research  1
Using a mixture of guided self-study and lecture, students learn modern Fortran programming for application to environmental data analysis and atmospheric and geological modeling. Older language features and use of legacy codes are also covered lightly.

GEOG 660  Ocean and Atmosphere Remote Sensing  3
See MAST606 for course description.
COREQ: GEOG250.

GEOG 669  Fluvioglacial Geomorphology  3
See GEOG611 for course description.

GEOG 671  Physical Climatology  4
Energy and moisture exchange between the atmosphere and land surface for characteristic natural and human-modified environments.
PREREQ: MATH241 and GEOG250.

GEOG 672  The American Suburb  3
See UAP614 for course description.

GEOG 675  Urban, Regional and Environmental Planning  3
See UAP615 for course description.
GEOG 617 SEMINAR IN CLIMATE CHANGE 3
Examines facts and fallacies regarding global warming and climate science and assesses the current state of scientific understanding of and ability to forecast climate change.
PREREQ: GEOG101 or GEOG152 or GEOG220 or equivalent.

GEOG 620 ATMOSPHERIC PHYSICS 3
Introduction to energy and moisture flows in the atmosphere at small scales. Includes atmospheric thermodynamics, cloud physics and radiation.
PREREQ: MATH242 and GEOG220.
COREQ: GEOG250.

GEOG 622 RESOURCES, DEVELOPMENT AND THE ENVIRONMENT 3
Focuses on food, resources, energy and population issues in relation to economic development and the global environment. Engages students in discussion and debate on sustainable development policies.
May be cross-listed with UAPP622.

GEOG 623 ATMOSPHERIC DYNAMICS 3
Investigates atmospheric motion in a quantitative manner. Expands basic conservation laws to derive the equations of atmospheric motion and to develop the concepts of vorticity and circulation. Discusses atmospheric wave motion and general circulation.
PREREQ: MATH242 and GEOG220.
COREQ: MATH243.

GEOG 628 ISSUES IN LAND USE AND ENVIRONMENTAL PLANNING 3
Examines theory and contemporary practice in land use and environmental planning with emphasis on creating an integrative framework that balances development demands for urban, suburban, and agricultural land against the needs to conserve and enhance environmental and cultural resources.
May be cross-listed with UAPP628.

GEOG 635 THE EVOLUTION OF THE AMERICAN URBAN LANDSCAPE 3
See UAPP635 for course description.

GEOG 636 RESEARCH TOPICS IN HISTORIC PRESERVATION 3
See UAPP636 for course description.

GEOG 638 WORLD CITIES IN COMPARATIVE PERSPECTIVE 3
World city as a new and distinctive geographic urban form in the world economy. Case studies explore common features of internal structure and external relationships of world cities, their growing environmental problems and extent to which they have decoupled from national cultures and economies.
May be cross-listed with UAPP638.

GEOG 641 SUMMER INSTITUTE FOR GEOGRAPHY TEACHERS I 3
Explores content, perspectives, and methods of geography, focusing on maps and spatial analysis (Delaware Geography Standard 1) and how humans interact with the physical environment (Delaware Standard 2). Content presented relates directly to requirements of K-12 Delaware Content Standards in Geography.

GEOG 642 SUMMER INSTITUTE FOR GEOGRAPHY TEACHERS II 3
Explores content, perspectives, and methods of geography, focusing on geographic concept of Place (Geography Standard 3) and Region (Geography Standard 4). Content presented relates directly to requirements of K-12 Delaware Content Standards in Geography.

GEOG 645 METHOD AND THEORY IN GEOGRAPHY 3
Nature of geography, its history, methodology and applications in research and societal problems. A preprofessional course.

GEOG 649 ENVIRONMENT AND SOCIETY 3
Considers relationships between environmental and social processes from theoretical, philosophical, and methodological perspectives of geography. Explores the ethical and contextual implications implied in framing environmental questions and posing solutions. Examines approaches to the geographical analysis of environmental problems.

GEOG 651 MICROCLIMATOLOGY 4
Introduction to instrumentation and techniques involved in micrometrical monitoring and sampling. Students have the unique opportunity to collect data through a semester long research project. Research results are written to the specifications of a peer-reviewed scientific journal.
PREREQ: GEOG412 or GEOG612.

GEOG 652 SEMINAR IN CLIMATOLOGY 3
General theoretical and practical considerations of research in climatology. REQUIREMENTS: Requires permission of instructor.

GEOG 653 SYNOPTIC CLIMATOLOGY 3
Physical processes involved with development and transportation of weather systems. Selected topics include relationships between upper atmospheric flow and surface weather phenomena, synoptic evaluation of air masses and synoptic techniques for environmental analysis.
PREREQ: GEOG220.

GEOG 654 NEW EUROPE: CULTURE, GEOPOLITICS, MILIEU 3
Post-Soviet Europe is examined in terms of emerging economic, cultural and ethnic configurations; tensions between national and supra-national territories; the role of mass media in ethnic, political and ecologic space; processes of transformation in former Soviet states; dynamics of regional cooperation on environmental issues.

GEOG 655 WATER BUDGET IN ENVIRONMENTAL ANALYSIS 3
Development of climatic water budget and its use in understanding problems in hydrology, agriculture, forestry, urban planning and distribution of environmental systems. Evaluation of influence of different human activities on factors of the water budget.

GEOG 656 HYDROCLIMATOLOGY 3
Study of hydrologic cycle as it relates to water in the atmosphere and on and on the earth’s surface. Hydrologic processes including precipitation, soil moisture, evapotranspiration, runoff and streamflow will be examined.
PREREQ: MATH241 and GEOG2250 or equivalent.

GEOG 657 CLIMATE DYNAMICS 3
Investigation of physical processes controlling global climate, starting with earth-sun relationship and adding additional processes to increase complexity and realism. Extensive use of models to explore importance of each process.
PREREQ: GEOG250 and MATH302.

GEOG 660 COMPUTER CARTOGRAPHY 4
Introduction to cartographic theory and computational methods necessary for drawing maps with the aid of a digital computer.
PREREQ: GEOG250.

GEOG 661 ADVANCED GEOGRAPHIC INFORMATION SYSTEMS 4
Commercial geographical information systems (GIS) are introduced and used to analyze a wide variety of spatial data bases. Georeferenced data are acquired, restructured and manipulated in a GIS environment. GIS methods are applied to local-scale geographical, environmental and land planning problems.
PREREQ: GEOG250 and GEOG270 or GEOG372 or GEOG470.

GEOG 662 SEMINAR IN GEOGRAPHIC INFORMATION SYSTEMS 3
Principles underlying geographic information systems (GIS) examined, and sample geographic problems analyzed. Design and programming of modules for data acquisition and storage, map projection, map overlay, spatial data analyses, and graphic output are considered. Geographic themes and data vary each time seminar offered.
PREREQ: GEOG470, GEOG670 or GEOG471.

GEOG 664 SATELLITE CLIMATOLOGY 3
Use of satellite observations to study climate system. Discussions consider development of satellite climatology, sensors, platforms and methodologies used to estimate climate variables from radiance measurements. Aspects of climate that emphasized include cloud climatologies, cloud systems, atmospheric moisture, radiation budget, land-surface conditions.
PREREQ: GEOG250 and GEOG412.

GEOG 665 SPATIAL DATA ANALYSIS 3
Special approaches to analysis of data associated with points, lines and areas on Earth’s surface commonly encountered in environmental sciences. Introduces mapping, graphical and quantitative approaches to analyzing spatial data. FORTRAN programs developed and used.
PREREQ: GEOG250.

GEOG 667 REMOTE SENSING OF ENVIRONMENT 3
See MAST681 for course description.

GEOG 668 PHYSICAL GEOGRAPHY OF COLD ENVIRONMENTS 3
Survey and analysis of land surface processes in polar and mountain environments. Emphasis on ground thermal regime, permafrost, periglacial (cold climate, non-glacial) landforms and environmental problems in cold regions. May be cross-listed with GEOL682.

GEOG 803 TOPICS IN GEOMORPHOLOGY 1-3
See GEOG803 for course description.

GEOG 835 CLIMATOLOGICAL RESEARCH 3
Techniques of research in basic and applied climatology: to include field study, and the analysis of climatological data. REQUIREMENTS: Requires permission of instructor.

GEOG 836 RESEARCH 1-9 PF

GEOG 899 MASTER’S THESIS 1-6

GEOG 964 PRE-CANDIDACY STUDY 3-12 PF
Research and readings in preparation of dissertation topic and/or qualifying examinations for doctoral students before admission to candidacy but after completion of all required course work. REQUIREMENTS: Not open to students who have been admitted to candidacy.

GEOG 969 DOCTORAL DISSERTATION 1-12 PF
### GEOL 105 GEOLOGICAL HAZARDS AND THEIR HUMAN IMPACT 3
Methods for predicting and dealing with geological hazards. May be taken with a 1 credit lab, GEOL 115.

### GEOL 107 GENERAL GEOLOGY 4
Principles of physical geology and its application in interpreting earth processes. Laboratory covers identification of earth materials and interpretation of topographic and geologic maps.

### GEOL 108 VOLCANOES AND EARTHQUAKES 3
Violent geologic activity as illustrated by volcanoes and earthquakes. Nature, causes and origins of volcanic and earthquake activity, their interactions with humans and their potential control.

### GEOL 109 PLANETS, ASTEROIDS AND IMPACTS 3
Composition, structure, surface features, origin, and evolution of planets, satellites, asteroids, and comets. Also explores possible connection between meteorite impacts and mass extinctions. Did an asteroid kill off the dinosaurs?

### GEOL 110 EARTH HISTORY: EVOLUTION, EXTINCTION AND THE GEOLOGICAL RECORD 3
History of the earth and its biota. Origins, evolution and mass extinctions of major groups of organisms as demonstrated by the earth’s fossil record. History of the Pleistocene Ice Ages and the evolution of humans.

### GEOL 111 GEOLOGY OF DELAWARE AND ITS NEIGHBORS 3
Introduction to geologic setting of Delaware and neighboring states. Rocks and fossils of region. Emphasis on formation and evolution of region through geologic time. Studies Delaware’s coastal zone and effect of coastal processes on recent geologic history of Delaware.

### GEOL 112 EARTH RESOURCES AND PUBLIC POLICY 3
Introduction to geologic occurrence of resources including water, energy, metals and industrial minerals. Discussion of geology, politics and economics of resource extraction and utilization. Environmental implications of resource use; methods of estimation of resource availability.

### GEOL 113 EARTH SCIENCE 4
Earth materials, structure and geologic phenomena that produce them. Physical and temporal aspects of earth history. Laboratory examination of rocks, minerals and fossils. Experiments in geological processes and interpretation of geologic maps.

### GEOL 115 GEOLOGICAL HAZARDS LABORATORY 1
Laboratory investigation of environmental geologic processes and their impact on society: earthquakes, volcanoes, coastal hazards, rivers and streams, groundwater. Identification of earth materials and study of earth processes using topographical, geological and tectonic maps.

COREQ: GEOL 105.

### GEOL 300 THE EARTH’S MATERIALS I: MINERALS 4
Systematics, identification, properties and associations of minerals and other raw materials of the earth. Economically significant minerals and their uses.

PREREQ: GEOL 105 and GEOL 115, or GEOL 107, or GEOL 113.

### GEOL 301 SYSTEMATIC AND EVOLUTIONARY PALEONTOLOGY 3
Classification of fossils, organic evolution, paleoecology; and application to geologic principles.

PREREQ: GEOL 107.

### GEOL 302 THE EARTH’S MATERIALS II: ROCKS 4
Identification, description, occurrences, origins and uses of rocks and ores.

PREREQ: GEOL 105 and GEOL 115, or GEOL 107, or GEOL 113; GEOL 300.

### GEOL 303 THE EARTHS SURFACE I: SURFICIAL PROCESSES 4

PREREQ: GEOL 105 and GEOL 115, or GEOL 107, or GEOL 113.

### GEOL 304 THE EARTHS SURFACE II: STRATIGRAPHY 4
Description and correlation of stratigraphic units; concepts of time and methods of absolute dating; environments of deposition and modern/ancient analogs and facies analysis; basin analysis.

PREREQ: GEOL 105 and GEOL 115, GEOL 107, or GEOL 113; GEOL 303.

### GEOL 305 THE EARTH’S LITHOSPHERE I: STRUCTURAL GEOLOGY AND PLATE TECTONICS 4
Study of geologic structures, geologic stress and responses of rocks to stress. Examines plate tectonics and major structural and tectonic relations generated at plate boundaries.

PREREQ: GEOL 105 and GEOL 115, or GEOL 107 or GEOL 113.

### GEOL 306 THE EARTH’S LITHOSPHERE II: FIELD GEOLOGY 4

PREREQ: GEOL 105 and GEOL 115, or GEOL 107, or GEOL 113; GEOL 305.

### GEOL 307 THE EARTH’S HISTORY I: PALEONTOLOGY 4
Recognition, biology and paleobiology of major groups of invertebrates. Use of fossil record in solving environmental and paleoenvironmental problems. Principles of stratigraphy and correlation and origin and development of the geologic time scale.

PREREQ: GEOL 105 and GEOL 115, or GEOL 107, or GEOL 113.

### GEOL 308 THE EARTH’S HISTORY II: EARTH SYSTEM SCIENCE 4
Interaction and evolution of lithosphere, biosphere, hydrosphere and atmosphere. Examination of geologic record as test for hypotheses about earth system processes including climate change, paleoceanography and tectonics. Integrative study of history of earth and its inhabitants.

PREREQ: GEOL 105 and GEOL 115, or GEOL 107, or GEOL 113; GEOL 307.

### GEOL 366 INDEPENDENT STUDY 1-3
Undergraduate research carried out under supervision of staff. Written report required.

RESTRICTIONS: May be repeated once if project warrants it.

### GEOL 401 SENIOR SEMINAR: TOPICS IN GEOSCIENCE 3
Integrated examination of topics and concepts of current interest and importance in geoscience. Topics may vary.

PREREQ: Senior geology majors only, within 30 credits of graduation.

### GEOL 405 INTRODUCTION TO RESEARCH 1-3
Undergraduate research carried out under supervision of staff. Written report required.

RESTRICTIONS: May be repeated once if project warrants it.

### GEOL 407 PETROLOGY 3
Petrography, chemistry, origin and tectonic significance of the major classes of igneous, sedimentary, or metamorphic rocks.

PREREQ: Completion of any of the one-year undergraduate core course sequences (GEOL300-302, 303-304, 305-306, or 307-308).

### GEOL 411 FLUVIAL GEOMORPHOLOGY 4

May be cross-listed with GEOG411.

PREREQ: Completion of any of the one-year undergraduate core course sequences (GEOL300-302, 303-304, 305-306, or 307-308).

### GEOL 412 GEOLOGICAL APPROACHES TO ARCHAEOLOGY AND HISTORY 3
Geological techniques in interpretation of archaeological sites and their surroundings. Application of geological principles to interpretation of the cultural record.

PREREQ: Completion of any of the one-year undergraduate core course sequences (GEOL300-302, 303-304, 305-306, or 307-308).

### GEOL 414 QUATERNARY GEOLOGY AND GEOCHRONOLOGY 3
Survey of stratigraphy and chronology of marine and terrestrial records and theories of climatic change. Studies of stratigraphy of significant Quaternary successions throughout the world and their correlation and absolute dating.

PREREQ: Completion of any of the one-year undergraduate core course sequences (GEOL300-302, 303-304, 305-306, or 307-308).

### GEOL 416 PALEOCOLOGY 3
Paleoenvironmental and stratigraphic interpretation of sediments and fossils. Basic statistics, biostratigraphy models, well logging and sequence stratigraphy. Application to geology problems.

PREREQ: Completion of any of the one-year undergraduate core course sequences (GEOL300-302, 303-304, 305-306, or 307-308).
GEOL 421 ENVIRONMENTAL AND APPLIED GEOLOGY 3
Application of geologic principles to matters of environmental concern. Discussion, examples, techniques and case histories in water supply, waste disposal, zoning and land use, mining, legislation, regulation and professionalism emphasizing role of geologist and educated citizen. PREREQ: Completion of any of the one-year undergraduate core course sequences (GEOL300-302, 303-304, 305-306, or 307-308).

GEOL 422 OSHA 40-HOUR HAZARDOUS MATERIALS SAFETY TRAINING 3
OSHA 40-hour safety training certification hazardous waste operations health and safety training program. Includes material from environmental regulations, hazard recognition, toxicology, environmental monitoring, personal protective equipment, site characterization and analysis, site zone and control, health and safety plans, decontamination and spill response recovery. RESTRICTIONS: GEOL422 cannot be applied toward the nine credits of 400-level geology electives required of BS geology majors.

GEOL 428 HYDROGEOLOGY 3

GEOL 431 MARINE GEOLOGY 3
Geology of ocean basins and their continental margins; sedimentation within marine environment and its uses in interpreting geologic history and paleoecology. PREREQ: Completion of any of the one-year undergraduate core course sequences (GEOL300-302, 303-304, 305-306, or 307-308).

GEOL 434 GEOLOGY OF COASTS 3
Erosional, depositional and tectonic processes; morphology and classification, and geologic history of coastal areas of the world. PREREQ: Completion of any of the one-year undergraduate core course sequences (GEOL300-302, 303-304, 305-306, or 307-308).

GEOL 446 GENERAL GEOCHEMISTRY 3
Chemical principles applied to geologic processes and environments. Thermochemistry of mineral equilibria; mineral stabilities at high temperature and pressure. Radioisotopes and methods of geochronology. The geochemical history of the earth. PREREQ: GEOL107 and CHEM103.

GEOL 453 ELEMENTARY GEOPHYSICS I 3
Fundamentals of seismology, wave propagation, refraction and reflection of seismic waves. Seismic and ground-penetrating radar (GPR) exploration methods and interpretations, with emphasis on near-surface problems. PREREQ: GEOL107 or GEOL105/115 or GEOL113; MATH 242; PHYS201 and PHYS202.

GEOL 454 ELEMENTARY GEOPHYSICS II 3
Gravity and shape of the earth and theories of isostasy. Geomagnetism, magnetization of rocks and paleomagnetism. Gravity, magnetic and electromagnetic methods and interpretations. PREREQ: GEOL107 or GEOL105/115 or GEOL113; MATH242, PHYS201 and PHYS202.

GEOL 466 INDEPENDENT STUDY 1-3
See GEOG482 for course description. PREREQ: Completion of any one-year core course sequence (e.g., GEOL300-302, 303-304, 305-306, 307-308).

GEOL 482 PHYSICAL GEOGRAPHY OF COLD ENVIRONMENTS 3
See GEOG482 for course description. PREREQ: Completion of any one-year core course sequence (e.g., GEOL300-302, 303-304, 305-306, 307-308).

GEOL 501 TOPICS IN MIDDLE SCHOOL GEOLOGY EDUCATION: WATERSHEDS 3
Application of geologic principles to topics related to watersheds, ground and surface waters, topographic maps, point and non-point sources of pollution, water cycle, and drinking water. PREREQ: GEOL107. RESTRICTIONS: Restricted to in-service middle school teachers.

GEOL 502 TOPICS IN MIDDLE SCHOOL GEOLOGY EDUCATION: EARTH HISTORY 3
Application of geologic principles to topics related to Earth’s history including: rock record, relative and absolute dating of rocks, fossil record, correlation of rocks and fossils, geologic time scale, and history of geologic events in Delaware. RESTRICTIONS: Restricted to in-service middle school science teachers.

GEOL 601 GEOLOGICAL SCIENCES AT DELAWARE 1 PF
Overview of University of Delaware graduate program in geology. Research opportunities and current activities. Orientation in department practices and procedures. Guidelines for preparation of research proposals. Professional activities and career options.

GEOL 602 CASE STUDIES OF NEAR SURFACE GEOLOGIC SYSTEMS 3
Broad overview of the history and processes of selected near surface geologic systems. Environmental and applied aspects of near surface geologic systems. RESTRICTIONS: Graduate students only.

GEOL 603 NUMERICAL MODELING OF NEAR SURFACE GEOLOGICAL SYSTEMS 3
Computer simulation of selected geologic processes. Numerical solution of partial differential equations with applications in geomorphology, hydrogeology, stratigraphy and geophysics. Signals and time series. PREREQ: GEOG250 or equivalent or permission of instructor. RESTRICTIONS: Graduate students only.

GEOL 604 FIELD METHODS - NEAR SURFACE GEOLOGIC SYSTEMS 3
Training and experience in obtaining and interpreting surface and shallow subsurface data. Emphasis on correlation and interpretation of morphostratigraphic relationships and history. Field methods employed include: augering and coring, shallow geophysical methods and modern surveying techniques. RESTRICTIONS: Graduate students only.

GEOL 605 STRATIGRAPHY 3
Principles of stratigraphy and application of stratigraphic methods (e.g., lithostratigraphy, biostratigraphy, chronostratigraphy, sequence stratigraphy and magnetic stratigraphy) for basin analysis. Interpretation of sedimentary facies. Application of sequence stratigraphy to the Quaternary Period. RESTRICTIONS: Graduate students only.

GEOL 607 PETROLOGY 3
Petrography, chemistry, origin and tectonic significance of the major classes of igneous, sedimentary, or metamorphic rocks.

GEOL 611 FLUVIAL GEOMORPHOLOGY 3

GEOL 612 GEOLOGICAL APPROACHES TO ARCHAEOLOGY AND HISTORY 3
Geological techniques in interpretation of archaeological sites and their surrounding geographic terrain; paleogeographies of archaeological settings; and uses of geology for interpretations of history.

GEOL 614 QUATERNARY GEOLOGY AND GEOCHRONOLOGY 3
Survey of stratigraphy and chronology of marine and terrestrial records and theories of climatic change. Studies of stratigraphy of significant Quaternary successions throughout the world and their correlation and absolute dating.

GEOL 616 PALEOECOLOGY 3
Paleoenvironmental and stratigraphic interpretation of sediments and fossils. Basic statistics, bioturbation models, well logging, and sequence stratigraphy. Application to geology problems.

GEOL 621 ENVIRONMENTAL AND APPLIED GEOLOGY 3
Application of geologic principles to matters of environmental concern. Discussion, examples, techniques and case histories in water supply, waste disposal, zoning and land use, mining, legislation, regulation and professionalism emphasizing role of geologist and educated citizen.

GEOL 622 OSHA 40-HOUR HAZARDOUS MATERIALS SAFETY TRAINING 3
OSHA 40-hour safety training certification hazardous waste operations health and safety training program. Includes material from environmental regulations, hazard recognition, toxicology, environmental monitoring, personal protective equipment, site characterization and analysis, site zone and control, health and safety plans, decontamination, and spill response recovery.

GEOL 628 HYDROGEOLOGY 3

GEOL 631 MARINE GEOLOGY 3
Geology of ocean basins and their continental margins; sedimentation within marine environment and its uses in interpreting geologic history and paleoecology.

GEOL 634 GEOLOGY OF COASTS 3
Erosional, depositional and tectonic processes; morphology and classification, and geologic history of coastal areas of the world.

GEOL 646 GENERAL GEOCHEMISTRY 3
Chemical principles applied to geologic processes and environments. Thermochemistry of mineral equilibria; and mineral stabilities at high temperature and pressure. Radioisotopes and methods of geochronology. Geochronology of earth.
GREK 101  **Elementary Ancient Greek I**  3
Prepares students to read ancient Greek literary works in the original language. Emphasizes building a basic vocabulary and acquiring essential grammar. Includes discussion of ancient Greek culture and civilization.

GREK 102  **Elementary Ancient Greek II**  3
Completion of elementary Greek. 
PREREQ: GREK101 or equivalent.

GREK 213  **Ancient Prose: Intermediate Greek**  3
Focuses on the works of one or more prose authors with particular attention to review of grammar and syntax. Readings drawn from the philosophical, historical, and oratorical works of authors such as Plato, Herodotus, Xenophon, Lydas, Demosthenes, and Isocrates in rotation or in combination. 
PREREQ: GREK102 or equivalent.

GREK 214  **Ancient Poetry: Intermediate Greek**  3
Focuses on the works of one or more poets. Readings drawn from the epic, lyric, and dramatic (tragic and comic) works of authors such as Homer, Sappho, Pindar, Aeschylus, Sophocles, Euripides, and Aristophanes in rotation or in combination. 
PREREQ: GREK213 or equivalent.

RESTRICTIONS: Satisfies College of Arts and Sciences language requirement.

GREK 313  **Ancient Prose: Advanced Intermediate Greek**  3
Focuses on the works (in the original language) of one or more prose authors with particular attention to interpretative issues such as themes and contemporary intellectual and cultural milieu. Readings will be drawn from the philosophical, historical, and oratorical works of authors such as Plato, Herodotus, Xenophon, Lydas, Demosthenes, and Isocrates in rotation or in combination. 
PREREQ: GREK214 or equivalent.

RESTRICTIONS: Meets with GREK213.

GREK 314  **Ancient Poetry: Advanced Intermediate Greek**  3
Advanced intermediate level course in ancient Greek focusing on the works (in the original language) of one or more poets. Readings will be drawn from the epic, lyric, and dramatic (tragic and comic) works of authors such as Homer, Sappho, Pindar, Aeschylus, Sophocles, Euripides, and Aristophanes in rotation or in combination. 
PREREQ: GREK214 or equivalent.

RESTRICTIONS: Meets with GREK214.

GEOG 106  **Independent Study**  1-3

GEOG 107  **Independent Study**  1-3

GERMAN

GRMN 101  **Elementary German I**  3
Introduction to the German language and a development of speaking, listening, reading and writing skills through the use of basic texts.

GRMN 102  **Elementary German II**  3
Completion of basic German. 
PREREQ: GRMN101 or GRMN105.

GRMN 105  **German I - Elementary**  4
Introduction to the German language and development of speaking, listening, reading and writing skills through the use of basic texts.

GRMN 106  **German II - Elementary/Intermediate**  4
Completion of basic German. Increasing mastery of the basic skills of speaking, listening, reading and writing. 
PREREQ: GRMN105.

RESTRICTIONS: Two to three years of high school German acceptable in lieu of prerequisite.

GRMN 107  **German III - Intermediate**  4
Review of grammar, continued practice in speaking and writing, and reading texts of average difficulty. 
PREREQ: GRMN106.

RESTRICTIONS: Four years of high school German acceptable in lieu of prerequisite. Satisfies College of Arts and Sciences language requirement.

GRMN 111  **Intermediate German I**  3
Review of grammar. Increasing mastery of the basic skills of speaking, listening, reading and writing. 
PREREQ: GRMN102 or GRMN106.

RESTRICTIONS: Three years of high school German acceptable in lieu of prerequisite.

GRMN 112  **Intermediate German II**  3
Continued practice in speaking and writing, reading texts of average difficulty, grammar review as needed. 
PREREQ: GRMN111.

RESTRICTIONS: Four years of high school German acceptable in lieu of prerequisite. Satisfies Arts and Sciences foreign language requirement.
**GRMN 200 GERMAN GRAMMAR REVIEW**
3
PREREQ: GRMN107.
RESTRICTIONS: Not intended for students who have already taken a 300 or 400-level course in German.

**GRMN 205 GERMAN CONVERSATION**
3
Practical use of German by means of oral reports and discussions. Emphasis on improvement of basic conversational skills. Grammar review where appropriate, and/or some written work.
PREREQ: GRMN107 or one 200-level German course.
RESTRICTIONS: Prerequisites require minimum grade of B. Not intended for students who have already taken a 300 or 400-level course in German.

**GRMN 206 CULTURE THROUGH CONVERSATION**
3
Discussion of topics drawn from contemporary German life. Designed to broaden knowledge of German culture while improving oral and aural language skills.
PREREQ: GRMN107.
RESTRICTIONS: Taught abroad only.

**GRMN 208 CONTEMPORARY GERMANY I**
3
Introduction to contemporary Germany, its culture, its people, their way of life and the issues confronting them.
RESTRICTIONS: Taught abroad only, in both English and German. Not for major credit. Does not satisfy foreign language requirement.

**GRMN 211 GERMAN READING AND WRITING**
3
Reading and discussion of 20th-century German short stories and novellas. Several short compositions. Grammar review where appropriate.
PREREQ: GRMN107.
RESTRICTIONS: Not intended for students who have already taken a 300 or 400-level course in German.

**GRMN 235 GERMAN POPULAR CULTURE**
3
Examines aspects of German popular culture, especially youth culture: customs, attitudes, pastimes, audio, print and visual media preferred by German young adults. Students exposed to colloquial German used within everyday contexts.
PREREQ: GRMN107.

**GRMN 255 GERMANY IN THE NEWS**
3
Explores topics in contemporary German society, culture and politics as expressed in the news media. Emphasis on current events and issues of Germany. Focus of study is the German press: newspapers and magazines printed in the German language.
PREREQ: Any 200-level course taught in the German language.

**GRMN 305 GERMAN CONVERSATION AND PHONETICS**
3
Discussion of current cultural, social and political topics in German-speaking countries. Pronunciation exercises and vocabulary building.
PREREQ: Any two 200-level German courses.

**GRMN 306 PRACTICAL ORAL/WRITTEN EXPRESSION**
3
Strengthens grammar and vocabulary skills in preparation for advanced courses. Class exercises include oral exposes, discussion of articles and videos, textual analysis and compositions.
PREREQ: Any two 200-level German courses.
RESTRICTIONS: Taught abroad only. Taught in German.

**GRMN 308 CONTEMPORARY GERMANY II**
3
Discussion and study of issues related to contemporary cultural, political and social developments in Germany, including its place in today's European community.
PREREQ: Any two 200-level German courses.
RESTRICTIONS: Taught abroad only.

**GRMN 311 INTRODUCTION TO MODERN GERMAN LITERATURE**
3
Masterpieces of poetry, narrative prose and drama from the eighteenth century to present.
PREREQ: Any two 200-level German courses.

**GRMN 325 GERMAN CIVILIZATION AND CULTURE**
3
Survey of major cultural, social and political developments in Germany from the mid-eighteenth century to present.
PREREQ: Any two 200-level German courses.
RESTRICTIONS: GRMN211.

**GRMN 350 INTRODUCTION TO BUSINESS GERMAN**
3
Familiarizes students with characteristics of business German (vocabulary, terminology and syntactical patterns) and aspects of the German business community.
PREREQ: Any two 200-level German courses.

**GRMN 355 SPECIAL TOPICS**
3
Explores an area of special interest in German literature or culture studies. The subject matter varies and will be announced in the registration booklet.
PREREQ: Any two 200-level German courses.
RESTRICTIONS: May be repeated for credit when topics vary.

**GRMN 366 INDEPENDENT STUDY**
1-3

**GRMN 406 ADVANCED GERMAN LANGUAGE**
3
Grammatical structure and stylistics with special attention given to technical vocabulary and discourse, e.g., business, law, science and agriculture.
PREREQ: Any 300-level German course.
RESTRICTIONS: Taught abroad only.

**GRMN 412 EARLY GERMAN LITERATURE**
3
Representative authors and themes: twelfth-seventeenth centuries. "Courtly love" and "knighthood" (Minnesang, Das Nibelungenlied); "bourgeoisie" vs. "peasantry" during the Reformation (Sach's Fastnachtspiele, Eulenspiegel); and the Baroque themes of "carpe diem" and "memento mori" (Grimmelshausen's Simplicissimus, Gryphius's plays, Baroque poetry).
PREREQ: Two of GRMN311, GRMN355 and any 300-level German course.

**GRMN 422 AGE OF Goethe**
3
Major works by Lessing, Lenz, Goethe, Schiller and their contemporaries. The importance of the Enlightenment, the Storm and Stress movement, the Classical period and early Romanticism.
PREREQ: Two of GRMN311, GRMN355 and any 300-level German course.

**GRMN 433 NINETEENTH-CENTURY GERMAN LITERATURE**
3
Studies major literary trends and figures (Heine, Buechner, Droste-Huelshof, Grillparzer, Hebbel, Keller, Stifter, Storm and Nietzsche) from the end of Romanticism to Naturalism.
PREREQ: Two of GRMN311, GRMN355 and any 300-level German course.

**GRMN 442 FROM NATURALISM TO EXPRESSIONISM**
3
Main literary currents from the 1880's to the 1920's. The drama from Hauptmann to Kaiser; the poetry of Hofmannsthal, Rilke, Lasker-Schuler, and others; narrative prose including Thomas Mann and Kafka.
PREREQ: Two of GRMN311, GRMN355 and any 300-level German course.

**GRMN 453 GERMAN LITERATURE: 1945 TO 1989**
3
Major authors and literary movements from the end of World War II until German unification. Works by Boell, Grass, Frisch, Duerrenmatt, Bachman, Handke and Christa Wolf.
PREREQ: Any two 300-level German courses.

**GRMN 455 SELECTED AUTHORS, WORKS AND THEMES**
3
Works of one or more outstanding authors or a special theme.
PREREQ: Any two of GRMN311, GRMN355 and any 300-level German course.
RESTRICTIONS: May be repeated for credit when topics vary.

**GRMN 465 POSTWALL GERMANY: LITERATURE AND CULTURE**
3
Explores reunited Germany's cultural and literary landscape and examines how reunification has affected East and West Germans. Focuses on how reunification has (re) shaped German national identity, affected the way Germans remember the (Nazi) past and contributed to the formation of a multicultural society.
PREREQ: Two of GRMN311, GRMN355 and any 300-level German course.

**GRMN 466 INDEPENDENT STUDY**
1-3

**GRMN 533 GERMAN READINGS FOR PH.D. CANDIDATES**
3 PF
Basic course in German for graduate students in other disciplines who have had little or no previous experience in the language. Emphasis on developing reading comprehension.

**GRMN 612 EARLY GERMAN LITERATURE**
3
Representative authors and themes: twelfth-seventeenth centuries "courtly love" and "knighthood" (Minnesang, Das Nibelungenlied); "bourgeoisie verses peasantry" during the Reformation (Sach's Fastnachtspiele, Eulenspiegel); Baroque themes of "carpe diem" and "memento mori" (Grimmelshausen's Simplicissimus, Gryphius's plays, Baroque poetry).

**GRMN 622 AGE OF Goethe**
3
Major works by Lessing, Lenz, Goethe, Schiller and their contemporaries. The importance of the Enlightenment, the Storm and Stress movement, the Classical period and early Romanticism.

**GRMN 633 NINETEENTH CENTURY GERMAN LITERATURE**
3
Study of major literary trends and figures (Heine, Buechner, Droste-Huelshof, Grillparzer, Hebbel, Keller, Stifter, Storm and Nietzsche) from the end of Romanticism to Naturalism.

**GRMN 642 NATURALISM TO EXPRESSIONISM**
3
Main literary currents from the 1880's to the 1920's. The drama from Hauptmann to Kaiser; the poetry of Hofmannsthal, Rilke, Lasker-Schuler and others, and narrative prose including Thomas Mann and Kafka.

**GRMN 653 GERMAN LITERATURE: 1945 TO 1989**
3
Major authors and literary movements from the end of World War II until German unification. Works by Boell, Grass, Frisch, Duerrenmatt, Bachman, Handke and Christa Wolf.
### GRMN 655 Selected Authors, Works and Themes 3
Works of one or more outstanding authors or a special theme. RESTRICTIONS: May be repeated for credit when topics vary.

### GRMN 665 Postwall Germany: Literature and Culture 3
Explores reunified Germany’s cultural and literary landscape and examines how reunification has affected East and West Germans. Focuses on how reunification has reshaped German national identity, affected the way Germans remember the (Nazi) past and contributed to the formation of a multicultural society.

### GRMN 869 Master’s Thesis 1-6

### GRMN 875 Seminar: Topics in German Literature 3
Study of selected topics, authors and works in the various fields of German literature. Variable content. Emphasizes preparation of seminar presentations and term paper. RESTRICTIONS: May be repeated for credit when topics vary.

### HEBREW

#### HEBR 105 Hebrew I - Elementary 4
Introduction to Hebrew alphabet and language, and development of basic speaking, listening, reading and writing skills. May be cross-listed with JWST105.

#### HEBR 106 Hebrew II - Elementary/Intermediate 4
Continuation of Elementary Hebrew. Increasing mastery of the basic skills of speaking, listening, reading, and writing through texts, conversations and songs. May be cross-listed with JWST106. PREREQ: HEBR105. Those with background other than HEBR105 should see instructor for appropriate placement.

#### HEBR 107 Hebrew III - Intermediate 4
Strengthening grammar skills, continued practice in speaking, listening, writing and reading through conversation, texts and songs. May be cross-listed with JWST107. PREREQ: HEBR106. Those with background other than HEBR106 should see instructor for appropriate placement. RESTRICTIONS: Satisfies College of Arts and Sciences language requirement.

#### HEBR 205 Hebrew Conversation 3
Practical use of Hebrew by means of discussions and oral reports on a variety of topics including family, school and work life. Emphasis on improvement of conversational skills for social situations, as well as grammatical competence and reading comprehension through multicultural themes including the revival of the Hebrew language and various issues related to Hebrew culture. May be cross-listed with JWST205. PREREQ: HEBR107 or equivalent.

#### HEBR 209 Contemporary Israel Through Film 3
Development of oral and written proficiency in Hebrew through discussion and analysis of Israeli films pertaining to major issues in the development of the young state. Grammar review where needed. May be cross-listed with JWST209. PREREQ: HEBR107 or one 200-level Hebrew course or instructor’s permission. RESTRICTIONS: Minimum grade of A required for HEBR107 and minimum grade of B required for a 200-level course.

#### HEBR 366 Independent Study 1-3

#### HEBR 466 Independent Study 1-6

### Health and Exercise Sciences

#### HESC 120 Physical Education 1 PF
Introduces knowledge and skills in physical activity. Program geared toward lifetime sports and allows for selection.

#### HESC 121 Water Safety Instruction 2
Prepares students with skills and knowledge to teach people to swim and be safe in and around water. Topics covered: basic water safety, swimmer strokes, advanced lifesaving skills, first aid, artificial resuscitation, teaching techniques, lesson plans, unit plans and practical teaching experience. RESTRICTIONS: Requires current Red Cross Advanced Lifesaving Certificate.

#### HESC 122 Lifeguard Training 2
Skills and knowledge for professional lifeguard. Topics include professional lifeguard; rescue skills; breathing and cardiac emergencies; first aid; oxygen administration in use of Automated External Defibrillation (AED); and spinal injuries.

#### HESC 124 Aerobic Instructor Training Certification 2
Provides potential teacher with pertinent, current knowledge on aerobic dance, to allow design of safe and effective programs. Emphasis on effective leadership skills.

#### HESC 132 Scuba 2
Prepares students with skills and knowledge necessary to continue their training for open water scuba certification.

#### HESC 135 Freshman Seminar 2
Covers basic survival skills; effective coping strategies to meet personal, academic, career and social challenges. Enhances student success and develops positive lifelong learning skills.

#### HESC 138 Lifeguard Training Instructor 2

**Restrictions:**
- May be cross-listed with JWST209.
- Requires current Red Cross Advanced Lifesaving Certificate.
- Requires aerobic dance experience and permission of instructor.
- Open to first semester freshmen.
- Current certification in first aid, CPR and lifeguard training.
HESC 139 CURRICULUM IN PHYSICAL EDUCATION 3
Focuses on curriculum and teaching methods for K-12 physical education. Examines student characteristics, domains of learning, movement concepts, planning and assessment to meet national and state content standards.
RESTRICTIONS: Open to HPEI majors only.

HESC 140 FUNDAMENTAL SKILLS ANALYSIS 3
Designed to develop cognitive understanding and practical experience for teaching and refinement of fundamental skills in grades K-12. Emphasis on processes of perceiving, extending, refining and applying fundamental skills through teaching progressions, lead-up games, and activities.
RESTRICTIONS: Must be completed for upper division clearance. Open to HPEI majors only.

HESC 141 ADVENTURE CHALLENGE AND OUTDOOR RECREATION 1
Provides opportunity to develop skills and techniques, learn methods and acquire knowledge of designated outdoor recreation skills and adventure challenge activities. Emphasis on developing readiness for presenting such activities in group settings.
RESTRICTIONS: Open to HPEI majors only.

HESC 143 SKILLS, TECHNIQUES AND KNOWLEDGE OF STUNTS AND TUMBLING 1
Preparation for teaching elementary school gymnastics using developmentally appropriate experiences with minimal equipment, including concepts of weight transfer, rolling, balance skills, and muscle fitness.
RESTRICTIONS: Open to HPEI majors only.

HESC 155 PERSONAL HEALTH MANAGEMENT: AN APPROACH FOR A LIFETIME 3
Utilizing group problem solving techniques and on-line resources, students develop comprehensive approach to managing their own health.
RESTRICTIONS: Not open to students who have taken HESC214.

HESC 160 HEALTH BEHAVIOR SCIENCE FIRST YEAR SEMINAR 1
Exposure to career opportunities within health behavior science field.
RESTRICTIONS: Open to HIBI majors only.

HESC 168 FRESHMAN SPECIAL TOPICS 1-3
Freshman level independent study.

HESC 200 ISSUES IN HEALTH BEHAVIOR SCIENCE 3
Issues surrounding health behavior science, with emphasis on role of professional in promoting individual and community behavior change.
RESTRICTIONS: Open to HIBI and HLBI majors only.

HESC 202 FOUNDATIONS OF SPORT MANAGEMENT 3
Overview of sport management field and segments of sport industry, including types of employment opportunities, as well as skills, educational background, and experiences essential for successful career in sport industry.
RESTRICTIONS: Open to SMI majors only.

HESC 205 FRESHMAN SEMINAR IN EXERCISE SCIENCE 1 PF
Introduction to biomechanics, exercise physiology, and motor control, including familiarization with types of laboratory research and career opportunities associated with each discipline.

HESC 207 FOUNDATIONS OF LEISURE AND SPORT MANAGEMENT 3
History, theory, and philosophy of leisure and sport and their influence on society, with emphasis on principles and objectives of program planning and execution.
RESTRICTIONS: Open to SMI, SM, HLBI, and HLBH majors only.

HESC 210 EMERGENCY MANAGEMENT OF INJURIES AND ILLNESSES 3
Emergency management of life-threatening and non-life-threatening injuries and illnesses. Includes CPR skills and initial and secondary assessments; first aid for wounds, burns, heat illnesses, and cold illnesses; and injuries to head, spine, chest, and extremities.
RESTRICTIONS: Open to majors within Department of Health, Nutrition and Exercise Sciences only.

HESC 214 WELLNESS: A WAY OF LIFE 3
Principles of personal and public health including present and future problems of environmental control. Includes health services, health education and healthy school environment.
RESTRICTIONS: Not open to students who have taken HESC155.

HESC 220 ANATOMY AND PHYSIOLOGY 3
Structure and function of human body: skeletal, muscular, circulatory, respiratory, nervous, endocrine, digestive and urinary systems. Foundation course for all areas of physical education and athletics.
RESTRICTIONS: Open to majors and HLEX concentration students.

HESC 225 OFFICIATING RECREATIONAL SPORTS 1
Theory and practice of officiating recreational sports. Introduced as lifetime activity, emphasis placed on practical experience with intramural program. Minimal classroom time. Offers excellent leadership training.
RESTRICTIONS: Meets one half of semester. Spring sports: basketball and softball.

HESC 230 GROUP FACILITATION SKILLS IN HEALTH AND PHYSICAL EDUCATION 3
Effective group facilitation, management and communication proficiency modeled and practiced. Participate in variety of group models to enhance delivery of diverse classroom topics. Develops preliminary health education planning skills including communication of sensitive issues.
RESTRICTIONS: Open to HPEI majors only.

HESC 240 INTRODUCTION TO ATHLETIC TRAINING 3
Orientation to athletic training as career in health care industry and introduction to prevention and care of injuries in physically active population.
PREREQ: HESC220.
RESTRICTIONS: Restricted to Athletic Training Interest (ATI) students only. Not open to students who have taken HESC305.

HESC 250 MOTOR DEVELOPMENT 3
RESTRICTIONS: Open only to HPEI and EXSI majors only.

HESC 251 SKILLS, TECHNIQUES AND KNOWLEDGE OF RHYTHMS AND DANCE 1
Preparation of physical education teachers. Provides opportunity to develop skills, learn methods and techniques and acquire knowledge of above activities. Emphasis on developing readiness for presenting such activities in public school settings.
RESTRICTIONS: Open only to HPEI and EXSI majors only.

HESC 252 LIFETIME LEISURE ACTIVITIES 1
Provides opportunity to develop skills, learn teaching methods and instructional techniques in selected lifetime sports including archery, golf, and bowling. Emphasis on developing readiness for presenting such activities in public school settings.
RESTRICTIONS: Open to HPE and HPEI majors only.

HESC 255 SKILLS, TECHNIQUE AND KNOWLEDGE OF RACQUET SPORTS 1
Preparation of physical education teachers. Provides opportunity to develop skills, learn methods and techniques and acquire knowledge of racquetball, tennis, badminton and pickleball. Emphasis on developing readiness for presenting such activities in public school settings.
RESTRICTIONS: Open to HPE and HPEI majors only.

HESC 257 ATHLETIC TRAINING PRACTICUM I 3 PF
Supervised clinical experience in athletic training. Development of competencies and proficiencies in content areas comprising role of an athletic trainer, as specified in NATA’s Athletic Training Educational Competencies.
PREREQ: HESC240.
RESTRICTIONS: Open to athletic training majors only.

HESC 258 ADVANCED TAPING AND BRACING TECHNIQUES 1
Laboratory experience in advanced taping, wrapping, bracing and splinting; variations for upper and lower extremity orthopedic injuries; emergency and non-emergency on-field transportation techniques; and equipment fitting and modification techniques.
RESTRICTIONS: Open to athletic training majors only.

HESC 261 LEADERSHIP IN LEISURE AND SPORT MANAGEMENT 3
Dynamics of group interaction and theories, principles, and practices of leadership. Review of research in leadership and group dynamics. Practical experience in applying theories and techniques through group execution of major campus-wide special event.
PREREQ: HESC207.
RESTRICTIONS: Open to HLBI, HLBI, SM, and SMI majors.

HESC 263 LEADERSHIP PRACTICUM 1 PF
Work under auspices of appointed professional to develop leadership skills in fitness activities.

HESC 268 SOPHOMORE SPECIAL TOPICS 1-3
Sophomore level independent study.
HESC 275 TACTICAL APPROACH TO TEACHING SPORTS 3
Uses tactical problems to teach invasion, net/field and running/soccer activities. Analyzes strategies for successful transfer across similar games. Appropriate practices and outcomes of quality physical education programs emphasized.
PREREQ: HESC140
RESTRICTIONS: Open to HPE majors only.

HESC 276 TECHNOLOGY IN HEALTH AND PHYSICAL EDUCATION 2
Focuses on future educators integrating technology into classroom. Hands-on work involves designing educational experiences for professional and student use.
RESTRICTIONS: Open to HPEI majors only.

HESC 300 ISSUES IN PHYSICAL ACTIVITY STUDIES AND SPORTS 3
Examines personal values, beliefs, and assumptions for purpose of developing and/or refining personal health philosophy and professional plan of action.
RESTRICTIONS: Open to junior and senior HPE majors only.

HESC 302 PRACTICUM IN SPORT MANAGEMENT 1 PF
Pre-internship professional experience in sport management/recreation agency. Work under auspices of faculty supervisor and professional mentor to gain practical experience.
PREREQ: HESC202 and HESC207.
RESTRICTIONS: Open to sport management majors only.

HESC 303 PRACTICUM IN SPORT MANAGEMENT 1 PF
Pre-internship professional experience in sport management agency. Work under auspices of faculty supervisor and professional mentor to gain practical experience.
PREREQ: HESC202, HESC207 and HESC302.
RESTRICTIONS: Open to sport management majors only.

HESC 305 FUNDAMENTALS OF ATHLETIC TRAINING 3
Organization and administration of athletic training program and prevention, diagnosis and treatment of athletic injuries, including physical therapy, taping and training room. First aid, safety measures and prevention of injuries.
PREREQ: HESC220 or HESC310.

HESC 306 ADVANCED SEMINAR IN SPORTS ORTHOPAEDICS I 1 PF
Provides understanding of diagnostic and decision making processes for common orthopaedic sports injuries. Rationale for use of diagnostic tests and principles of consultation and referral emphasized.
PREREQ: HESC220 or HESC310 and HESC240.
RESTRICTIONS: Open to athletic training majors only or with permission of instructor.

HESC 307 ADVANCED SEMINAR IN SPORTS ORTHOPAEDICS II 1 PF
Provides an understanding of special tests used in diagnosis of common orthopaedic sports injuries and their anatomic and pathomechanical basis.
PREREQ: HESC220 or HESC310 and HESC240.
RESTRICTIONS: Open to athletic training majors only or with permission of instructor.

HESC 310 PRE-Clinical ANATOMY AND PHYSIOLOGY 4
Structure and function of human body for pre-professionals in clinical and allied health fields. Emphasis on skeletal, muscular and nervous systems, with additional coverage of circulatory, respiratory, endocrine and immune systems.
RESTRICTIONS: Restricted to exercise science majors.
PREREQ: BISC276 or BISC306.

HESC 315 INSTRUCTIONAL STRATEGIES FOR DRUG EDUCATION 3
Presents methods and materials used in school drug education programs. Emphasis on basic information related to drug problem. Outside resource people including former drug users involved in class presentations.
PREREQ: HESC214 and HESC230.

HESC 317 STRENGTH AND CONDITIONING LABORATORY 1
Practical applications of strength and conditioning theory presented in HESC320. Development of fundamental skills needed to be professional trainer for people of all activity levels.
PREREQ: HESC220 or HESC310.
COREQ: HESC320 is a prerequisite or corequisite.

HESC 319 HEALTH RELATED FITNESS 3
Provides knowledge/techniques for teaching K-12 students to incorporate daily physical activity and nutrition into their personal wellness plans. Emphasis on health-related fitness, lifetime physical activity and nutrition using nationally approved program.
PREREQ: NTD1200.
RESTRICTIONS: Open to HPE majors only.

HESC 320 PRINCIPLES OF STRENGTH/CONDITIONING 3
Addresses scientific basis of strength and conditioning based upon principles related to biomechanics, exercise physiology, injury prevention techniques and anatomy. Emphasis on program design, energy systems, advanced lifting techniques, nutrition, plyometrics, ergogenic aids and effects of strength training on the cardiovascular system.
PREREQ: HESC220 or HESC310.
RESTRICTIONS: Open only to students enrolled in majors or minors in department.

HESC 324 MEASUREMENT AND EVALUATION 3
Measurement and evaluation of physical skills and knowledge as related to physical education. Includes descriptive statistics, knowledge tests, grading, physical performance tests and tests of sports skills.
PREREQ: Three-credit math course.
RESTRICTIONS: Open to HPE majors only.

HESC 325 INSTRUCTIONAL STRATEGIES FOR HUMAN SEXUALITY 3
Develops content knowledge and presents teaching methodologies relative to all facets of human sexuality. Emphasis on process of integrating information into effective age specific educational strategies.
PREREQ: HESC315
RESTRICTIONS: HPE majors or permission of instructor.

HESC 326 RESEARCH METHODS AND STATISTICS FOR BEHAVIORAL SCIENCE 3
Overview of types of research and statistical techniques commonly used in health behavior science, including research proposal development.
RESTRICTIONS: Open only to juniors and seniors in health behavior sciences majors.

HESC 329 DYNAMICS OF TEAM PROBLEM SOLVING 3
Development of teaming skills and their application in solving real life health-related issues. Topics include facilitation and leadership, dialogue and discussion, team maintenance and development and conflict resolution.

HESC 330 TEACHING COMMUNITY AND MENTAL HEALTH 3
Development of teaching approaches for mental health issues such as death and dying, suicide, depression, stress reduction and self-esteem. Emphasis on developing partnerships with community-based health programs and accessing pertinent health information.
PREREQ: HESC214
RESTRICTIONS: Open to HPE majors only.

HESC 332 HEALTH BEHAVIOR THEORY AND ASSESSMENT 3
Provides understanding and application of health behavior theory to program development and evaluation. Emphasis on skills and competencies necessary for programming and evaluation including needs assessments, research, communication and team process.
PREREQ: HESC326.
RESTRICTIONS: Open to students in health behavior science majors or WMG concentration only.

HESC 333 HEALTH BEHAVIOR THEORY AND PROGRAM PLANNING 3
Health behavior theories as they relate to youth health behaviors and development of health education programs, including development and use of instruments for assessing health behaviors.
RESTRICTIONS: Open only to HPE majors.

HESC 335 HEALTH AND AGING 3
Aging process addressed from biopsychosocial perspective. Particular emphasis on developing understanding of complex interrelations among aging, health and social structure.
RESTRICTIONS: Open to health behavior science majors or GRN concentration only.

HESC 340 MANAGEMENT OF SPORT INFORMATION 3
Analysis of information management process in sport industry. Relationship between sport organizations and their publics and media explored.
PREREQ: HESC202 and HESC207.
RESTRICTIONS: Open to sport management majors only.

HESC 341 PRINCIPLES OF OUTDOOR RECREATION 3
Orientation to field of outdoor recreation. Attention given to heritage, trends, resources, economics, management approaches, ecological and educational goals and ethics toward outdoor natural environment. Laboratory section involves participation and skill development in variety of outdoor recreation activities.

HESC 342 SURVEY IN ADAPTIVE PHYSICAL ACTIVITY 3
Current concepts and trends in adapted physical activity across lifespan, including skills necessary to prepare meaningful individualized movement experiences for people with special needs. Field work required.
RESTRICTIONS: Open to HNES majors with sophomore, junior, or senior standing, or HIXC concentration students.
HEALTH AND EXERCISE SCIENCES

HESC 343 ADAPTED PHYSICAL EDUCATION 3
Knowledge and skills required to meet professional and legal mandates pertaining to individualized health and physical education for students with special needs.
PREREQ: HESC220, HESC250.
RESTRICTIONS: Open to HPE majors with junior or senior standing.

HESC 344 FINANCIAL ASPECTS OF SPORT MANAGEMENT 3
Analysis of economic and societal variables impacting financial viability of professional, intercollegiate and Olympic sport organizations.
PREREQ: HESC202, HESC207, ECON1100 and FINC200.
RESTRICTIONS: Open to sport management majors only.

HESC 347 LEGAL ASPECTS OF SPORTS MANAGEMENT 3
Introduction to legal system and liability issues of tort law, agency law, antitrust labor law and constitutional law as they apply to professional and amateur sports.
RESTRICTIONS: Open to sport management majors, health behavior science majors with concentration in leisure service management, and legal studies minors.

HESC 350 BASIC CONCEPTS IN KINESIOLOGY 3
Review of musculoskeletal anatomy and lever systems provides foundation for analyzing human movement. Practical kinesiological evaluation focuses on common fitness and health related exercises. Movement analysis and proper techniques discussed for cardiovascular machines, abdominal work, stretching, etc.
PREREQ: HESC220 or HESC310.
RESTRICTIONS: Open only to students whose major or minor requires this course.

HESC 353 PRE-PROFESSIONAL SEMINAR 1 PF
Prepares exercise science majors with planning of employment and/or advanced degree opportunities. Includes in-depth resume and cover letter writing, interviewing techniques, and personalized career inventory and career exploration projects.
RESTRICTIONS: Open to exercise science majors only. Requires junior status.

HESC 354 SEMINAR 1 PF
Explores internship opportunities in (1) recreation and leisure services field for recreation major or (2) fitness management field for fitness management major. Completion of necessary paperwork for placement in agency assisting students in meeting career objectives required.
RESTRICTIONS: Requires junior status. Recreation/leisure service limited to recreation majors; fitness management limited to fitness management majors.

HESC 355 FIGURE SKATING PRACTICUM I 3 PF
Survey in figure skating science covering basics of coaching and teaching including in-depth review of instructional and competitive programs of Ice Skating International Association and United States. F.S.A. Extensive study and work in basic badge programs of I.S.I.A. and United States F.S.A.
RESTRICTIONS: Open to figure skating coaching minors only.

HESC 356 FIGURE SKATING PRACTICUM II 3 PF
Concentration in areas of pairs and ice dance with emphasis on teaching and coaching techniques related to basic through intermediate levels with an analysis of progression and sequencing.
RESTRICTIONS: Open to figure skating coaching minors only.

HESC 357 ATHLETIC TRAINING PRACTICUM II 3 PF
Supervised clinical experience in athletic training. Development of competencies and proficiencies in content areas comprising role of athletic trainer, as specified in NATA’s Athletic Training Educational Competencies.
PREREQ: HESC257.
RESTRICTIONS: Open to athletic training majors only.

HESC 358 ATHLETIC TRAINING PRACTICUM III 3 PF
Supervised clinical experience in athletic training. Development of competencies and proficiencies in content areas comprising role of athletic trainer, as specified in NATA’s Athletic Training Educational Competencies.
PREREQ: HESC357.
RESTRICTIONS: Open to athletic training majors only.

HESC 368 JUNIOR SPECIAL TOPICS 1-3
Junior level independent study.

HESC 370 METHODS AND MATERIALS IN ELEMENTARY PHYSICAL EDUCATION 3
Introduction to teaching physical education in elementary school settings with emphasis on designing and delivering developmentally appropriate units of instruction and pedagogical analysis of effective teaching behaviors. Also includes classroom management, teaching strategies and performance-based assessment of pupil achievement.
PREREQ: HESC139, HESC140, HESC210, HESC250, HESC275, HESC276 and HESC319. Satisfactory completion of Praxis I.
RESTRICTIONS: Junior status, upper division clearance, minimum gpa of 2.50, major index of 2.75 and completion of all skills requirements. Open to HPE majors only.

HESC 371 OUTDOOR ADVENTURE LEADERSHIP 3
Introduces recreation leadership in outdoor adventure activities. Attention directed toward conceptual and technical aspects of adventure programs.

HESC 375 NEUROMECHANICAL BASIS OF HUMAN MOVEMENTS 3
Functional aspects of neuromuscular and sensory systems and elementary mechanics employed to explain mechanical characteristics and control mechanisms underlying basic groups of human motor activities.
PREREQ: PHYS201 or 207
COREQ: HESC220 or 310 may be taken as either a corequisite or a prerequisite.
RESTRICTIONS: Restricted to exercise science majors.

HESC 380 METHODS AND MATERIALS IN SECONDARY PHYSICAL EDUCATION 3
Introduction to teaching physical education in secondary school settings with emphasis on designing and delivering developmentally appropriate units of instruction and pedagogical analysis of effective teaching behaviors. Also includes classroom management, teaching strategies and performance-based assessment of pupil achievement.
PREREQ: HESC139, HESC140, HESC210, HESC220, HESC250, HESC275, HESC276 and HESC319. Satisfactory completion of Praxis I.
RESTRICTIONS: Junior status, upper division clearance, minimum gpa of 2.50, major index of 2.75 and completion of all skills courses. Open to HPE majors only.

HESC 381 ADVENTURE CHALLENGE EDUCATION 3
Introduction to adventure challenge education and its concepts. Counseling concepts in adventure challenge education introduced. Activities including low-level group initiatives through participation on high level "ropes courses" emphasized. Activities create atmosphere for individual and group development.

HESC 390 PRINCIPLES OF COACHING 3
Introduces general philosophy and methods of coaching. Covers communication skills, teaching skills, sport psychology and managing team related responsibilities and relationships, including risk management.
RESTRICTIONS: Open to coaching science minors only.

HESC 395 SPORT MEDICINE PHARMACOLOGY 3
Provides understanding of origin, chemistry, effects and uses of medications commonly used in sports medicine. Major topics include pharmacokinetics, indications, contraindications, adverse reactions, management of overdose, phophonoresis, iophoroses, drugs affecting skeletal muscle, pain and inflammation.
PREREQ: HESC358.
RESTRICTIONS: Open to athletic training majors only.

HESC 400 RESEARCH METHODS 3
Introduces research on health and physical activity, including types of research, research design, matching appropriate statistical tools with research designs, research writing style and format and ethical issues related to research.
PREREQ: Junior or senior standing. Completion of STAT200 with at least a C-.
RESTRICTIONS: Open only to exercise science majors.

HESC 401 FOUNDATIONS OF HUMAN SEXUALITY 3
See IFST401 for course description.

HESC 403 PRACTICUM IN ADAPTED PHYSICAL EDUCATION 3-9 PF
Experience working with special children in physical education setting. Clinical experiences may include work with a particular group of disabled children (e.g. mentally retarded) or several different groups of disabled children (e.g. mentally retarded, visually or hearing impaired or orthopedically handicapped). Variable time involvement up to maximum of 14 weeks.
PREREQ: HESC342.
RESTRICTIONS: Open to majors only.

HESC 405 REHABILITATION OF ATHLETIC INJURIES 3
Students plan and implement comprehensive individualized rehabilitation programs including determination of therapeutic goals and objectives, selection of therapeutic exercises, methods of evaluating and recording rehabilitation progress and development of criteria for progression and return to competition.
RESTRICTIONS: Open to athletic training majors only.

HESC 407 PREVENTION AND RECOGNITION OF ATHLETIC INJURIES 3
Procedures for preventing, diagnosing, treating and rehabilitating athletic injuries. Emphasis on early detection of both nature and extent of injury.
PREREQ: HESC480 and HESC481.
RESTRICTIONS: Open only to AT majors.

HESC 409 THERAPEUTIC MODALITIES 4
Provides both theory and clinical experience in use of most common types of therapeutic modalities utilized in sports medicine.
RESTRICTIONS: Open to athletic training majors only.
HEALTH AND EXERCISE SCIENCES

HESC 414 METHODS AND MATERIALS IN HEALTH EDUCATION 3
Emphasis on health education in school curriculum: curriculum content and organization of materials for instructional purposes.
PREREQ: HESC155, HESC210, HESC276, HESC315, HESC325 and HESC330. Satisfactory completion of Praxis I.
RESTRICTIONS: Junior status, upper division clearance, minimum GPA of 2.50, major index of 2.75 and completion of all skills requirements.

HESC 420 FUNCTIONAL HUMAN ANATOMY 4
Anatomical individuality, functional significance and human performance interpretations involved through consideration of muscular, skeletal and nervous systems. Laboratory experience emphasizes meaning and significance of musculoskeletal movements and utilizes prosected human specimens, models, x-rays, dry biological materials and other aids.
PREREQ: HESC220 or HESC310.
RESTRICTIONS: Open only to AT, Honors, and biomedical engineering majors.

HESC 422 ORGANIZATION AND ADMINISTRATION OF LEISURE SERVICES 3
Study of operation and management of sport, recreation and fitness facilities. Emphasis on developing skills necessary to conduct day-to-day operations and manage these types of facilities.
RESTRICTIONS: Open to senior health behavior science majors.

HESC 425 BIOMECHANICS OF HUMAN MOTION 4
Study of fundamental mechanical principles governing human body in motion and at rest, including application of statics and dynamics in quantitative analysis of sport and exercise.
PREREQ: HESC220 or HESC310.
RESTRICTIONS: Open only to students in the athletic training major, health and physical education major, figure skating coaching minor, and strength and conditioning minor.

HESC 426 BIOMECHANICS I 4
Application of mechanical principles in study of human musculoskeletal system, including analysis of joint forces, as well as mechanical properties of bone, muscle, and connective tissues.
PREREQ: PHYS201 or 207, and HESC310.
COREQ: HESC375 must be either a corequisite or a prerequisite.
RESTRICTIONS: Open to exercise science majors only.

HESC 427 BIOMECHANICS II 3
Provides information on measurement of human motion in three dimensions and on calculation of inverse dynamics in two dimensions as applied to analysis of human motion.
PREREQ: HESC426 and MATH242.
RESTRICTIONS: Open only to exercise science majors.

HESC 428 MOTOR CONTROL AND LEARNING 3
Control and learning of human movement, with emphasis on historical and contemporary theories, psychomotor aspects of movement, learning and performance, and fundamental systems related to perception and action.
PREREQ: HESC310 and HESC375.
COREQ: HESC 429.
RESTRICTIONS: Exercise science majors only.

HESC 429 MOTOR CONTROL AND LEARNING LABORATORY 1
Laboratory experiences related to motor control and learning.
PREREQ: HESC310 and HESC375.
RESTRICTIONS: Majors in exercise science only.

HESC 430 PHYSIOLOGY OF ACTIVITY 3
PREREQ: HESC220 or HESC310.
COREQ: HESC431
RESTRICTIONS: Restricted to majors in exercise science and athletic training; minors in strength and conditioning; and students in health and exercise concentration or weight management concentration within nutrition major.

HESC 431 PHYSIOLOGY OF ACTIVITY LABORATORY 1
Laboratory experiences include measurement of physiological parameters under exercise conditions.
COREQ: HESC430.

HESC 432 EXERCISE TESTING AND PRESCRIPTION 4
Basic exercise prescription and fitness testing, including considerations for populations with special needs. Provides background content for American College of Sports Medicine’s Health Fitness Instructor exam.
PREREQ: HESC220 or 310, and HESC430.
RESTRICTIONS: Open only to majors within Department of Health, Nutrition and Exercise Sciences, or HEX and WMG concentrations.

HESC 433 APPLIED PHYSIOLOGY OF ACTIVITY 3
Function of human body during exercise, including integration of body systems during exercise, work, and sport activities and ways in which environment impacts performance.
PREREQ: HESC220.
COREQ: HESC431.
RESTRICTIONS: Open only to majors in health behavior science and health and physical education.

HESC 434 TWELVE-LEAD ELECTROCARDIOGRAM INTERPRETATION 3
Study of all aspects of electrocardiography including arrhythmia identification, rate determination, axis deviation, heart blocks, hypotrophy and myocardial infarction patterns.
RESTRICTIONS: Open to exercise science majors only.

HESC 437 SPORT MARKETING 3
Study of basic marketing concepts with applications to sport organizations, both amateur and professional. Topics include promotions and public relations, sport consumer behavior, strategic market planning, marketing information management, marketing communications and sponsorship.
PREREQ: BIAD 100.
RESTRICTIONS: Open to junior and senior sport management majors.

HESC 438 SPORT EVENT AND FACILITY MANAGEMENT 3
Management of sport events and facilities, including sponsorship acquisition, marketing and promotions, volunteer management, budgeting, participant registration, facility design, and event and facility operations.
PREREQ: HESC261, HESC437.
RESTRICTIONS: Open only to junior and senior sport management majors.

HESC 439 ETHICS AND ISSUES IN SPORT MANAGEMENT 3
Examination of importance of sport in society as transmitter of values, including major ethical theories in sport and ethical perspectives on current issues in sport.
PREREQ: HESC438.
RESTRICTIONS: Open only to junior or senior sport management majors.

HESC 440 STRATEGIES FOR ATHLETIC PEAK PERFORMANCE 3
Presentation of methods and techniques for mental preparation necessary to attain athletic peak performance. Provides experiential activities in areas of relaxation, visual imagery, visual motor behavior rehearsal, hypnosis stress reduction and concentration techniques.

HESC 447 ADVANCED TOPICS IN STRENGTH AND CONDITIONING 3
Theoretical principles for developing individualized strength and conditioning programs based on biomechanical, physiological and neural concerns, including calculations of volume, intensity and tonnage. Topics include teaching progressions and technique training for Olympic style exercises, weight room safety and weight room design.
PREREQ: Junior or senior standing. Completion of HESC320, HESC350 and HESC425 or HESC426 with at least a C. HESC426 may be a corequisite.
RESTRICTIONS: Restricted to minors in strength and conditioning.

HESC 448 ORGANIZATION AND ADMINISTRATION 3
Information for prospective certified athletic trainers on organization and administration of athletic training programs as identified by NATA. Topics include record keeping, purchasing and maintenance of equipment and facilities and policies and procedures for operation of athletic training program.
RESTRICTIONS: Open to athletic training majors only.

HESC 449 ADVANCED TOPICS IN SPORTS MEDICINE 3
Exposure to variety of medical specialists and allied health professionals including physical therapists, dentists, nurses and specialists in orthopaedics, neurology, cardiology, pediatrics, internal medicine, ophthalmology and physical medicine.
RESTRICTIONS: Open to athletic training majors only.

HESC 450 FACILITY AND PARK MANAGEMENT 3
Study of principles and procedures involved in planning for parks and recreation resources, land acquisition and utilization, maintenance of park and recreation areas, facilities and equipment.

HESC 451 CLINICAL EXERCISE PHYSIOLOGY 3
Methods of evaluating cardiovascular function through graded exercise tests as well as principles of exercise prescription. Theoretical as well as practical covering of administrative aspects of testing, metabolic calculations, variety of testing protocols, basic exercise physiology and exercise prescription.
PREREQ: HESC430.
RESTRICTIONS: Open only to exercise science majors.

HESC 453 AQUATIC MANAGEMENT 3
Equips individuals with knowledge, techniques and skills required to operate aquatic facility as manager or director.
HESC 455  FIGURE SKATING PRACTICUM III  3 PF
Concentration on advanced teaching/coaching techniques related to skill required in I.S.I.A. and United States F.S.A. Levels with analysis of progression and sequencing. Seminar sessions to include professional responsibilities, business practices, skating pedagogy, special programs and precision skating.
RESTRICTIONS: Open to figure skating coaching minors only.

HESC 456  FIGURE SKATING PRACTICUM IV  3 PF
Direct involvement in teaching/coaching of beginner elite national and world competitors under supervision of Ice Skating Development Center professional staff.
RESTRICTIONS: Open to figure skating coaching minors only.

HESC 457  ATHLETIC TRAINING PRACTICUM III  3 PF
Supervised clinical experience in athletic training. Development of competencies and proficiencies in content areas comprising role of athletic trainer, as specified in NATA's Athletic Training Educational Competencies.
PREREQ: HESC358.
RESTRICTIONS: Open to athletic training majors only.

HESC 458  ATHLETIC TRAINING PRACTICUM V  3 PF
Supervised clinical experience in athletic training. Development of competencies and proficiencies in content areas comprising role of athletic trainer, as specified in NATA's Athletic Training Educational Competencies.
PREREQ: HESC457.
RESTRICTIONS: Open to athletic training majors only.

HESC 459  ATHLETIC TRAINING PRACTICUM VI  3 PF
Supervised clinical experience in athletic training. Development of competencies and proficiencies in content areas comprising role of athletic trainer, as specified in NATA's Athletic Training Educational Competencies.
PREREQ: HESC458.
RESTRICTIONS: Open to athletic training majors only.

HESC 460  COACHING/PERFORMANCE PRACTICUM  1-3 PF
Practical coaching/performance experience in scholastic/clinical setting with season chosen corresponding to each student's interest. Must keep daily log of methods and experiences and choose an appropriate project. Observations made by minor coordinator and cooperating supervisor.
PREREQ: HESC210, HESC220, HESC240 and HESC390.
RESTRICTIONS: Junior status or higher.

HESC 461  PRACTICUM IN STRENGTH AND CONDITIONING  3 PF
Directed practical experience in strength and conditioning environment.
PREREQ: Admission to strength and conditioning minor and completion of HESC320, HESC342 and HESC447 with at least a C-.

HESC 462  PRACTICUM IN EXERCISE SCIENCE  1-6 PF
Directed practical experiences in clinical aspects of exercise science.
PREREQ: Admission to exercise physiology or biomechanics concentration.
RESTRICTIONS: Junior status or higher.

HESC 464  INTERNSHIP  9 PF
Practical learning experience in fitness management. Experiences may include, but are not limited to hospitals, rehabilitation centers, commercial fitness agencies and corporate fitness centers. Students complete approximately 450 hours over a 14-week period.
RESTRICTIONS: Requires permission of instructor.

HESC 465  TEACHING SEMINAR IN HEALTH AND PHYSICAL EDUCATION  3
Examines role of health and physical education teacher in elementary and secondary schools. Provides forum for analyzing and discussing topics of interest to preprofessionals and includes participation of professionals from school community.
COREQ: EDUC400.
RESTRICTIONS: Open to HPE majors only.

HESC 468  SENIOR SPECIAL TOPICS  1-3
Senior level independent study.

HESC 470  BASEBALL AND SOCIETY  3
Study of baseball as reflection of society and how it pervades American culture. Examines baseball as game, sport, business and social institution as portrayed in literature, memorabilia, film, ballparks and scandals.

HESC 480  UPPER EXTREMITY AND SPINE EVALUATION  3
Evaluation of upper extremity, cervical spine and facial injuries. SOAP format evaluation, on-field evaluation, mechanics and pathomechanics of joint movement, detailed anatomy, etiology of specific injuries and special and stress tests discussed.
PREREQ: HESC220 and HESC240.
RESTRICTIONS: Open to athletic training majors only.
Overview of global sport industry, including bid and host process for international sport competitions, organization of international sport community, penetration strategies of American sport leagues and products into international markets, and structure of sport in other countries.

PREREQ: CV I and CV II.

Others with special needs discussed.

Exercise prescription for cardiac patients, diabetics, pulmonary diseases and others with special needs discussed.

RESTRICTIONS: Open to MBA and educational leadership majors.

Focuses on development of broad spectrum of curriculum materials and instructional aids utilized in outdoor education programs. Includes techniques in social studies, science, art, language arts, physical education, music and math.

Consists of three basic parts: survey of completed research on effects of exercise and complete research project.

Focuses on development of broad spectrum of curriculum materials and instructional aids utilized in outdoor education programs. Includes techniques in social studies, science, art, language arts, physical education, music and math.

Programs.

Overview of legal principles relevant to sport managers, including tort law, contract law, constitutional law, agency law, risk management, judicial review and administrative law related to operations and administration of sport and athletic programs.

Theoretical and empirical inquiry into developmental changes in movement patterns across life span. Focus placed on changes in behavioral aspects of human motor behavior and underlying mechanisms to which these changes relate. Design and complete research project.

Neural control of human movement, including gradation of muscular force, motor unit control principles, neuromuscular aspects of strength, segmental motor control, organization of ballistic movements, adaptations in control of movement, and aging. Learn related research techniques through hands-on demonstrations.

Consists of three basic parts: survey of completed research on effects of exercise upon human body as it specifically relates to physical education and athletics; instruction in use of stress testing equipment; and completion of independent research project.

Fundamentals for administering 12-lead and single-lead electrocardiograms and stress test protocols for individuals recovering from cardiovascular disease. Emphasis on determining rate, rhythm, axis, hypertrophy and infarction.

Prepares student to direct exercise programs in rehabilitative setting. Addresses theoretical and practical aspects of exercise testing and prescription in addition to administrative issues of programs. Design exercise program for phase I, II or III cardiac rehabilitation.

Introduction to contemporary and classical research literature in exercise physiology with emphasis on acute and chronic effects of exercise on performance and health. Lecture/discussion format.

See NTD168D for course description. PREREQ: BISC276 or equivalent and NTD1200 or equivalent.

Instructs students in exercise recommendations for populations with special needs. Exercise prescription for cardiac patients, diabetics, pulmonary diseases and others with special needs discussed.

PREREQ: CV I and CV II.
HIST 130  ISLAMIC NEAR EAST: 600-1500  3
Introduces origins of Islam, its development as religion and culture, and broad trends in Middle Eastern history until 1500.

HIST 131  ISLAMIC NEAR EAST: 1500-PRESENT  3
Considers traditional make-up of Middle East and charts emergence of region in its present form through nineteenth and twentieth centuries.

HIST 134  HISTORY OF AFRICA  3
Introduction to African history south of the Sahara, from earliest times to 1914. Introduces major themes in African history: pre-colonial African political, social and economic institutions; diversity in African political organizations; slave trade and colonialism. May be cross-listed with BAMS134.

HIST 135  INTRODUCTION TO LATIN AMERICAN HISTORY  3
Introduction to Latin American history from preconquest period to present.

HIST 136  TOPICS IN EAST ASIA IN FILM  1
See EAST136 for course description. RESTRICTIONS: May be repeated for credit when topics vary.

HIST 137  EAST ASIAN CIVILIZATION: CHINA  3
Survey of major aspects of Chinese civilization, relating the past to the present.

HIST 138  EAST ASIAN CIVILIZATION: JAPAN  3
Survey of major aspects of Japanese civilization, relating the past to the present.

HIST 200  HISTORY AND GOVERNMENT OF DELAWARE  3
Survey of history of Delaware and its present government, with special attention to needs of social studies teachers.

HIST 201  INTRODUCTION TO GLOBAL ISLAM  3
See POSC201 for course description.

HIST 205  UNITED STATES HISTORY  3
Introductory survey of seventeenth, eighteenth, and nineteenth century American history. Themes and approach vary with instructor.

HIST 206  UNITED STATES HISTORY  3
Introductory survey of American history since 1865. Themes and approach vary with instructor.

HIST 210  INTRODUCTION TO MILITARY HISTORY  3
Survey of history of warfare from ancient Greeks through World War II, with emphasis upon tactics, weapons, armor, strategy and human factors that contributed to success or failure in war.

HIST 216  INTRODUCTION TO MATERIAL CULTURE STUDIES  3
See ANTH316 for course description.

HIST 220  AMERICAN CIVIL RIGHTS MOVEMENT  3-4
Team-taught, interdisciplinary, history of American Civil Rights Movement. Deals with crucial years from 1954 to 1970 and examines larger history of American race relations. May be cross-listed with BAMS220.

HIST 221  FILM AND AMERICAN SOCIETY  3
Examines how American political, social and cultural beliefs found expression in American feature films from World War II through 1990s. Weekly lectures and classic films such as On the Waterfront, Dr. Strangelove, Bonnie and Clyde, others.

HIST 241  HISTORY OF CHRISTIANITY TO 1300  3
Survey of evolution of Christianity from its origins to 1300.

HIST 243  ANCIENT RELIGION AND CIVILIZATION  3
Outlines religion in Europe and Near East from Paleolithic period to rise of Islam. Covers religious beliefs, rituals, death and burial practices of ancient man and construction and use of religious edifices.

HIST 245  MEDIEVAL KINGS AND QUEENS  3
Intensive examination, based on primary sources, of deeds and lives of selected kings and queens of Middle Ages, Byzantine rulers and popes.

HIST 254  JEWISH HOLOCAUST: 1933-1945  3
Focuses on infamous "Final Solution," with particular emphasis on roots of Anti-Semitism, National socialist policies and plans, ghetto and camp life, Einsatzgruppen, resistance, politics of rescue and art and literature of Holocaust. May be cross-listed with JWST254.

HIST 268  SEMINAR  3
Introduction to study and writing of history. Individual instructors take different approaches but all tend to stress nature and verification of historical evidence, its interpretation and its communication in writing. RESTRICTIONS: Open to history majors only.

HIST 270  HISTORY OF MODERN ASIA  3
Comparative survey of modern histories of several Asian countries, for example China, Japan and Vietnam, emphasizing their responses to modern world. Topics include traditional societies, impact of imperialism, nationalist and communist movements, Pacific War, cultural revolution in China, Vietnam Conflict and emergence of Japanese economic powerhouse.

HIST 278  HISTORIC CULTURES OF THE MIDDLE ATLANTIC REGION  3
See ANTH278 for course description.

HIST 291  WOMEN'S HISTORY THROUGH FILM  1
See WOMS291 for course description.

HIST 300  WOMEN IN AMERICAN HISTORY  3
Position of women in American life viewed from historical perspective including such topics as home and family life, women in the work force, women as agents of social change and feminism. May be cross-listed with WOMS300.

HIST 302  THE WORLD IN OUR TIME  3
Examination of current events within context of historical forces.

HIST 305  IMAGES OF RACE AND ETHNICITY IN AMERICAN CULTURE  3
Study of how images shaped attitudes toward race and ethnicity in American culture from colonial era to present. Study Native Americans, African Americans and immigrants. Visual materials include works of fine art, folk art, photographs, cartoons, motion pictures and popular illustrations. May be cross-listed with BAMS305.

HIST 306  HISTORY OF AMERICAN FOREIGN POLICY  3
Foreign policy of United States and nation's changing relations with outside world. Covers 1900 to present. Special attention given to presidential personality - how President's background and personality affect making of foreign policy.

HIST 307  THE UNITED STATES IN THE EARLY NATIONAL PERIOD  3
Political and cultural change in America from 1789-1825, from presidency of George Washington through James Monroe. Particular attention to nationalism under new Constitution, westward expansion under Jefferson and Madison, and cultural life in the early republic.

HIST 308  THE UNITED STATES IN THE ANTEBELLUM PERIOD  3
Social transformation and politics in America from 1825 to eve of Civil War. Particular attention to presidency of Andrew Jackson, changes in institutions and culture related to expansion, and conflicts leading to disunion.

HIST 309  UNITED STATES BUSINESS AND POLITICAL ECONOMY  3
History of United States as a capitalist civilization, particularly since nineteenth century rise of modern corporation. Emphasis on business history, business-government relations and larger social history of United States political economy.

HIST 310  POSTWAR AMERICA I: 1945-1963  3
Social, political and diplomatic history of United States from 1945 to 1963.

HIST 311  POSTWAR AMERICA II: 1963-PRESENT  3
Social, political and diplomatic history of United States from 1963 to present.

HIST 312  CRIME AND PUNISHMENT IN AMERICAN HISTORY  3
See CRJU312 for course description.

HIST 313  EARLY TWENTIETH CENTURY AMERICA  3
Rise of big business and ways that farmers, labor leaders, socialists and middle-class reformers responded to new industrialism.

HIST 314  TWENTIETH CENTURY AMERICA  3
Causes and consequences of American intervention in two world wars, and social, political and economic history of United States during years between wars.

HIST 316  FIRST ENCOUNTERS: INDIANS AND EUROPEANS IN EARLY AMERICA  3
Explores initial contacts between Native Americans and Europeans during sixteenth and seventeenth centuries. Focuses on encounters between Indians and Spanish in Mexico, French in Canada and British along the Atlantic seaboard.

HIST 318  COLONIAL AMERICA  3
Transit of culture from England to America and its modification there during seventeenth century. Development of mature colonial societies to 1760.

HIST 319  REVOLUTIONARY AMERICA  3
American colonies and the new nation from 1760-1789 with particular emphasis on political and cultural developments in the age of the American Revolution.

HIST 321  CIVIL WAR AND RECONSTRUCTION  3
Sectional conflict and the struggle between rival nationalisms in mid-nineteenth century United States.
HIST 323 THE OLD SOUTH
History of Southern United States from beginnings of European colonization to outbreak of Civil War. Special attention to slavery and how it shaped Southern life.

HIST 324 AMERICAN CONSTITUTIONAL HISTORY
See CRJU 324 for course description.

HIST 325 HISTORY OF BLACK AMERICA TO THE CIVIL WAR
See BAMS 304 for course description.

HIST 326 HISTORY OF BLACK AMERICA SINCE THE CIVIL WAR
See BAMS 306 for course description.

HIST 327 AMERICAN INDUSTRIAL SOCIETY FROM 1815 TO THE PRESENT
Exploration of social forces and social impact of American industrialization: rise of factory system, emergence of an industrial work force, role of cities and immigrants, westward migration, transition from slavery to freedom in the South, reform movements, family life and population change, and social and political conflict.

HIST 328 INTERNATIONAL MIGRATION
See POSC 329 for course description.

HIST 330 PEASANTS AND REVOLUTION IN AFRICA
The most remarkable nationalist struggles in modern Africa have been supported by peasants. Special attention paid to these struggles, especially in Guinea-Bissau, Angola, Zimbabwe, Mozambique, and to the Mau-Mau of Kenya. Why did the peasants support the revolution? Did they benefit from the victories?

HIST 331 HISTORY OF CARIBBEAN I
Examines major themes in Caribbean history from pre-Columbian period to end of slavery in 1838. Discussion of demographic and ecological consequences of European contact, sugar and slavery, evolution of creole cultures and slave resistance.

HIST 332 HISTORY OF CARIBBEAN II
Examines period from 1838 to present. Includes discussion of social and economic adjustments to emancipation, making of plural societies with importation of Asian laborers, American imperialism and political and social movements of twentieth century.

HIST 333 AFRICAN AMERICAN WOMEN'S HISTORY
Explores diversity of African American women's lives and development of women, work, and culture from colonial era through late twentieth century. Examines social, political, religious and economic factors affecting change and transformation in lives of African American women. Provides broad introduction to interdisciplinary field of African American and Women's Studies.

HIST 334 TOPICS IN LATIN AMERICAN HISTORY
History and culture of Latin American peoples. RESTRICTIONS: Only taught abroad in Latin America.

HIST 335 GREEK-ROMAN SPORT-RECREATION
Covers period 2000 B.C. to sixth century A.D. from point of view of spectator and participant; use of ancient authors in translation, artistic representations and secondary literature. Extensive use of slides.

HIST 336 TOPICS IN MODERN EUROPEAN HISTORY
Reflection of developments in modern European history from First World War to present. Emphasis on political, social, cultural and economic patterns of the period, complemented by visits to museums and appropriate historic sites. RESTRICTIONS: Taught abroad only. May be repeated for credit when taken on different study abroad programs.

HIST 340 ANCIENT NEAR EAST AND GREECE
Stresses such themes as way in which world view of ancients was different from ours, and relationship between individual and society. Readings in ancient historical works and ancient literature. Extensive use of slides.

HIST 341 ANCIENT ROME
Students encouraged in forming opinions on such questions as why and how Rome came to rule its empire; why Julius Caesar was murdered; and why Augustus succeeded where Julius Caesar had failed. Readings in ancient sources. Extensive use of slides.

HIST 342 BARBARIAN EUROPE
Survey of political, social, cultural and economic developments in Europe between 300 and 1050.

HIST 343 MEDIEVAL EUROPE: 1050-1350
Survey of political, social, cultural and economic developments in Europe between 1050 and 1350.
HIST 365  TOPICS IN EAST ASIAN HISTORY  3
Topics vary and may include history of civilization (China, Japan, Korea, Southeast Asia, etc.), women in historical and modern times, European colonialism in Asia, and trade with United States. RESTRICTIONS: Taught only in study abroad program. May be repeated for credit when topics vary.

HIST 366  INDEPENDENT STUDY  1-6

HIST 368  MODERN CHINA: 1600-1920's  3
History of China from the rise of the Manchus to the collapse of their dynasty and the emergence of the Republic. Topics include the reform tradition, Opium War and imperialism, modernization, the rise of modern Chinese nationalism and revolution. RESTRICTIONS: Not open to freshmen.

HIST 369  CHINA SINCE 1900  3
History of China from the fall of the last dynasty to present. Topics include collapse of the ancient regime, Republican revolution, warlordism and imperialism, rise of modern nationalism, Chiang Kaishek and Mao Zedong, post-1949 China and Deng Xiaoping era. RESTRICTIONS: Not open to freshmen.

HIST 370  HISTORY OF MODERN JAPAN  3
History of Japan from 1600 to 1952 with special emphasis on domestic forces of change, impact of the West, Japanese imperialism and militarism, dilemma of progress and Japan's place in modern world.

HIST 371  POSTWAR JAPAN  3
Traces emergence of contemporary Japan in its cultural, social, political, and economic spheres. Explores dynamic between every day life as depicted in literature, film, journalism, memoirs and historical writings and national projects of "economic miracle" and the making of the "economic superpower." May be cross-listed with WOMS372. PREREQ: HIST370. RESTRICTIONS: Not open to first year students.

HIST 372  POPULAR CULTURE IN URBAN JAPAN  3
Explores theory and practice of popular culture as manifested in history of urban Japan from seventeenth to twenty-first century. Topics include entertainments, sports, mass media, tourism, fashion, consumerism, sex and gender. Discussion format with intensive reading and writing. May be cross-listed with WOMS372. PREREQ: HIST370. RESTRICTIONS: Not open to first year students.

HIST 373  MODERN IRELAND: 1534-PRESENT  3
Anglo-Irish relations, emergence and victory of Irish nationalism and historical roots and subsequent development of Ulster problem.

HIST 374  HISTORY OF ENGLAND TO 1715  3
Political, constitutional, social and economic development to 1715.

HIST 375  BRITAIN SINCE 1714  3
British politics, society, and culture in modern times. The rise of parliamentary democracy, industry, liberalism, empire, feminism, social democracy and mass culture.

HIST 377  RADICALISM AND REVOLUTION: ISLAMIC MOVEMENT/ MODERN MIDDLE EAST  3
Addresses background, historical development and present state of Islamic fundamentalist movements.

HIST 378  NATIONALISM IN THE MODERN MIDDLE EAST  3
Focuses on the ideology of nationalism in an attempt to explain the emergence of the modern countries in the Middle East.

HIST 379  HISTORICAL ARCHAEOLOGY OF THE EASTERN UNITED STATES  3
See ANTH379 for course description.

HIST 380  HISTORY OF THE ARAB-ISRAELI CONFLICT  3
Explores roots and historical complexity of Arab-Israeli conflict. Topics include: origins of Zionism, nature of traditional Arab/Ottoman society in the nineteenth century, relationship between early Zionists and indigenous Arab population of Palestine, creation of a Jewish society, rise of Palestinian nationalism, and the protracted search for coexistence between Jews and Arabs. May be cross-listed with JWST381.

HIST 381  ISLAM AND THE WEST: THE HISTORY OF MUTUAL PERCEPTIONS  3
Surveys history of mutual views of Islam and Christianity/Judaism/the West from the Middle Ages to present. Topics include medieval polemics, Enlightenment attempts at respect and understanding, question of Orientalism, and current specter of a clash of civilizations.

HIST 382  HISTORY OF WESTERN MEDICINE  3
Social and cultural forces that have influenced development of modern medicine.

HIST 389  THE AMERICAN WEST  3
Surveys American West through the eyes of its diverse population as well as those drawn to study and define it. Particular attention given to themes currently debated concerning the legacy, meaning and imagery of the American West.

HIST 390  AMERICAN INDIANS: THE SOUTHWEST  3
Addresses history of Indians in American Southwest from pre-European contact to present. Approaches subject from multiple disciplinary and cultural perspectives and focuses on histories of the "Pueblo," Hopi, Apache and Navajo people.

HIST 391  HISTORY OF WORLD WAR II IN ASIA AND THE PACIFIC  3
Social, political and military developments in Asia and the Pacific from c. 1870-1954, focusing on causes, courses and consequences of World War II. Topics include Western imperialism in Asia, Japanese militarism, occupation and resistance, Allied counterattack, origins of the Cold War and rise of nationalism and communism in occupied and affected areas.

HIST 392  BUDDHISM AND POLITICS IN ASIA  3
Addresses modern phenomenon of politically engaged Buddhism by introducing historical development of Buddhism and its relations to state and society. Focuses on case studies on Buddhist political movements in modern Asian history, such as Buddhist Peace Movement during the Vietnam War, Tibetan resistance to Chinese rule, movement of Untouchables in India. RESTRICTIONS: Not open to freshmen.

HIST 393  HISTORY OF MODERN VIETNAM  3
Covers major social, cultural, political, economic and military developments in Vietnamese history from approximately 1500 to present, including traditional civilization, colonization, nationalism and communism, the Indochina Wars (among them the "Vietnam Conflict"), the Kampuchean Crisis, and life under the Socialist Republic of Vietnam since 1976.

HIST 394  AFRICA SINCE 1960  3
Deals with current political, economic and social problems and progress found in Africa. Historical analysis of the emergence and development of these problems, issues and achievements. Links present to the past for factual historical analysis.

HIST 395  PAN AFRICANISM  3
Traces rise, development and varied expressions of drive towards the liberation and unity of black people on the continent (Africa) and in the diaspora. Covers liberation struggles in Africa and Civil Rights movement in United States. May be cross-listed with BAMS395.

HIST 397  HISTORY OF SOUTH AFRICA  3
Surveys complex historical development of South African society. Topics include African resistance to white expansion, wars of resistance, impact of agricultural and labor laws on African societies, tensions in white society, Africaners in power since 1948, and African struggles for freedom.

HIST 403  HISTORY, PHILOSOPHY, FUNCTIONS AND FUTURE OF MUSEUMS  3
See MSST403 for course description.

HIST 408  PUBLIC HISTORY: RESOURCES, RESEARCH AND PRACTICE  3
Team-taught seminar that acquaints students with the function and resources of American historical organizations and how to use these resources in the non-academic setting for productive historical research. Addressed to those pursuing careers in public history and teaching and scholarship. May be cross-listed with MSST408.

HIST 411  SEMINAR IN AMERICAN HISTORY  3
Topics vary. Recent topics include Jefferson and His Time, Women in twentieth Century America, The Nightmare Years: The United States 1960-1980, American Religious History and Conservatism in Recent America. May be cross-listed with WOMS411. PREREQ: HIST268. RESTRICTIONS: Majors only, or permission of instructor.

HIST 430  SEMINAR IN TWENTIETH CENTURY LATIN AMERICAN REVOLUTIONS  3
Focuses on four twentieth century Latin American revolutions, concentrating on historical background and events of the Mexican, Guatemalan, Cuban and Nicaraguan revolutions. PREREQ: HIST268. RESTRICTIONS: Majors only, or permission of instructor.

HIST 439  WOMEN AND REVOLUTION IN AFRICA  3
Discusses critical roles played by women in African revolutionary movements. Why did women join these revolutionary movements? What is the relationship between feminism and revolution? May be cross-listed with WOMS439. PREREQ: HIST268. RESTRICTIONS: Majors only, or permission of instructor.
HIST 440  Seminar in Africa Under Colonial Rule  3
Introduces various Colonial policies of the European powers in Africa, emphasizing the comparisons and contrasts among these policies. Attention paid to effect of Colonialism on Africa’s economic, social and political development.
PREREQ: HIST268.
RESTRICTIONS: Majors only, or permission of instructor.

HIST 444  Seminar: Women in the Islamic Middle East  3
Examines major developments, themes and problems in women’s history in the Middle East from advent of Islam to present. By tracing women’s legal status, sexual morality, family and social life, and female economic and political participation, it seeks to shed light on process of women’s roles in society and to challenge notion that gender divisions and roles have been static over time. May be cross-listed with WOMS444.
PREREQ: HIST268.
RESTRICTIONS: Majors only, or permission of instructor.

HIST 449  Seminar: Science, Technology and Medicine  3
Topics vary and may include The American System, History of Chemistry, or History of Engineering.
PREREQ: HIST268.
RESTRICTIONS: Majors only, or permission of instructor.

HIST 453  Seminar: History Through Media  1-6
Trains students to produce historical documentaries from archival photographs and sound recordings in United States National Archives and other depositories.
PREREQ: HIST268.
RESTRICTIONS: Majors only, or permission of instructor.

HIST 454  Vernacular Architecture  3
Study of traditional American folk architecture from seventeenth century to present. Examination of changes in construction, house types and decoration in vernacular buildings, as well as issues of regional differences and individual craftsmanship. May be cross-listed with ARTH454.

HIST 459  Seminar in United States Urban History  3
Process of urbanization in America with special emphasis on Philadelphia-Wilmington area.
PREREQ: HIST268.
RESTRICTIONS: Majors only, or permission of instructor.

HIST 463  Historical Archaeology and the Public  3
See ANTH463 for course description.

HIST 464  Internship in History  1-6
Internship with substantially historical content at museum, historical society, historic site, government agency, or other venue, under joint supervision of Department of History and the sponsoring organization. Includes completion of journal of activities and/or final project.
PREREQ: Sophomore standing or higher.
RESTRICTIONS: Requires pre-approval from Department of History’s Undergraduate Studies Committee, which also determines the number of credits.

HIST 466  Independent Study  1-6

HIST 470  Seminar in Ancient History  3
Topics vary and may include Slavery in Antiquity, The Archaeology of the Ancient World or The Greek City State.
PREREQ: HIST268.
RESTRICTIONS: Majors only, or permission of instructor.

HIST 471  Seminar in Medieval History  3
Topics may include Europe in Tenth Century, Europe in Eleventh Century, and Women in Europe to 1600. May be cross-listed with WOMS472.
PREREQ: HIST268.
RESTRICTIONS: Majors only, or permission of instructor.

HIST 473  Seminar in Early Modern European History  3
Topics vary and may include Renaissance Humanism, or Women in Europe from 1100-1600.
PREREQ: HIST268.
RESTRICTIONS: Majors only, or permission of instructor.

HIST 474  Seminar in English History  3
Topics vary and may include Britain Since 1945; English Political Ideas, Hobbes to Burke.
PREREQ: HIST268.
RESTRICTIONS: Majors only, or permission of instructor.

HIST 475  Seminar in Modern European History  3
Topics vary and may include The Holocaust, The Cold War, Hitler’s Germany, or The Age of Revolution. May be cross-listed with WOMS475.
PREREQ: HIST268.
RESTRICTIONS: Majors only, or permission of instructor.

HIST 477  Seminar in Latin American History  3
Topics vary and may include History of Mexico, History of the Caribbean or Slavery in the New World.
PREREQ: HIST268.
RESTRICTIONS: Majors only, or permission of instructor.

HIST 479  Seminar in Asian History  3
Topics vary and may include History of Southeast Asia, Twentieth Century China or Japan in the Twentieth Century.
PREREQ: HIST268.
RESTRICTIONS: Majors only, or permission of instructor.

HIST 480  Seminar in World History  3
Topics vary and may include Decolonization.
PREREQ: HIST268.
RESTRICTIONS: Majors only, or permission of instructor.

HIST 483  Seminar in Comparative History  3
Topics vary, but all compare some aspect of American with European history or Western with non-Western history.
PREREQ: HIST268.
RESTRICTIONS: Majors only, or permission of instructor.

HIST 491  Planning a Course of Instruction  3
Aims, course planning, instructional strategies, evaluation and selection of materials for teaching history and the social sciences in secondary schools. RESTRICTIONS: Student Learning Portfolio must be completed by the end of this course in order to student teach in the spring semester.

HIST 493  Problems in Teaching History and Social Sciences  3
Helps beginning teachers carry out planned instructional strategies, analyze their teaching behavior, evaluate the effectiveness of their instruction and modify their instructional plans based on their teaching experience.

HIST 601  United States Historiography  3
Introduces changing interpretations of United States history and examines development of the American historical profession.

HIST 602  European Historiography  3
Introduces changing interpretations of various aspects of European history.

HIST 603  Historiography of Technology  3
Introduces major historiographic issues and examines the development of this subfield of history.

HIST 604  History and Philosophy  3
Survey of major historians from the Bible and Herodotus through nineteenth century, together with some of the most influential philosophers of history.

HIST 605  History of Theories in Material Culture  3
See EAMC605 for course description.

HIST 606  Issues in American Material Culture  3
See EAMC606 for course description.

HIST 607  Readings in American Material Life  3
Readings of recent monograph and serial publications pertaining to American Material Life. Topics include Landscape, Architecture, Work, Department, Family and Religion. Discussion and interpretation of authors’ arguments. Review of material life historiography. Emphasis on broad synthesis of material culture literature.

HIST 608  Public History: Resources, Research and Practice  3
Team-taught seminar acquaints students with function and resources of American historical organizations and how to use these resources in the non-academic setting for productive historical research. Addressed to those pursuing careers in public history and teaching and scholarship. May be cross-listed with MSST608.

HIST 611  Seminar in American History  3

HIST 614  The American Suburb  3
See UAPP614 for course description.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIST 617</td>
<td>Seminar in Gender and Women's History</td>
<td>3</td>
<td>Reading seminar. Topics vary and may include United States Women's History, United States Women's History in Comparative Perspective, Gender in History, or European Women's History.</td>
</tr>
<tr>
<td>HIST 620</td>
<td>The Invasion of America</td>
<td>3</td>
<td>Reading seminar devoted to exploring experiences of Native Americans in present-day United States and Canada from sixteenth century to the Indian Removal of 1830s.</td>
</tr>
<tr>
<td>HIST 621</td>
<td>Seminar on American Society and Culture Before the Revolution</td>
<td>3</td>
<td>Reading seminar in American society and culture from first settlements to the Revolution.</td>
</tr>
<tr>
<td>HIST 623</td>
<td>Age of the American Revolution</td>
<td>3</td>
<td>Reading seminar on political and constitutional changes from 1760 to 1790 and the social and cultural history of that period.</td>
</tr>
<tr>
<td>HIST 625</td>
<td>United States Social and Cultural History: 1790-1860</td>
<td>3</td>
<td>Reading seminar on social and cultural change between 1790 and 1860, with emphasis on expansion of population into the West, sectionalism, rise of urban and industrial revolutions, and reform.</td>
</tr>
<tr>
<td>HIST 627</td>
<td>Antebellum America</td>
<td>3</td>
<td>Reading seminar on development of modern political party system, American presidency in transition, transportation revolution, slavery, abolition reform and important changes in American society during antebellum period.</td>
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<tr>
<td>HIST 629</td>
<td>United States Social and Cultural History: 1850-1929</td>
<td>3</td>
<td>Reading seminar covering interpretive issues in social and cultural history. Topics include social class, social structure and social mobility; work and leisure; reform; and historical memory.</td>
</tr>
<tr>
<td>HIST 630</td>
<td>Twentieth Century Latin American Revolutions</td>
<td>3</td>
<td>Examines revolutionary change and obstacles to revolutionary change in Latin America. External and internal process discussed in full context of each country's historical development. Each student responsible for leading discussion of several of required readings.</td>
</tr>
<tr>
<td>HIST 631</td>
<td>United States Political, Cultural and Economic History: 1929-Present</td>
<td>3</td>
<td>Reading seminar on major interpretive works illustrating the changing modes by which historians have viewed American political, economic, and cultural past from 1929 to the present. May be cross-listed with UAPP631.</td>
</tr>
<tr>
<td>HIST 632</td>
<td>Making the American City</td>
<td>3</td>
<td>See UAPP632 for course description.</td>
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<tr>
<td>HIST 633</td>
<td>The United States in the Twentieth Century</td>
<td>3</td>
<td>Reading seminar on twentieth century United States history.</td>
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<tr>
<td>HIST 635</td>
<td>The Evolution of the American Urban Landscape</td>
<td>3</td>
<td>See UAPP635 for course description.</td>
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<tr>
<td>HIST 636</td>
<td>Research Topics in Historic Preservation</td>
<td>3</td>
<td>See UAPP636 for course description.</td>
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<tr>
<td>HIST 637</td>
<td>Law and Society in Historical Perspective</td>
<td>3</td>
<td>See SOCi637 for course description.</td>
</tr>
<tr>
<td>HIST 638</td>
<td>Documentation of Historical Structures</td>
<td>1</td>
<td>See SOCi631 for course description.</td>
</tr>
<tr>
<td>HIST 640</td>
<td>Africa Under Colonial Rule</td>
<td>3</td>
<td>Introduces various Colonial policies of the European powers in Africa, emphasizing the comparisons and contrasts among these policies. Attention paid to effect of Colonialism on Africa's economic, social and political development.</td>
</tr>
<tr>
<td>HIST 646</td>
<td>Creating European Modernity</td>
<td>3</td>
<td>Origins and spread of rapid, sustained economic growth since 1750.</td>
</tr>
<tr>
<td>HIST 647</td>
<td>Non-Western Industrialization</td>
<td>3</td>
<td>Introduces issues of political economy and social and cultural dimension of industrialization from a global perspective. Examines variety of theoretical and historiographical approaches to issues of development within context of regional case studies focusing on Japan, Africa, China, Latin America, the Middle East and the Caribbean.</td>
</tr>
<tr>
<td>HIST 650</td>
<td>Political Economy of the Modern United States</td>
<td>3</td>
<td>Reading seminar introducing fields and historiographies of United States business history, business-government relations planning and modern political economy, from late nineteenth century to present.</td>
</tr>
<tr>
<td>HIST 652</td>
<td>Theory and Practice of Historical Preservation Planning</td>
<td>3</td>
<td>See UAPP629 for course description.</td>
</tr>
<tr>
<td>HIST 654</td>
<td>Vernacular Architecture</td>
<td>3</td>
<td>Study of traditional American folk architecture from seventeenth century to present. Examination of changes in construction, house types and decoration in vernacular buildings, as well as issues of regional differences and individual craftsmanship. May be cross-listed with ARTH654, MSSi654 and/or UAPP654.</td>
</tr>
<tr>
<td>HIST 657</td>
<td>Historical Archaeology and Museum Interpretation</td>
<td>3</td>
<td>Introduction to the methods and practices of historical archaeological research from a museum perspective. Readings, demonstration techniques and field work.</td>
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<tr>
<td>HIST 660</td>
<td>Humanities Colloquium</td>
<td>3</td>
<td>See ANTH663 for course description.</td>
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<tr>
<td>HIST 663</td>
<td>Historical Archaeology and the Public</td>
<td>3</td>
<td>See ANTH663 for course description.</td>
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<tr>
<td>HIST 671</td>
<td>Studies in Medieval History</td>
<td>3</td>
<td>Topics vary and may include: Europe in the Tenth Century, Europe in the Eleventh Century, and Women in Europe to 1600.</td>
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<tr>
<td>HIST 673</td>
<td>Studies in Early Modern European History</td>
<td>3</td>
<td>Topics vary and may include Renaissance Humanism; Women in Europe, 1100-1600; or Rome and Religion.</td>
</tr>
<tr>
<td>HIST 674</td>
<td>Studies in English History</td>
<td>3</td>
<td>See UAPP629 for course description.</td>
</tr>
<tr>
<td>HIST 675</td>
<td>Seminar in Modern European History</td>
<td>3</td>
<td>Topics vary and may include The Holocaust, The Cold War or Hitler's Germany.</td>
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<tr>
<td>HIST 677</td>
<td>Studies in Latin American History</td>
<td>3</td>
<td>Topics vary and may include history of Mexico, history of the Caribbean or slavery in the New World.</td>
</tr>
<tr>
<td>HIST 679</td>
<td>Studies in Asian History</td>
<td>3</td>
<td>Topics vary and may include History of Southeast Asia, Twentieth Century China or Japan in the Twentieth Century.</td>
</tr>
<tr>
<td>HIST 683</td>
<td>Studies in Comparative History</td>
<td>3</td>
<td>Topics vary, but all compare some aspect of American history with European history or Western history with non-Western history.</td>
</tr>
<tr>
<td>HIST 692</td>
<td>Planning a Course of Instruction</td>
<td>3</td>
<td>Aims, course planning, instructional strategies, evaluation and selection of materials for teaching history and the social sciences in secondary schools.</td>
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<tr>
<td>HIST 693</td>
<td>Seminar: Problems in Teaching History and Social Science</td>
<td>3</td>
<td>Helps beginning teachers carry out planned instructional strategies, analyze their teaching behavior, evaluate the effectiveness of their instruction and modify their instructional plans based on their teaching experience.</td>
</tr>
<tr>
<td>HIST 802</td>
<td>Research and Writing Seminar: European History</td>
<td>3</td>
<td>Original research and writing on subjects in European history. Evaluation of sources, interpretation of evidence and presentation of research papers. Emphasis on professional standards of criticism.</td>
</tr>
<tr>
<td>HIST 803</td>
<td>Research and Writing Seminar: America to 1860</td>
<td>3</td>
<td>Original research and writing on subjects in American history before 1860. Evaluation of sources, interpretation of evidence and presentation of research papers. Emphasis on professional standards of criticism.</td>
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<tr>
<td>HIST 804</td>
<td>Museum Internship</td>
<td>3</td>
<td>See MSST804 for course description.</td>
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<tr>
<td>HIST 806</td>
<td>Research and Writing Seminar: Hagley Library and Archives</td>
<td>3</td>
<td>Original research and writing on a variety of subjects based on research materials available at the Hagley Museum and Library. Evaluation of sources, interpretation of evidence and presentation of research papers. Emphasis on professional standards of criticism.</td>
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<tr>
<td>HIST 868</td>
<td>Research</td>
<td>1-9 PF</td>
<td></td>
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<tr>
<td>HIST 869</td>
<td>Master's Thesis</td>
<td>1-6</td>
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</tbody>
</table>
HIST 964  PRE-CANDIDACY STUDY  1-12 PF  
Research and readings in preparation of dissertation topic and/or qualifying examinations for doctoral students before admission to candidacy but after completion of all required course work.  
RESTRICTIONS: Not open to students who have been admitted to candidacy.

HIST 969  DOCTORAL DISSERTATION  1-12 PF

HEALTH PROMOTION

HLPR 610  HEALTH AND THE MEDIA  3
Explores relationships between health behavior and cognition, and media communications and messages. Specific attention placed on culturally influenced health outcomes, channels of communication, and personal and demographic influences. Health promotion programmatic considerations and interventions related to media factors emphasized.

HLPR 803  ADVANCED HEALTH PROMOTION PROGRAMMING AND EVALUATION  3
Prepares student with skills for planning, developing, implementing and evaluating health promotion programs in variety of settings and populations. Emphasis on behavioral, epidemiological and socio-ecological issues that impact programming and skills required to evaluate program.  
PREREQ: HESC 490.  
RESTRICTIONS: Open to graduate students only.

HLPR 807  TOPICS AND ISSUES IN HEALTH PROMOTION  3
Seminar format and multidisciplinary approach to study current issues. Different faculty review issues from viewpoint of their disciplines. Students participate in selection of topics and required to prepare and present in-depth reports on multiple issues.  
RESTRICTIONS: Open to graduate students only.

HLPR 809  HEALTH BEHAVIOR  3
Health and behavioral science theory and research provide framework for analysis of health-related behaviors across lifespan. Emphasis on psychological and social determinants of health-related behaviors of individuals. Examines roles of health professionals in facilitating behavior change.  
RESTRICTIONS: Open to graduate students only.

HLPR 813  HEALTH PSYCHOLOGY AND BEHAVIORAL MEDICINE  3
Relationships among social, psychological, and cultural factors and health, including prevention and treatment of disease and other health behaviors.  
RESTRICTIONS: Graduate students only.

HLPR 819  SOCIAL MARKETING  3
Application of marketing principles to health behavior change. Includes development, implementation and evaluation of social marketing campaigns; theories of behavior change applied to marketing; message development, targeting and segmentation; analysis of current social marketing initiatives.  
RESTRICTIONS: Graduate students only.

HLPR 823  HUMAN RESPONSE TO STRESS  3
Provides overview of current models and theories of stress, review of multidisciplinary approaches to study of stress in applied settings, and reading knowledge of selected research findings in field of stress.  
RESTRICTIONS: Open to graduate students only.

HLPR 864  INTERNSHIP  3 PF
Up to maximum of 450 hours of fieldwork experience in health promotion setting, completed along with performance evaluation and term paper.  
RESTRICTIONS: Open to graduate students only and requires successful completion of qualifying examination.

HLPR 868  RESEARCH  3 PF
Opportunity to apply information derived from graduate program of study to health promotion setting or specific population. Involves selecting, organizing, conducting and evaluating project related to field of health promotion.  
RESTRICTIONS: Open to graduate students only and requires successful completion of qualifying examination.

HEALTH STUDIES

HLTH 405  HEALTH STUDIES PRACTICUM  6 PF
Directed service learning experience in health services setting.  
RESTRICTIONS: Restricted to senior health studies majors.

HOTEL, RESTAURANT AND INSTITUTIONAL MANAGEMENT

HRIM 140  INFORMATION TECHNOLOGY AND SERVICES MANAGEMENT  3
Overview of service industry, its history, current status and future trends. Uses integrated approach to study of services, stressing importance of understanding underlining processes of service delivery and way new technologies affecting them.

HRIM 144  HOSPITALITY INFORMATION MANAGEMENT, NETWORKS AND SYSTEMS  3
Examines network architectures that support hospitality and retail systems, such as LANs, WANs, UNIX and Internet based networks. Students plan and define supporting telecommunications and cable infrastructure needed to create data highways in today’s hotels and retail operations, using workflow analysis to shape flow of information.

HRIM 180  INTRODUCTION TO HOSPITALITY  3
Objectives within industry, means of achieving these objectives and opportunities for career development. History of hospitality, current trends and related issues.

HRIM 187  INTRODUCTION TO HOSPITALITY INFORMATION MANAGEMENT  3
Provides overview of information systems and technology applications used in hospitality industry to support operations and management decision-making. Also covers hospitality specific software applications.

HRIM 201  FOOD PRINCIPLES  2
Examines chemical and physical properties of food and its preparation. Includes composition and structure of food, functional properties of ingredients, and methods to obtain desired sensory and nutritional qualities.  
COREQ: HRIM 211.

HRIM 211  FOOD PRINCIPLES LABORATORY  1
Principles of food selection and preparation as related to chemical and physical properties of food. Includes composition and structure of food, functional properties of ingredients, and methods to obtain desired sensory and nutritional qualities.  
COREQ: HRIM 201.

HRIM 212  CLUB MANAGEMENT  3
Overview of elements unique to club management such as nature of private membership, investment, governance, club house operations, food and beverage operations, elements of quality service, financial structures of clubs, accounting and private club marketing.

HRIM 214  ISSUES IN TOURISM MANAGEMENT  3
Examines scope and organization of tourism industry, motivations for travel, and management of micro and macro tourism resources. Economic, social, political and environmental impact of tourism considered along with issue of sustainable development within industry.

HRIM 215  MEETING AND CONFERENCE MANAGEMENT  3
Development of management strategies applicable to meeting and conference management including the methodologies unique to each property and group served by any one operation.

HRIM 217  CATERING MANAGEMENT  3
Application of management principles to catering function. Topics include: developing catering management systems; catering menu planning and design; on-premise versus off-premise catering management; and food production. Plan and implement actual catered events.

HRIM 218  BEVERAGE MANAGEMENT  3
Beverages are a complex product category with legal and social issues that require special attention from management. Emphasizes legal and ethical issues associated with serving alcoholic beverages, in-depth study of wine, mixology, inventory control, and profitable beverage management.

HRIM 219  QUALITY MANAGEMENT FOR THE HOSPITALITY INDUSTRY  3
Examines quality revolution in hospitality industry. Control charts, Pareto charts, scatter diagrams, and other tools used in restructuring, re-engineering, and continuous quality improvement explored. Integrates principles of customer quality focus and organizational behavior as they apply to hospitality industry.

HRIM 230  EXECUTIVE PRESENTATIONS AND PROBLEM SOLVING  3
Examines various problem solving methods relating to specific issues of hospitality industry. Explores oral, written and multi-media executive presentation techniques of problem solving results including personal presentations.

HRIM 238  ASSESSMENT AND EVALUATION IN SERVICE DELIVERY SYSTEMS  3
Introduction to research process applied to evaluation of service delivery systems, including design, data collection, analysis, interpretation and reporting of findings. Special emphasis placed on development and use of service delivery evaluation instruments.
HRIM 280 PROPERTY MANAGEMENT 3
Introduction to problems of cost and operational control of security, safety, parking, preventive maintenance, laundry, HVAC, electrical, refrigeration, plumbing, fire prevention, care of guest rooms and public space. Emphasis on equipment, personnel and technology.

HRIM 313 PRINCIPLES OF GAMING MANAGEMENT 3
Overview of gaming management and how it relates to hospitality management. Topics include history of gaming in United States, social and legal aspects, licensing, organization, credit issues, marketing and Title 31 of Bank Security Act.

HRIM 314 HOSPITALITY ENTREPRENEURSHIP AND VENTURE CREATION 3
Overview of venture creation in hospitality enterprises from concept development to capital creation. Examines various business structures used in hospitality businesses including franchising and management contracts.

HRIM 316 CROSS CULTURAL ETIQUETTE AND PROTOCOL 3
Introduces range of mores and decorum required to effectively work with and offer services to international visitors and associates. Various levels of treatment accorded domestic and international dignitaries within specific types of events and accommodations in hospitality industry also discussed.

HRIM 320 HOTEL, RESTAURANT AND GENERAL FOOD SERVICE PURCHASING 3
Principles of purchasing food and beverage supplies for hotels, restaurants and general food service; and marketing selection principles, buying procedures, choice of supplier and receiving.

HRIM 321 QUANTITY FOOD SERVICE MANAGEMENT 2
Principles of quantity food service management with emphasis on quality and cost control. Topics include menu planning, safety, sanitation and technical operations, as well as labor, food and energy cost containment. PREREQ: HRIM201. COREQ: HRIM325.

HRIM 322 RETAIL DESIGN AND CONSUMER BEHAVIOR 3
See FASH322 for course description.

HRIM 325 LABORATORY IN QUANTITY FOOD SERVICE MANAGEMENT 2
Laboratory experience in quantity food production, service and management. Applications in safety, sanitation, technical operations and quality and cost controls in quantity food service environment. PREREQ: HRIM201 and HRIM211. COREQ: HRIM321.

HRIM 327 PROPERTY ENGINEERING 3
Introduction to problems of cost and operational control of security, safety, parking, preventive maintenance, laundry, HVAC, electrical, refrigeration, plumbing, fire prevention, care of guest rooms and public space.

HRIM 330 INTERNATIONAL HOSPITALITY OPERATIONS 3-5
How hotels, food service operations and tourism attractions function outside of United States, with particular emphasis on Europe. Focuses on cultural, political, environmental, geographic and economic factors critical to successful international hospitality operations.

HRIM 335 HOSPITALITY FACILITY DESIGN 3
Explores architectural design process, including both aesthetic and functional design, as it relates to hospitality venues such as restaurants, hotels, commercial kitchens and resorts. Examines impact of codes, construction costs and environmental parameters that affect hospitality construction.

HRIM 346 HOSPITALITY INDUSTRY WEB-BASED MARKETING 3
Provides information necessary to understand online service industry marketing. Through use of case studies and examples, learn how to manage design, implementation and evaluation of web-based marketing programs.

HRIM 366 INDEPENDENT STUDY 1-6

HRIM 380 MANAGEMENT OF LODGING OPERATIONS 3
Management of front desk, housekeeping, maintenance, security and conference operations.

HRIM 381 MANAGEMENT OF FOOD AND BEVERAGE OPERATIONS 3
Management tools available to control sales and expenses in food and beverage operations. Analysis of centers of responsibility. Cost management approach to development of control systems. PREREQ: HRIM321.

HRIM 382 MANAGERIAL ACCOUNTING AND FINANCE IN THE HOSPITALITY INDUSTRY 3
Generation and analysis of quantitative information for planning, control and decision making by managers at various levels. Use of timely and relevant information as a vital tool in management. PREREQ: ACCT200 or both ACCT207 and ACCT208.

HRIM 425 HISTORIC ROADSIDE ARCHITECTURE 3
Examines various historic hospitality and retail venues with emphasis on their development throughout this automobile based century. Hotels, motels, diners, fast food and full service restaurants, roadside attractions and retail outlets discussed as they relate to travel and tourism.

HRIM 442 HOSPITALITY COMPUTER-BASED EDUCATION 3
Introduction to use of computer-based education and training in hospitality industry. Focuses on implementing interactive technology-based training in hospitality learning environments and includes instructional systems design, how to evaluate and select hardware and software, and concept of just-in-time training.

HRIM 448 DATA MINING ANALYSIS IN THE HOSPITALITY INDUSTRY 3
Collection of data in hospitality systems environments into accessible warehouse, and mining (or organizing) data into management information system. Multi-unit consolidations using traditional polling techniques and innovative web-based consolidations key to organization of data into up-to-date and accurate source of management information for analysis.

HRIM 450 MANAGING HOSPITALITY INFORMATION SYSTEMS 3
Life cycle approach to understanding hospitality industry information systems. Includes study of issues considered in analysis, design and implementation of information systems in hospitality operations. PREREQ: HRIM187 or MISY160.

HRIM 466 INDEPENDENT STUDY 1-6

HRIM 480 HUMAN RESOURCES MANAGEMENT IN THE HOSPITALITY INDUSTRY 3
Techniques and philosophies of personnel management as applied to hospitality operations. Motivation, attitude formation and job satisfaction. Case studies related to theories of organizational behavior and industrial psychology.

HRIM 481 MARKETING IN THE HOSPITALITY INDUSTRY 3
Application of marketing principles in hotel, restaurant and institutional management settings. Development of marketing strategies in both profit and non-profit hospitality operations.

HRIM 482 LAW OF INNKEEPING 3
Introduction to laws relating to hotel, restaurant and institutional operations.

HRIM 487 MANAGEMENT SYSTEMS IN THE HOSPITALITY INDUSTRY 3
Principles of systems analysis applied to hospitality industry. Organization of operation and subsystems of property. Case studies and simulations apply economic and management principles.

HRIM 488 HOTEL, RESTAURANT AND INSTITUTIONAL MANAGEMENT PRACTICUM I 1-4
Structured experience in hospitality industry environment. At least 40 hours per credit hour in planned activities associated with management and operation of subsystem of hospitality property. RESTRICTIONS: Requires proof of 800 hours paid work experience in food service and lodging industry.

HRIM 489 HOTEL, RESTAURANT AND INSTITUTIONAL MANAGEMENT PRACTICUM II 1-6
Structured experience in hospitality industry environment. At least 40 hours per credit hour in planned activities associated with management and operation of hospitality property. PREREQ: HRIM321, HRIM325 and HRIM488.

HRIM 601 ADVANCED HOSPITALITY AND TOURISM PRODUCT MANAGEMENT 3
Reviews different types, styles and quality of hospitality and tourism products. Product management including branding, product lifecycles, positioning and packaging. Includes latest trends in product development and theoretical and practical issues related to multi-unit operations.

HRIM 602 INTERNATIONAL HOSPITALITY AND SERVICE MANAGEMENT 3
Provides understanding of service delivery system, concepts, principles and theories. Mechanics of identifying and setting organizational vision and service standards and impact of technology on service delivery covered. PREREQ: HRIM601.

HRIM 603 STRATEGIC HOSPITALITY MANAGEMENT 3
Provides comprehensive understanding of strategic management concepts and competitive strategy as applied to hospitality industries. Examines co-alignment of environmental scanning, strategy and structure of hospitality service firm.

HRIM 604 HOSPITALITY FINANCIAL MANAGEMENT ISSUES 3
Examines both managerial accounting and financial management as practiced in hospitality industry. Applies principles of finance and accounting to decision-making in industry, emphasizing industry features and characteristics. PREREQ: HRIM382, its equivalent, or permission of instructor.
HRIM 605 ISSUES IN HOSPITALITY INFORMATION TECHNOLOGY 3
Examines issues related to information technology in hospitality industry, including systems, networking, databases, telecommunication, internet and e-commerce. PREREQ: HRIM601.

HRIM 642 HOSPITALITY COMPUTER BASED TRAINING 3
Project management approach to development and implementation of computer-based training in hospitality industry. Understanding project management concepts and techniques and applying them to creation of interactive technology-based training. PREREQ: HRIM601.

HRIM 643 HISTORIC ROADSIDE ARCHITECTURE 3
See UAPP643 for course description.

HRIM 648 DATA-MINING ANALYSIS IN THE HOSPITALITY INDUSTRY 3
Collecting data in hospitality systems environments and mining (or organizing) data into management information system. Creating and organizing data warehouses based on understanding customer relationship management. PREREQ: HRIM602.

HRIM 664 HOSPITALITY TECHNOLOGY INTERNSHIP 3
Supervised technology-related work experience with hospitality business or related organization.

HRIM 668 INDUSTRY PROJECT 3
Provides opportunity to research, design and/or develop a solution to a real-world hospitality technology-related problem or issue.

HRIM 667 MANAGEMENT SYSTEMS IN THE HOSPITALITY INDUSTRY 3
Issues surrounding implementation of information technology in supporting hospitality operations from guest service perspective and decision making from viewpoint of management. Case studies and review of software utilized to understand subsystems in hospitality property. PREREQ: HRIM601.

HEALTH SERVICES ADMINISTRATION

HSAD 604 ADVANCED PRACTICE ROLES FOR HEALTHCARE PROVIDERS 3
Focuses on roles and issues affecting healthcare providers engaged in advanced practice. Roles analyzed in relation to current issues and concepts of advanced practice. May be cross-listed with NURS604.

RESTRICTIONS: Permission required from department.

HSAD 619 FINANCIAL MANAGEMENT IN HEALTH SERVICES ORGANIZATIONS 3
Provides basic principles and concepts of effective management of budgets for healthcare units. Includes analysis of environmental and departmental organization and their impact on healthcare. May be cross-listed with NURS619.

RESTRICTIONS: Permission of department required.

HSAD 635 HEALTH ADMINISTRATION THEORIES 3
Theories of administration, organization and management, their interaction with other health discipline theories and their influence on management of healthcare agencies. Includes interaction of theories with attainment of institutional goals. May be cross-listed with NURS635.

RESTRICTIONS: HSAD604 required as prerequisite or corequisite.

HSAD 637 HEALTH PLANNING STRATEGIES 3
Analyzes organizational systems and roles of managers and administrators. Students identify organizational needs, formulate goals and objectives appropriate to healthcare agencies and identify strategies appropriate to accomplishing goal attainment with ethical constraints of healthcare. May be cross-listed with NURS637.

RESTRICTIONS: HSAD604 required as prerequisite or corequisite.

HSAD 638 HEALTH SERVICES EVALUATION 3
Emphasizes role of managers and administrators in personnel development, promotion of research in clinical settings and development and implementation of quality improvement initiatives and their implications for healthcare. May be cross-listed with NURS638.

RESTRICTIONS: HSAD604 required as prerequisite or corequisite.

HSAD 664 HEALTH SERVICES ADMINISTRATION PRACTICUM 1-3
In conjunction with his/her faculty advisor and based on student's individualized long range goals, student selects a preceptor and healthcare setting in which to apply didactic contact in real life settings. Requires 126 hours of on-site experience, which can be taken in one semester or divided over three semesters. COREQ: HSAD635, HSAD637, or HSAD638.

HSAD 868 RESEARCH/SCHOLARLY PROJECT 1-3
Investigation of problem in clinical settings related to finance, administration, personnel management, public policy or education, resulting in completion of scholarly project. PREREQ: Research and statistics and any two of the following: HSAD635, HSAD637, HSAD638.

HSAD 890 COLLOQUIUM 0 PF
Lectures by faculty and visiting researchers provide broad overview of scope as well as significant results of current research in health sciences.

INDIVIDUAL AND FAMILY STUDIES

IFST 101 HUMAN SERVICES AND CULTURAL COMPETENCE 1
Overview of human services and approaches to culturally competent practices; critical perspectives regarding diversity, society, race, class, gender and social policy discussed.

IFST 165 SEMINAR 1 PF
IFST 201 LIFE SPAN DEVELOPMENT 3
Exploration and understanding of social, emotional, cognitive and physical development of individual from infancy through old age in context of family.

IFST 202 FAMILIES OF FOUNDATION STUDIES 3
Examination of diverse families in United States with emphasis on issues of race, ethnicity, class, and gender. Focus on effects of demographic, historical and social changes.

IFST 210 INTRODUCTION TO CARING FOR YOUNG CHILDREN 3
Introduction of core competencies needed in early care and education. Topics include basic orientation to child development; understanding children's behavior; developmental curriculum; family issues; health, safety, and nutrition; and professional issues.

IFST 220 CHILD DEVELOPMENT I: PRENATAL TO AGE 3 3
Study of prenatal development and physical, perceptual, social-emotional, and cognitive-language developmental domains of children birth to three. Emphasis on nurturing relationships and understanding child development within cultural contexts of children's families. Directed observation in infant/toddler settings.

IFST 221 CHILD DEVELOPMENT II: 3 TO 10 3
Study of cognitive, social, emotional, and physical development of children three to ten years old. Variables that influence child development including family and school investigated. Directed observation of children.

IFST 222 INCLUSIVE CURRICULUM: BIRTH - GRADE 2 3
Curriculum/programming for optimal development of children birth to second grade in inclusive settings. Focus on curriculum approaches and examination of role of play, constructivist theories, developmentally appropriate/culturally responsive practice. PREREQ: IFST220 and IFST221. COREQ: IFST224.

IFST 224 PRACTICUM IN INCLUSIVE CURRICULUM: BIRTH - GRADE 2 3

IFST 230 FAMILIES AND THEIR COMMUNITIES 3
Discusses community context of family life and interface of family with school, community and work settings. Community development, social capital, collaboration, family and community asset building, and opportunity structure analysis approaches presented.

IFST 235 SURVEY IN CHILD AND FAMILY SERVICES 3
Introduces scope of human service agencies focusing on needs of children and families. PREREQ: IFST101.

IFST 236 INFANTS AND TODDLERS: DEVELOPMENT AND PROGRAMS 3
Study of infant and toddler with emphasis on interrelated growth patterns and processes, appropriate curriculum and stimulation, and effects of prenatal and perinatal conditions on future development. PREREQ: IFST221.
IFST 306  READING AND WRITING FROM BIRTH - GRADE 2  3
Covers development of language and literacy from birth to second grade. Explores instructional and assessment strategies for promoting growth in speaking, listening, reading, and writing.
PREREQ: LING101, IFST222 and IFST242.

IFST 310  PARENTING THROUGH THE LIFE SPAN  3
Applied focus on parenting styles, roles, issues and goals through life span. Parent diversity, interfaces with schools and community, resources, theoretical perspectives and developmental needs of children and parents examined.
PREREQ: IFST201 or PSYC235.

IFST 328  INTRODUCTION TO THE RESEARCH PROCESS  3
Exposure to research process through attending and critiquing research presentations, reading and reviewing scholarly papers, and development of variety of research skills, such as instrument design, coding and data entry. Students’ work contributes to development of professional portfolio.
PREREQ: IFST201 and IFST202.

IFST 330  HELPING RELATIONSHIPS  1 PF
Introduction to core dimensions of counseling and helping relationships: empathy, respect, genuineness and concreteness. Practice in communicating those levels of core dimensions facilitative to interpersonal functioning.

IFST 331  YOUTH-AT-RISK  3
Explores diverse theories regarding characteristics of youth-at-risk including examination of individual, family, peer groups and community. Emphasis on theories, current research and transition from adolescence to young adulthood.
PREREQ: EDUC202 or IFST201.

IFST 332  COUNSELING THEORIES  3
Examination of selected counseling theories from theoretical, personal, functional and philosophical points of view.

IFST 333  DEVELOPMENT OF HUMAN RELATIONSHIPS  3
Developmental theory and research related to intrapersonal and interpersonal conditions, characteristics, attitudes and behaviors necessary for effective human relationships. Basic focus on psychology of individual, relationship skills, conflict management and intimacy.

IFST 334  EXPERIENTIAL EDUCATION  3
Field experience combined with seminar emphasizing professional issues in human services, including portfolio development and career planning.
PREREQ: IFST101.
RESTRICTIONS: Human services majors only.

IFST 338  SEXUALITY IN CONTEMPORARY SOCIETY  3
Multidisciplinary approach to controversial human sexuality issues which examines and addresses societal solutions to these controversies.

IFST 339  ADOLESCENT DEVELOPMENT  3
Physical, intellectual and social-emotional development of adolescents and youth in context of family, peer groups and community. Emphasis on theories, current research and transition from adolescence to young adulthood.
PREREQ: IFST222 and IFST242.

IFST 340  EARLY CHILDHOOD CURRICULUM II  3
History, research and practical issues in organization and operation of early childhood programs with emphasis on preschool and kindergarten settings; integrating and adapting curriculum, facilities, equipment and instructional strategies to needs of young children. Includes field experience.
PREREQ: IFST222 and IFST242.

IFST 346  DELIVERY OF HUMAN SERVICES  3
Presents approaches to interviewing and working with individuals and families in variety of community-based human service settings. Discusses prevention, advocacy and empowerment strategies of community intervention. Explores professional and ethical issues in providing family and community services.
PREREQ: IFST235 and IFST334 or permission of instructor.

IFST 347  PROGRAM DEVELOPMENT AND EVALUATION  3
Focuses on program development, administrative procedures, and program evaluation. Basic skills required for development, delivery and evaluation of wide range of human service programs including preventive interventions for families and individuals.
PREREQ: IFST235 and IFST334 or permission of instructor.

IFST 350  TECHNOLOGY AND ASSISTIVE TECHNOLOGY IN EARLY CHILDHOOD EDUCATION  3
Study of impact technology and assistive technology have on teaching and learning in early childhood settings. Focus on effective use of technology to develop curriculum, gather assessment data, and interact with children and families. Basic operation and evaluation of technical tools.
PREREQ: IFST222 and IFST244.
COREQ: IFST306, IFST412 and IFST432.

IFST 355  PROFESSIONAL ISSUES IN EARLY CHILDHOOD DEVELOPMENT AND EDUCATION  3
Overview and analysis of issues for professionals serving children birth to grade two and their families. History, scope and mission of early care and educational programs; controversial issues, theories and program models; ethical and legal issues; emerging careers; public policy and advocacy. Program observations and interviews.
PREREQ: IFST222/224.

IFST 360  LEARNING IN COMMUNITY CONTEXTS  3
See EDUC360 for course description.

IFST 364  FIELD EXPERIENCES IN INDIVIDUAL AND FAMILY STUDIES  2-4
Provides opportunities to work/participate in human service agencies, business and industry, as well as formal and non-formal educational settings.
RESTRICTIONS: May be repeated for up to nine credit hours.

IFST 365  SEMINAR  1-3

IFST 366  INDEPENDENT STUDY  1-12

IFST 390  HONORS COLLOQUIUM  3
Topics vary within Individual and Family Studies content; often multidisciplinary.

IFST 401  FOUNDATIONS OF HUMAN SEXUALITY  3
Multidisciplinary study of human sexuality focusing on implications for individuals and society of biological, psychological and sociocultural determinants of human sexuality. Deals with sexually explicit material.
May be cross-listed with HESC401 and/or WOMS401.

IFST 402  CHILD AND FAMILY POLICY  3
Provides historical overview of family and child policy in United States, including policies toward children and families in poverty. Role of economy, politics, race, class, gender, legal and advocacy issues discussed.
PREREQ: IFST235 and IFST207.

IFST 403  CONCEPTS IN GERONTOLOGY  3
Theories and practices of gerontology with emphasis on their relationships to elderly and their needs for development of resources.
PREREQ: EDUC202 or IFST201.

IFST 405  AGING AND THE FAMILY  3
Explores developmental changes of older adults and impact on their family members. Major focus on kinship and caregiving by family and decision making in selecting residential and institutional care when elders develop cognitive and physical disabilities.

IFST 409  DOMESTIC VIOLENCE SERVICES  3
Examines issues in providing services to families in which domestic violence is occurring. Multiple service systems explored, with emphasis on service coordination, service gaps, and public policy.
May be cross-listed with CRJU409 and/or WOMS409.
PREREQ: IFST235 or SOCI201 or WOMS201.
RESTRICTIONS: Open to juniors and seniors only.

IFST 410  THE HOSPITALIZED CHILD  3
Psychosocial needs of pediatric patients and their caregivers examined. Emphasis on coping, preparation, medical terminology, play, assessment and family-centered care. Studies implications for nursing care, child life specialists, premedical students and others working with pediatric population.
PREREQ: IFST221 or PSYC325.
IFST 411 Inclusive Curriculum: Birth - Preschool 3
Curriculum/programming for optimal development of children birth-36 months in inclusive settings. Focuses on primary caregiving and continuity of care, routines as basis for curriculum, environmental designs, building relationships with children and families, and IFSP process.
PREREQ: IFST222/224.
COREQ: IFST431 and IFST452.

IFST 412 Inclusive Curriculum: Preschool - Kindergarten 3
Curriculum/programming and assessment for optimal development of children in inclusive preschool and kindergarten settings. Focuses on how children learn; methods for teaching math, literacy, arts, science, and social studies in integrated curriculum; developmentally appropriate and culturally responsive instructional practices; continuum of teaching strategies.
PREREQ: IFST222 and IFST224.
COREQ: IFST306, IFST350 and IFST432.

IFST 413 Inclusive Curriculum: Kindergarten - Grade 2 3
Curriculum and assessment for optimal development of children kindergarten through grade 2 in inclusive settings. Focuses on how children learn; methods for teaching math, literacy, arts, science, and social studies in integrated curriculum; developmentally appropriate and culturally responsive instructional practices; continuum of teaching strategies.
PREREQ: IFST222, IFST224, IFST306.
COREQ: IFST414, IFST443 and IFST435.

IFST 414 Classroom Management/Guidance and Behavior Support 3
Covers social and emotional development in childhood. Focuses on program planning and structure, roles of environmental antecedent and consequence variables in behavior. Hands-on experiences address practical techniques and specific behavior management strategies including schedules and transitions, and guidance. Functional behavior analysis (mild to severe) explored.
PREREQ: IFST222/224.
COREQ: IFST413, IFST443 and IFST435.

IFST 422 Capstone in Family Relationships 3
Integrative analysis of interpersonal relationships and problems in courtship, marriage and family in contemporary society.
PREREQ: IFST202.

IFST 428 Educational Research and Issues in Human Resources 3
Introduction to research process through study of problem identified by analysis of clinical experiences; in-depth examination of selected current educational concerns.
RESTRICTIONS: Requires permission of instructor.

IFST 430 Family Life Education 3
Investigates curriculum and instructional strategies for use in support, prevention and empowerment-based programs across lifespan. May be cross-listed with WOMS430.
PREREQ: IFST201 or IFST202.

IFST 431 Field Experience: Birth - Preschool 1 PF
Field-based experiences in school, agency, or family setting with children. Collaboration with school, community and families in order to support ongoing work in setting.
PREREQ: IFST222 and 224.
COREQ: IFST411 and IFST452.

IFST 432 Field Experience: Preschool - Kindergarten 2 PF
Field-based experiences in school, agency, or family setting with children ages three to six. Observation, instruction, and assessment of children. Collaboration with school, community and families in order to support ongoing work in setting.
PREREQ: IFST222 and 224.
COREQ: IFST306, IFST350 and IFST412.

IFST 433 Field Experience: Kindergarten - Grade 2 1 PF
Field-based experiences in school, agency or family setting with children, kindergarten through second grade. Observation, instruction, and assessment of children. Collaboration with school, community, and families in order to support ongoing work in setting.
PREREQ: IFST222 and 224.
COREQ: IFST413, IFST414 and IFST435.

IFST 435 Programs for Children with Exceptionalities 3
Philosophy, organization, and operation of programs for children with exceptionalities. Focus on teaching in inclusive settings, and implementing developmentally appropriate practices. Addresses parent-professional partnerships, characteristics of specific disabilities and related interventions, IEP process, adaptation strategies, and positioning and handling techniques.
PREREQ: IFST222, IFST224 and EDUC230.
COREQ: IFST413, IFST414 and IFST433.

IFST 438 Leadership Development in Human Sexuality 3
Seminar/practicum for organizing and leading discussion groups in human sexuality. Trains group leaders to facilitate effective communication skills and responsible sexual decisions, integrating research and theories with individual and family life experiences.
PREREQ: IFST238 or IFST401.
RESTRICTIONS: Requires permission of instructor. For undergraduate teaching assistants only.

IFST 440 Early Childhood Administration, Leadership and Advocacy 3
Organization and administration of programs for young children. Development of effective strategies for leadership and advocacy. Consideration of personnel, facilities, regulations, quality programming and business management.
PREREQ: IFST340.

IFST 445 Family, Community and School Partnerships 3
Parent/child relationships with focus on parenting styles, roles, issues and goals geared toward successful utilization of family, school, and community-based resources. Family interfaces with schools and community resources, family diversity and theoretical perspectives, along with developmental needs of parents and children examined.
PREREQ: IFST101.
COREQ: IFST334 or IFST432.

IFST 449 Internship in Family and Community Services 1-10 PF
On-the-job experience in community and family service agency.
RESTRICTIONS: Requires permission of instructor.

IFST 452 Assessment of Children 3
Study of multiple roles of formal and informal assessment. Primary focus on integration of curriculum, assessment and programming. Strategies for family involvement identified.
PREREQ: IFST220, 221, 222, and 224.
COREQ: IFST411 and IFST431.

IFST 459 Child Development Practicum 1-9 PF
Supervised student teaching experience.
PREREQ: IFST435, IFST442 and IFST470.
RESTRICTIONS: Requires permission of instructor.

IFST 460 Women in International Development 3
See SOC460 for course description.

IFST 463 Atypical Infant and Toddler 3
Sensory, motor, affective and psychosocial development in infancy and toddlerhood. Observation and participation with infants. Early diagnosis, assessment and treatment strategies for disabilities of infant and toddler period.
PREREQ: IFST221 and IFST236.

IFST 465 Seminar 1-3
Discusses professional issues in delivery of human services.
COREQ: IFST449.

IFST 466 Independent Study 1-12

IFST 470 Families and Children at Risk 3
Study of social-emotional considerations of disabilities and risk factors upon development of children and families. Theory, research, and practices discussed with emphasis on family-professional collaboration, empowerment, family-focused practice, and cultural sensitivity.
PREREQ: IFST201 or IFST220 or PSYC325.
RESTRICTIONS: Open to juniors and seniors only.

IFST 475 Topics in Individual and Family Studies 1-3
Selected topics focusing on current issues affecting families from interdisciplinary and global perspective.
RESTRICTIONS: Prerequisites vary by topic and instructor.

IFST 480 Student Teaching Seminar 2 PF
Discussion-oriented and problem-centered seminar with emphasis on role and contributions of early childhood education professional.
COREQ: EDUC400.

IFST 481 Honors Capstone Student Teaching Seminar 3
Discussion-oriented and problem-solving seminar with emphasis on role and contributions of early childhood education professional. Includes introduction to teachers as researchers and completion of public presentation.
COREQ: EDUC400.
RESTRICTIONS: Permission of instructor. Honors students only.

IFST 490 Instructional Methods in Family and Consumer Sciences 3
Identification, selection and evaluation of developmentally appropriate strategies and resources for instruction in Family and Consumer Sciences secondary classrooms and community settings. School practicum required.

445
The page contains a list of courses in the field of Family and Individual Studies. The courses are categorized into various topics such as child development, family studies, and social services. Each course is identified by its code (e.g., IFST 640), followed by a brief description and prerequisites if necessary. The course catalog emphasizes the importance of integrating various fields such as language and literacy, social sciences, mathematics, and curriculum methods with community and family service agencies. It also highlights the development of research and assessment techniques in family studies, including a focus on integration and leadership in human services. The courses cover topics ranging from early childhood development to adult education, and emphasize the importance of both theoretical and practical aspects of family studies.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>IFST 679</td>
<td>Development of Counseling Skills</td>
<td>3</td>
</tr>
<tr>
<td>IFST 680</td>
<td>Professional Seminar in Counseling and Student Affairs</td>
<td>3</td>
</tr>
<tr>
<td>IFST 681</td>
<td>Career Development: Theories and Practice</td>
<td>3</td>
</tr>
<tr>
<td>IFST 682</td>
<td>Student Development in Higher Education</td>
<td>3</td>
</tr>
<tr>
<td>IFST 683</td>
<td>Seminar in Higher Education Administration</td>
<td>3</td>
</tr>
<tr>
<td>IFST 684</td>
<td>Theories of Counseling</td>
<td>3</td>
</tr>
<tr>
<td>IFST 685</td>
<td>Multicultural Issues in Counseling</td>
<td>3</td>
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<tr>
<td>IFST 686</td>
<td>Assessment in Counseling</td>
<td>3</td>
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<tr>
<td>IFST 687</td>
<td>Practicum in College Counseling</td>
<td>3</td>
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<tr>
<td>IFST 688</td>
<td>The Law and Student Affairs</td>
<td>3</td>
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<tr>
<td>IFST 689</td>
<td>The American College Student</td>
<td>3</td>
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<tr>
<td>IFST 690</td>
<td>Special Issues in Counseling Women</td>
<td>3</td>
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<tr>
<td>IFST 691</td>
<td>Group Counseling</td>
<td>3</td>
</tr>
<tr>
<td>IFST 692</td>
<td>Student Personnel Management</td>
<td>3</td>
</tr>
<tr>
<td>IFST 693</td>
<td>Group Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>IFST 694</td>
<td>Internship</td>
<td>3</td>
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<tr>
<td>IFST 695</td>
<td>Internship in Student Affairs</td>
<td>3</td>
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<tr>
<td>IFST 803</td>
<td>Human Development in Life Span Perspective</td>
<td>3</td>
</tr>
<tr>
<td>IFST 815</td>
<td>Research Issues and Designs</td>
<td>3</td>
</tr>
<tr>
<td>IFST 823</td>
<td>Proseminar: Social and Urban Policy</td>
<td>3</td>
</tr>
<tr>
<td>IFST 828</td>
<td>Trends and Issues in Individual and Family Studies</td>
<td>3</td>
</tr>
<tr>
<td>IFST 830</td>
<td>Theories: Family Studies and Human Development</td>
<td>3</td>
</tr>
<tr>
<td>IFST 855</td>
<td>Family Studies II: Analysis and Critical Issues</td>
<td>3</td>
</tr>
<tr>
<td>IFST 860</td>
<td>Diversity in Families and Human Development</td>
<td>3</td>
</tr>
<tr>
<td>IFST 865</td>
<td>Advanced Seminar in Family Studies</td>
<td>1-3</td>
</tr>
<tr>
<td>IFST 868</td>
<td>Research</td>
<td>1-6</td>
</tr>
<tr>
<td>IFST 869</td>
<td>Master's Thesis</td>
<td>1-6</td>
</tr>
<tr>
<td>IFST 870</td>
<td>Family Crisis and Coping</td>
<td>3</td>
</tr>
<tr>
<td>IFST 875</td>
<td>Intergenerational Relationships and Development</td>
<td>3</td>
</tr>
<tr>
<td>IFST 880</td>
<td>Families, Disabilities and Institutions</td>
<td>3</td>
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<tr>
<td>IFST 885</td>
<td>Children and Computers</td>
<td>3</td>
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Students participate in building sound theoretical and pedagogical foundation for use of computers in young children's education. Developmental perspectives such as Papert, Piaget, Vygotsky, and NAEYC's guidelines for Developmentally Appropriate Practice form core of theoretical foundation building.
ITALIAN

ITAL 105  ITALIAN I - ELEMENTARY  4
Introduction to the Italian language and development of speaking, listening, reading and writing skills through the use of basic texts.

ITAL 106  ITALIAN II - ELEMENTARY/INTERMEDIATE  4
Completion of basic Italian. Increasing mastery of the basic skills of speaking, listening, reading and writing.
PREREQ: ITAL105.
RESTRICTIONS: Taught abroad only.

ITAL 107  ITALIAN III - INTERMEDIATE  4
Review of grammar, continued practice in speaking and writing, reading texts of average difficulty.
PREREQ: ITAL106.
RESTRICTIONS: Taught abroad only.

ITAL 200  ITALIAN GRAMMAR REVIEW  3
Systematic review of fundamental aspects of Italian grammar. Study of special problem areas. Some conversational practice.
PREREQ: ITAL107.

ITAL 205  ITALIAN CONVERSATION  3
Practical use of Italian by means of oral reports and discussions. Emphasis on improvement of basic conversational skills. Grammar review and written work when appropriate.
PREREQ: ITAL107.
RESTRICTIONS: Prerequisite requires a minimum grade of B. One 200-level Italian course may be substituted for prerequisite.

ITAL 206  CULTURE THROUGH CONVERSATION  3
Discussion of topics drawn from contemporary Italian life. Designed for students who wish to broaden their knowledge of Italian culture while improving their oral and aural language skills.
PREREQ: ITAL107.
RESTRICTIONS: Taught abroad only.

ITAL 208  ITALIAN: PAST AND PRESENT  3
Introduction to Italy, its history, its culture, its people, their way of life and the issues confronting them.
RESTRICTIONS: Taught abroad only, in both English and Italian. Not for major credit. Does not satisfy the language requirement.

ITAL 211  ITALIAN READING AND COMPOSITION: SHORT FICTION  3
Reading and discussion of Italian short stories. Several short compositions. Grammar review where appropriate.
PREREQ: ITAL200, ITAL205 or ITAL206.

ITAL 212  ITALIAN READING AND COMPOSITION: DRAMA AND PROSE  3
Reading and discussion of some major twentieth century plays and prose texts. Several short compositions. Grammar review where appropriate.
PREREQ: ITAL200, ITAL205 or ITAL206.

ITAL 250  INTRODUCTION TO BUSINESS ITALIAN  3
Familiarizes students with characteristics of business Italian (vocabulary, technology, terminology and syntactical patterns) and aspects of the Italian business community.
PREREQ: ITAL107.

ITAL 305  ADVANCED ITALIAN CONVERSATION AND COMPOSITION  3
Discussion of current cultural, social and political topics in Italy. Vocabulary building, grammar exercises and frequent compositions.
PREREQ: ITAL211 or ITAL212.

ITAL 306  PRACTICAL ORAL/WRITTEN EXPRESSION  3
Offered abroad only, is designed to strengthen skills in grammar and vocabulary in preparation for advanced courses offered in second part of the semester. Class exercises include oral exposes, discussion of articles and videos, textual analysis and compositions.
PREREQ: Any two 200-level Italian courses conducted in Italian.
RESTRICTIONS: Taught abroad only.

ITAL 308  CONTEMPORARY ITALY II  3
Discussion and study of issues related to contemporary cultural, political and social developments in Italy, including its place in today's European community. The course will be conducted in Italian.
PREREQ: Any two 200-level Italian courses taught in the Italian language.
RESTRICTIONS: Taught abroad only.

ITAL 310  SURVEY OF ITALIAN LITERATURE  3
Development of Italian literature from its origins to the mid-seventeenth century. Study and discussion of representative works.
PREREQ: ITAL211 or ITAL212.

ITAL 311  SURVEY OF ITALIAN LITERATURE  3
Development of Italian literature from the mid-seventeenth century to the present. Study and discussion of representative works.
PREREQ: ITAL211 or ITAL212.

ITAL 325  ITALIAN CIVILIZATION AND CULTURE I  3
Survey of the major cultural, social and political developments in Italy from its Unification to the present.
PREREQ: ITAL211 or ITAL212.

ITAL 326  ITALIAN CIVILIZATION AND CULTURE II  3
Survey of the major cultural, social and political developments in Italy from its Unification to the present.
PREREQ: ITAL211 or ITAL212.

ITAL 355  SPECIAL TOPICS  3
Explores an area of special interest in Italian literature or cultural studies. Topics vary and will be announced in the registration booklet.
PREREQ: ITAL310 or ITAL311.
RESTRICTIONS: May be repeated for credit when topics vary.

ITAL 366  INDEPENDENT STUDY  1-3
Explores an area of special interest in Italian literature or cultural studies. Topics vary and will be announced in the registration booklet.
PREREQ: ITAL310 or ITAL311.
RESTRICTIONS: May be repeated for credit when topics vary.

ITAL 401  ADVANCED ITALIAN GRAMMAR AND STYLISTICS  3
Introduction to the various written and spoken styles of contemporary Italian from colloquial to formal. Exercises in writing and speaking, with special emphasis on the grammatical structure of the Italian language. Some translation.
PREREQ: Any two 300-level Italian courses.

ITAL 403  HISTORY OF THE ITALIAN LANGUAGE  3
Development of the Italian language from its Latin origins. Exposition of the questione della lingua; linguistic analysis of old Italian texts; and the effects of social, political and cultural factors on usage. Influences from and on other languages.
PREREQ: Any two 300-level Italian courses.
RESTRICTIONS: May be offered jointly with ITAL603.

ITAL 406  ADVANCED ITALIAN LANGUAGE  3
Grammatical structure and stylistics with special attention given to technical vocabulary and discourse, e.g., business, law, science and agriculture.
PREREQ: Any 300-level Italian course.
RESTRICTIONS: Taught abroad only.

ITAL 455  SELECTED AUTHORS, WORKS AND THEMES  3
Works of one or more outstanding authors or on a special theme.
PREREQ: Any 200-level Italian course.
RESTRICTIONS: Taught abroad only.

ITAL 601  ADVANCED ITALIAN GRAMMAR AND STYLISTICS  3
Introduction to the various written and spoken styles of contemporary Italian from colloquial to formal. Exercises in writing and speaking, with special emphasis on the grammatical structure of the Italian language. Some translation.
PREREQ: Any two 300-level Italian courses.
RESTRICTIONS: May be offered jointly with ITAL403.

ITAL 655  INDEPENDENT STUDY  1-3
Seminar on works of one or more outstanding authors or on a special theme.
PREREQ: Any 200-level Italian course.
RESTRICTIONS: Taught abroad only.
JAPANESE

JAPN 105 JAPANESE I - ELEMENTARY 4
Introduction to the contemporary Japanese language through developing listening comprehension, speaking, reading, and writing skills, including mastery of the Hiragana and Katakana syllabaries and introduction to Kanji characters. Media Center resources utilized.

JAPN 106 JAPANESE II - ELEMENTARY/INTERMEDIATE 4
Continued practice in the aural, oral, reading, and writing skills of contemporary Japanese, including the identification and reproduction of basic Kanji characters. Introduction to communicative levels and critical verb forms needed for more advanced communication. Media Center resources utilized.
RESTRICTIONS: Two to three years of high school Japanese acceptable in lieu of prerequisite.

JAPN 107 JAPANESE III - INTERMEDIATE 4
Development of aural, oral, reading, and writing skills at the intermediate Japanese level, including continued practice in identifying and reproducing Kanji characters, handling a greater variety of communicative levels, and verb forms. Media Center resources utilized.
PREREQ: JAPN106.
RESTRICTIONS: Four years of high school Japanese acceptable in lieu of prerequisite. Satisfies College of Arts and Sciences language requirement.

JAPN 200 JAPANESE GRAMMAR AND COMPOSITION 3
Further study of Japanese grammar, kanji characters and reading and writing skills for communication. Emphasis on grammar, Kanji and essay writing.
PREREQ: JAPN107. Students encouraged to take JAPN200 before JAPN205.

JAPN 204 THE ART OF JAPANESE CALLIGRAPHY 3
Practical training in Japanese calligraphy, using brush, inkstone and sumi ink. Students will work with both phonetic syllabaries and kanji characters.
PREREQ: JAPN105.

JAPN 205 JAPANESE CONVERSATION 3
Practical use of Japanese by means of oral reports on a variety of topics including family, school, and work life. Emphasis on improvement of conversational skills for social situations which require different politeness levels, as well as grammatical and written competence.
RESTRICTIONS: Prerequisite requires a minimum grade of B.

JAPN 206 CULTURE THROUGH CONVERSATION 3
Discussion of topics drawn from contemporary Japanese life. Designed for students who wish to broaden their knowledge of Japanese culture while improving their oral and aural language skills.
PREREQ: JAPN107.
RESTRICTIONS: Taught abroad only.

JAPN 208 CONTEMPORARY JAPAN I 3
Introduction to contemporary Japan, its culture, people, way of life and issues confronting them.
RESTRICTIONS: Taught abroad only, in both English and Japanese. Not for major credit. Does not satisfy language requirement.

JAPN 209 INTERMEDIATE SITUATIONAL JAPANESE 3
Practical training in Japanese for formal situations. Students will develop all four language skills in such contexts as job interviews, telephone etiquette, correspondence and relations with supervisors. Skills and role-playing featured.
PREREQ: JAPN107.

JAPN 305 JAPANESE CONVERSATION AND COMPOSITION 3
Discussion of current cultural, social and political topics in Japanese. Vocabulary building, grammar exercises and frequent compositions. PREREQ: Three of the following: JAPN200, JAPN205, JAPN206, JAPN209, or instructor's permission.

JAPN 306 PRACTICAL ORAL AND WRITTEN EXPRESSION 3
Designed to increase fluency and vocabulary. Grammar review focuses on special problems.
RESTRICTIONS: Taught abroad only.

JAPN 355 SPECIAL TOPICS 3
Explores an area of special interest in Japanese literature or culture studies. The subject matter varies and will be announced in the registration booklet.
PREREQ: Three of the following: JAPN200, JAPN205, JAPN206, JAPN209, or instructor's permission.
RESTRICTIONS: May be repeated for credit when topics vary.

JAPN 366 INDEPENDENT STUDY 1-3
PREREQ: Two of the following: JAPN200, JAPN205, JAPN206.

JAPN 455 SELECTED AUTHORS, WORKS, AND THEMES 3
Works of one or more outstanding authors or on a special theme. PREREQ: Two 300-level Japanese courses.
RESTRICTIONS: May be repeated for credit when topics vary.

JAPN 466 INDEPENDENT STUDY 1-3
PREREQ: One 300-level Japanese course.

JOURNALISM

JOUR 301 INTRODUCTION TO JOURNALISM 3
Introduction to history, practice and issues of journalism in a variety of formats. Gateway to journalism, exposing students to challenges and opportunities of the discipline, as well as work ethic and career responsibilities faced in the field. As an overview, helps students determine if journalism is right for them.
PREREQ: Grade of B or better in ENGL110.

JOUR 425 ETHICS AND ISSUES IN JOURNALISM 3
Examination of issues faced by journalism and journalists today, including different standards of truth, competing responsibilities (to readers, sources, corporate shareholders), blending of news and entertainment, and changing nature of journalism in digital age.
PREREQ: JOUR301.

JEWISH STUDIES

JWST 105 HEBREW I - ELEMENTARY 4
See HEBR105 for course description.

JWST 106 HEBREW II - ELEMENTARY/INTERMEDIATE 4
See HEBR106 for course description.

JWST 107 HEBREW III - INTERMEDIATE 4
See HEBR107 for course description.

JWST 201 ISSUES AND IDEAS IN JEWISH STUDIES 1
Forum for scholars to share their thoughts and research on the culture, literature and history of the Jewish people. Topics range from historical reviews to contemporary issues.

JWST 202 BIBLICAL AND CLASSICAL LITERATURE 3
See ENGL202 for course description.

JWST 205 HEBREW CONVERSATION 3
See HEBR205 for course description.
PREREQ: HEBR107 or equivalent.

JWST 208 INTRODUCTION TO JEWISH PHILOSOPHY 3
See PHIL208 for course description.

JWST 209 CONTEMPORARY ISRAEL THROUGH FILM 3
See HEBR209 for course description.

JWST 254 JEWISH HOLOCAUST: 1933-1945 3
See HIST254 for course description.

JWST 261 PEOPLES AND CULTURES OF THE MIDDLE EAST 3
See ANTH261 for course description.

JWST 308 TOPICS IN JEWISH THEOLOGY 3
See PHIL308 for course description.
PREREQ: PHIL208/IEWST208 recommended.

JWST 318 STUDIES IN FILM 3
See ENGL318 for course description.

JWST 348 CONTEMPORARY JEWISH-AMERICAN LITERATURE 3
See ENGL348 for course description.

JWST 349 INTRODUCTION TO JEWISH SOURCES: TEXT AND INTERPRETATION 3
See ENGL349 for course description.

JWST 360 SOCIOLOGY OF RELIGION 3
See SOC360 for course description.
**LATN 101** | **Elementary Latin I** | 3
---|---|---
Prepares students to read ancient Roman literary works in the original language. Emphasizes building a basic vocabulary and acquiring essential grammar. Discussion of Roman culture and civilization.

**LATN 102** | **Elementary Latin II** | 3
---|---|---
Completion of elementary Latin. 
**PREREQ:** LATN101 or equivalent. 
**RESTRICTIONS:** One year of high school Latin acceptable in lieu of prerequisite.

**LATN 213** | **Cicero** | 3
---|---|---
Introduction to reading Latin literature in the original language, focusing on the philosophical and forensic works of Cicero, the historical writings of Livy and the poetry of Ovid. 
**PREREQ:** LATN101 and LATN102 or equivalent.

**LATN 214** | **Virgil** | 3
---|---|---
Vergil's Aeneid or Ovid select works. Review of grammar and readings in the poetry of Vergil. 
**PREREQ:** LATN213. 
**RESTRICTIONS:** Satisfies College of Arts and Sciences language requirement.

**LATN 221** | **Roman Letters** | 3
---|---|---
Explores the letter as a literary form in the Roman world. Readings from the letters of Cicero and Pliny. 
**PREREQ:** LATN214.

**LATN 222** | **Historians of the Republic** | 3
---|---|---
Selected readings from the works of Livy, Sallust and Cornelius Nepos. 
**PREREQ:** LATN214.

**LATN 366** | **Independent Study** | 1-3
---|---|---

**LATN 403** | **Roman Lyric Poetry** | 3
---|---|---
Readings in the lyric poetry of Catullus and Horace. 
**PREREQ:** LATN214.

**LATN 466** | **Independent Study** | 1-3
---|---|---

**LEAD 110** | **Perspectives on Leadership** | 1
---|---|---
Overview of leadership as academic discipline and field of practice. Topics include exploring nexus of leadership and consumer policy, career paths, resources for academic success, and opportunities for leadership development. Emphasis on individual and team skills for problem solving. 
**RESTRICTIONS:** Priority given to freshmen.

**LEAD 201** | **Introduction to Consumer Policy** | 3
---|---|---
Explores general models of how consumer policies come into being and examines how relationships among consumers, government and business impact formulation of these consumer policies.

**LEAD 205** | **Leadership in Consumer Voice and Customer Service** | 3
---|---|---
Explores how consumers use voice to obtain more satisfactory service and how organizations encourage and use consumer voice for mutual benefit.

**LEAD 209** | **Presentation Strategies** | 3
---|---|---
Methods for delivering leadership messages and for developing strategic presentations, with emphasis on purpose, vision, audience and formats.

**LEAD 304** | **Leadership, Power and Social Responsibility** | 3
---|---|---
Examines power as a set of internal and external resources that leaders use to promote social responsibility to and by consumers. 
**PREREQ:** LEAD100.

**LEAD 311** | **Topics in Consumer Resource Management** | 3
---|---|---
Topics relating to development of human and economic resources and productive capacity to meet consumer needs over life span. Topics vary.

**LEAD 340** | **Consumer Affairs Internship** | 3-6
---|---|---
Off-campus supervised and coordinated field study in selected agencies and organizations. 
**RESTRICTIONS:** May be repeated once for credit. Requires permission of instructor.

**LEAD 342** | **Consumer Laws and Regulations** | 3
---|---|---
In-depth examination of consumer legislation and regulation policies at federal and state level. Major pieces of consumer legislation and regulatory agencies responsible for implementing and enforcing these policies examined. 
**PREREQ:** LEAD201.

**LEAD 366** | **Independent Study** | 1-6
---|---|---

**LEAD 401** | **Topics in Consumer Policy Analysis** | 3
---|---|---
Topics examine effects of consumer-oriented policies upon consumer well-being. Topics vary. 
**PREREQ:** LEAD201.

**LEAD 404** | **Leadership in Organizations** | 3
---|---|---
Understanding process of change and positively affecting change in organizations through exercise of leadership knowledge. 
**PREREQ:** LEAD100.

**LEAD 411** | **Topics in Leadership Dynamics** | 3
---|---|---
Topics relating to aspects of leadership. Themes in leadership dynamics explored. 
**PREREQ:** LEAD100.

**LEAD 490** | **Senior Capstone** | 3
---|---|---
Engage in project addressing “real world” leadership challenges. Successful project completion requires integration, synthesis and reflection upon knowledge and skills acquired in previous courses. Specific projects vary by semester. 
**PREREQ:** LEAD100, LEAD304, LEAD341. 
**RESTRICTIONS:** Open to senior LEAD majors only.

**LEGAL STUDIES**

**LEST 301** | **Introduction to Legal Studies** | 3
---|---|---
Introduces legal studies as a multidisciplinary field. May be cross-listed with CRJU301.
LINGUISTICS

LEST 345 LEGAL ISSUES OF THE MASS MEDIA 3
See COMM345 for course description.

LEST 380 INTRODUCTION TO LAW 3
See POSC380 for course description.

LEST 383 LANGUAGE, POWER AND THE LAW 3
See LING383 for course description.

LEST 385 LANGUAGE AND LAW: COURT INTERPRETATION 3
See LING385 for course description.

LEST 401 SENIOR SEMINAR 3
Culminates the legal studies minor by requiring an independent research project resulting in a term paper. Seminar provides guidance from professor and chance to share ideas and problems with fellow students.

LEST 408 ECONOMICS OF LAW 3
See ECON408 for course description. PREREQ: ECON300 or ECON301.

LEST 450 TOPICS IN ENVIRONMENTAL LAW 3
See FREC450 for course description.

LEST 466 INDEPENDENT STUDY 1-6

LEST 475 SOCIAL SCIENCE AND THE LAW 3
See CRJU475 for course description.

LEST 646 ADMINISTRATIVE LAW 3
See UAPP646 for course description.

LEST 649 CIVIL RIGHTS LAW AND POLICY 3
See UAPP649 for course description.

LEST 673 INTERNATIONAL LAW 3
See MAST673 for course description. RESTRICTIONS: Requires permission of instructor.

LING 101 Introduction to Linguistics I 3
Nature of language: structure of sounds, words, sentences, and meaning; relationships of language and society, culture, and thought. Emphasis on language universals and variation both within and between languages, including non-Western and non-white varieties.

LING 102 LANGUAGE, MIND AND SOCIETY 3
Explores structural aspects of language variation and the mental representation of language. Topics include: regional and social variation in language, sociolinguistics of multilingual/multicultural communities, language change, role of universal grammar in language learning, lexical access and parsing. PREREQ: LING101.

LING 130 AMERICAN SIGN LANGUAGE I 3
Introduction to American Sign Language and to the deaf culture. Topics include WH-questions, yes/no questions, negations, the alphabet and a basic working vocabulary. RESTRICTIONS: Requires interview with instructor if Sign Language has been studied elsewhere.

LING 131 AMERICAN SIGN LANGUAGE II 3
Continuation of LING130. PREREQ: LING130. RESTRICTIONS: Requires interview with instructor if Sign Language has been studied elsewhere.

LING 203 LANGUAGES OF THE WORLD 3
Survey of world's languages, examining number of important phenomena from wide range of languages. Phenomena both structural (e.g., word order and agreement) and societal or psychological (how multicultural societies choose a common language, the relation between language and thought). May be cross-listed with FLIT203.

LING 222 LANGUAGE AND GENDER 3
Explores various ways in which gender reflected in language. Topics include sexism in language, sexist language and differences in the structural aspects of men's and women's language and conversational style. Emphasis on the social implications of these differences. May be cross-listed with WOMS222.

LING 253 LABORATORY PHONETICS 3
Study of speech sounds, emphasizing the measurement of the acoustic signal. Introduction to acoustic phonetics, concentrating on the source-filter model of speech production. Computer laboratory projects in speech recording, digitization, analysis, variation, synthesis and perception.

LING 265 STUDIES IN LANGUAGE 3
Topics vary and will be announced in registration booklet. RESTRICTIONS: May be repeated for credit when topics vary.

LING 301 DICTIONARIES 3
Lexicographical information on the use of dictionaries in research, teaching, translation, reading and other fields. Sociological and political importance of dictionaries. Introduction to planning and compiling dictionaries: technological developments such as computerization and the dictionary of the future.

LING 358 LINGUISTICS AND LANGUAGE ARTS 3
See EDUC358 for course description.

LING 366 INDEPENDENT STUDY 1-6

LING 376 INTRODUCTION TO COMMUNICATION DISORDERS 3
Introduction to the field of communication disorders. Examines complex behaviors of speech, language and hearing and their changes throughout lifespan, as well as variety of communication disorders arising from biological, environmental and behavioral factors. PREREQ: LING101.

LING 377 CLINICAL PRINCIPLES AND PROCEDURES IN SPEECH PATHOLOGY 3
Focuses on clinical principles and procedures in assessment, planning and intervention in speech pathology. Assessment issues related to measurement concepts and descriptive statistics including use of norm-referenced tests, defining target behaviors and developing observation skills are covered. Treatment planning and intervention include developing treatment program, getting target behavior baselines and documenting treatment effectiveness. PREREQ: LING376.

LING 378 ANATOMY AND PHYSIOLOGY OF SPEAKING 3
Introduction to structures and processes underlying human speech production. Anatomical, physiological and neurological bases of speech-related processes, including breathing, phonation and articulation. Primary emphasis is to learn names and functions of various structures involved in speech production and to gain understanding of how they serve to support speaking in normally functioning humans.

LING 379 INTRODUCTION TO AUDIOLOGY 3
Provides overview to field of audiology. Content includes a study of anatomy and physiology of hearing mechanism, hearing assessment, classification of hearing disorders, auditory pathologies, and management of hearing loss. PREREQ: LING376.

LING 383 LANGUAGE, POWER AND THE LAW 3
Examines variety of topics which demonstrate the power of language in the legal arena, including language of mediation, role of forensic linguistics in murder and product liability cases, gender and power, Plain English movement, and attorneys' questioning styles. May be cross-listed with LEST383.

LING 385 LANGUAGE AND LAW: COURT INTERPRETATION 3
Examines court interpretation from various perspectives and includes an historical overview of policy development, linguistic challenges (for both spoken and signed languages), ethics and responsibilities, testing and certification of court interpreters (at state and federal levels), and comparative data about other countries. Numerous guest speakers supplement coursework. May be cross-listed with LEST385.

LING 390 ENGLISH LINGUISTICS 3
See ENGL390 for course description.

LING 401 HISTORICAL LINGUISTICS 3
Languages of the world, Indo-European languages, the comparative method and linguistic evolution. May be cross-listed with FLIT401. PREREQ: Completion of two years of a college language course.

LING 407 PHONOLOGY I 3
Basic introduction to phonology, concentrating on principles of articulatory phonetics, IPA transcription system, distinctive feature theory, segmental phonological analysis and the writing of phonological rules. PREREQ: LING101. RESTRICTIONS: Requires permission of instructor.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LING 417</td>
<td>Language Planning</td>
<td>3</td>
<td>Sociolinguistic study of the interaction between official and indigenous languages as well as the role of minority groups in national policy making. Highlights language as a cultural, political and social marker.</td>
</tr>
<tr>
<td>LING 418</td>
<td>Meaning and Language Use</td>
<td>3</td>
<td>Introduction to theories of meaning based on the notion of truth and their application to language use. May be cross-listed with CGSC418 and/or PHIL418. Prereq: LING 101.</td>
</tr>
<tr>
<td>LING 421</td>
<td>Methods of Teaching Foreign Languages</td>
<td>3</td>
<td>See FLIT421 for course description.</td>
</tr>
<tr>
<td>LING 422</td>
<td>Language Syllabus Design</td>
<td>3</td>
<td>See FLIT422 for course description.</td>
</tr>
<tr>
<td>LING 424</td>
<td>Second-Language Testing</td>
<td>3</td>
<td>See FLIT424 for course description.</td>
</tr>
<tr>
<td>LING 433</td>
<td>Introduction to Acoustic Phonetics</td>
<td>3</td>
<td>Introduction to articulatory, acoustic, and perceptual characteristics of speech with emphasis on acoustic properties of phonemes. While primarily lecture format with assigned text, a few laboratory sessions provide introduction to computer-based methods used in instrumental studies of speech. Prereq: LING253.</td>
</tr>
<tr>
<td>LING 462</td>
<td>Language Acquisition</td>
<td>4</td>
<td>See EDUC462 for course description.</td>
</tr>
<tr>
<td>LING 466</td>
<td>Independent Study</td>
<td>1-3</td>
<td></td>
</tr>
<tr>
<td>LING 470</td>
<td>Discovering Human Language: Introduction to Field Linguistics</td>
<td>3</td>
<td>Examines how languages are put together through a face-to-face encounter with an unknown language. Determine how this language - and human language in general - is constructed. Also learn about culture, people and even food where the language is spoken. Coreq: LING 101 or equivalent experience.</td>
</tr>
<tr>
<td>LING 477</td>
<td>The Structure of English</td>
<td>3</td>
<td>Explores current generative linguistic theories and the analysis of English phonology/morphology and syntax in the light of these theories. Contrastive analysis of English and a second language (such as Spanish). May be cross-listed with EDUC477 and/or ENGL477. Prereq: LING101.</td>
</tr>
<tr>
<td>LING 480</td>
<td>Introduction to Sociolinguistics</td>
<td>3</td>
<td>Theories (e.g., variation theory), research and methods of analysis of the interrelationships of language and society. Particular attention paid to application of sociolinguistic research to the solution of educational problems of various groups.</td>
</tr>
<tr>
<td>LING 491</td>
<td>Semantics I</td>
<td>3</td>
<td>Introduction to linguistic theories of meaning. Survey of the semantic issues in reference, ambiguity, presupposition and implicature. Selected linguistic phenomena (e.g., tense, aspect, predication, thematic roles). Some elements of formal semantics. Prereq: LING101.</td>
</tr>
<tr>
<td>LING 497</td>
<td>Sociolinguistics of English in Inner City</td>
<td>3</td>
<td>Application of sociolinguistic principles and research to the teaching of multicultural students in American educational systems. Topics include societal multilingualism, language attitudes, vernacular language education, diglossia, instructional methods for teaching English as a second dialect, and reactions of the educational community to Black English Vernacular.</td>
</tr>
<tr>
<td>LING 498</td>
<td>Teaching English as a Second Language</td>
<td>3</td>
<td>Investigation of the literature containing traditional and modern techniques of teaching pronunciation, grammar and vocabulary of American English; and devising and presenting lesson plans. May be cross-listed with EDUC498.</td>
</tr>
<tr>
<td>LING 499</td>
<td>Issues in Teaching English Language Learners</td>
<td>3</td>
<td>Addresses theoretical and instructional issues related to teaching English Language Learners (ELLs). Topics include issues in bilingual education, theories of L2 acquisition, ELL educational models, integrating language and content instruction, documentation and assessment of ELL skills, and understanding cultural diversity.</td>
</tr>
<tr>
<td>LING 601</td>
<td>Historical Linguistics</td>
<td>3</td>
<td>Languages of the world, the Indo-European languages, the comparative method and linguistic evolution. May be cross-listed with FLIT601. Prereq: Completion of two years of a college language course.</td>
</tr>
<tr>
<td>LING 607</td>
<td>Phonology I</td>
<td>3</td>
<td>Basic introduction to phonology, concentrating on principles of articulatory phonetics, IPA transcription system, distinctive feature theory, segmental phonological analysis and the writing of phonological rules.</td>
</tr>
<tr>
<td>LING 609</td>
<td>Syntax I</td>
<td>3</td>
<td>Introduction to syntactic theory and analysis. Emphasis on argumentation and analysis rather than on the fine points of syntactic theory.</td>
</tr>
<tr>
<td>LING 610</td>
<td>Syntax II</td>
<td>3</td>
<td>Continuation of LING609. More advanced analysis of syntactic structures. Attention given to the theory of principles and parameters and to principles of universal grammar. Prereq: LING609.</td>
</tr>
<tr>
<td>LING 611</td>
<td>Introduction to Morphology</td>
<td>3</td>
<td>Introduces major types of morphological phenomena, their analysis and current theoretical approaches to handling them. Prereq: LING607.</td>
</tr>
<tr>
<td>LING 617</td>
<td>Language Planning</td>
<td>3</td>
<td>Sociolinguistic study of the interaction between official and indigenous languages as well as the role of minority groups in national policy making. Highlights language as a cultural, political and social marker.</td>
</tr>
<tr>
<td>LING 618</td>
<td>Meaning and Language Use</td>
<td>3</td>
<td>Graduate introduction to theories of meaning based on the notion of truth and their application to language use. May be cross-listed with CGSC618.</td>
</tr>
<tr>
<td>LING 621</td>
<td>Methods of Teaching Foreign Languages</td>
<td>3</td>
<td>See FLIT621 for course description.</td>
</tr>
<tr>
<td>LING 622</td>
<td>Language Syllabus Design</td>
<td>3</td>
<td>See FLIT622 for course description.</td>
</tr>
<tr>
<td>LING 624</td>
<td>Second Language Testing</td>
<td>3</td>
<td>See FLIT624 for course description.</td>
</tr>
<tr>
<td>LING 633</td>
<td>Introduction to Acoustic Phonetics</td>
<td>3</td>
<td>Introduction to articulatory, acoustic, and perceptual characteristics of speech with emphasis on acoustic properties of phonemes. While primarily lecture format with assigned text, a few laboratory sessions provide introduction to computer-based methods used in instrumental studies of speech.</td>
</tr>
<tr>
<td>LING 670</td>
<td>Discovering Human Language: Introduction to Field Linguistics</td>
<td>3</td>
<td>Examines how languages are put together through a face-to-face encounter with an unknown language. Determine how this language - and human language in general - is constructed. Also learn about culture, people and even food where language is spoken. Coreq: LING101 or equivalent experience.</td>
</tr>
<tr>
<td>LING 671</td>
<td>Methods of Teaching Foreign Languages</td>
<td>3</td>
<td>See FLIT621 for course description.</td>
</tr>
<tr>
<td>LING 672</td>
<td>Language Syllabus Design</td>
<td>3</td>
<td>See FLIT622 for course description.</td>
</tr>
<tr>
<td>LING 673</td>
<td>Language Acquisition</td>
<td>3</td>
<td>See EDUC675 for course description.</td>
</tr>
</tbody>
</table>

452
LING 676 Second Language Acquisition and Bilingualism 3
Psycholinguistic, sociolinguistic and neurolinguistic approaches to Second Language Acquisition (SLA). General models of first and second language learning. SLA within bilingual education programs. Linguistic, psychological and social experiences of the bilingual. Bilingual instruction and models of bilingual education. May be cross-listed with EDUC676.

LING 677 The Structure of English 3
Explores current generative linguistic theories and the analysis of English phonology/morphology and syntax in the light of these theories. Contrastive analysis of English and a second language (such as Spanish). May be cross-listed with EDUC677 and/or ENGL677.

LING 680 Introduction to Sociolinguistics 3
Topics (e.g., variation theory), research and methods of analysis of the interrelationships of language and society. Particular attention paid to application of sociolinguistic research to the solution of educational problems of various groups.

LING 691 Semantics I 3
Introduction to linguistic theories of meaning. Survey of the semantic issues in reference, ambiguity, presupposition and implicature. Selected linguistic phenomena (e.g., tense, aspect, predication and thematic roles). Some elements of formal semantics. PREREQ: LING101 or equivalent.

LING 697 Sociolinguistics of English in the Inner City 3
Application of sociolinguistic principles and research to the teaching of multicultural students in American educational systems. Topics include societal multilingualism, language attitudes, vernacular language education, diglossia, instructional methods for teaching English as a second dialect, and reactions of the educational community to Black English Vernacular.

LING 698 Teaching English as a Second Language 3
Investigation of the literature containing the traditional and modern techniques of teaching the pronunciation, grammar and vocabulary of American English. Devising and presenting lesson plans. PREREQ: Three credits of English at the 200-level.

LING 699 Issues in Teaching English Language Learners 3
Addresses theoretical and instructional issues related to teaching English Language Learner (ELL) students. Topics include issues in bilingual education, theories of L2 acquisition, Methods of teaching ELLs, L2 Testing, educational models, integrating language and content instruction, documentation and assessment of ELL skills, and the role of cultural diversity in classrooms.

LING 801 Linguistic Typology 3-6
Introduction to the concerns of linguistic typology and the study of language universals and language documentation. COREQ: LING607, LING609.

LING 802 Studies in Old and Middle English 3
See ENGL802 for course description.

LING 830 Syntax III 3
In-depth investigation of syntactic universals and recent developments in the theory of syntax. PREREQ: LING610. RESTRICTIONS: May be repeated for credit when topics vary.

LING 831 Topics in Syntax 3
Current topics in syntactic theory, problems in the syntactic analysis of specific languages. PREREQ: LING830. RESTRICTIONS: May be repeated for credit when topics vary.

LING 832 The Acquisition of Syntax 3
Current issues in acquisition of syntax, such as: relationship between UG and specific language grammars, parameter setting model in L1 acquisition, effect of input frequency, methods for assessing children's syntax. PREREQ: Syntax 1 and II, or concurrent enrollment in Syntax II.

LING 848 Seminar in Language Development 3
See EDUC848 for course description.

LING 850 Linguistics and Writing 3
Survey of writing systems. Problems of text structure.

LING 851 Linguistic Field Methods 3
Development of skills and techniques in various kinds of field analysis. Use of native informants. Discussion of the relationship between data collecting and grammatical statement.

LING 853 Topics in the Structure of Chinese 3
Formal analysis of selected aspects of the grammar of Chinese and related dialects. Topics may include phonology, morphology, syntax and semantics. RESTRICTIONS: May be repeated for credit when topics vary.

LING 854 Topics in the Structure of French 3
Formal analysis of selected aspects of the grammar of French and related dialects. Topics may include phonology, morphology, syntax and semantics. RESTRICTIONS: May be repeated for credit when topics vary.

LING 855 Topics in the Structure of German 3
Formal analysis of selected aspects of the grammar of German and related dialects. Topics may include phonology, morphology, syntax and semantics. RESTRICTIONS: May be repeated for credit when topics vary.

LING 856 Topics in the Structure of Italian 3
Formal analysis of selected aspects of the grammar of Italian and related dialects. Topics may include phonology, morphology, syntax and semantics. RESTRICTIONS: May be repeated for credit when topics vary.

LING 857 Topics in the Structure of Japanese 3
Formal analysis of selected aspects of the grammar of Japanese and related dialects. Topics may include phonology, morphology, syntax and semantics. RESTRICTIONS: May be repeated for credit when topics vary.

LING 858 Topics in Phonology 3
Detailed examination of one or more current (controversial) issues in phonological theory. PREREQ: LING608. RESTRICTIONS: May be repeated for credit when topics vary.

LING 862 Acquisition of Phonology 3
Development of phonology in normal children from babbling stage through acquisition of phonemes and basic phonological rules of a language. Examination of data from a variety of languages, focusing on language: specific and universal phenomena. PREREQ: LING608.

LING 863 Projects in Acoustic Phonetics 3
Brief review of articulatory, acoustic, and perceptual characteristics of speech and computer-based laboratory instrumentation. Students conduct research projects in acoustic phonetics, speech analysis, or speech synthesis. Projects suggested by instructor, however, students may (with instructor's approval) choose project of their own design.

LING 880 Second Language Acquisition 3
Detailed analysis of current issues in second language acquisition based on extensive readings of research findings. Topics include monitor model, pidginization process, natural versus formal second language acquisition, and adult-versus-child acquisition.

LING 890 Studies in Linguistics 3
Varying topics in linguistics, such as grammatical theory, grammatical analysis, syntax, historical-comparative linguistics, stylistics and grammar testing. May be cross-listed with CGSC890 and/or ENGL890.

LING 964 Pre-Candidacy Study 3-12 PF
Research and readings in preparation of dissertation topic and/or qualifying examinations for doctoral students before admission to candidacy but after completion of all required course work. RESTRICTIONS: Not open to students who have been admitted to candidacy.

LING 969 Doctoral Dissertation 1-12 PF

LIBERAL STUDIES

MALS 600 Nature and Human Nature 3
Concentrates on salient views of nature and human nature, and the ways in which they have been shaped by the historical circumstances and disciplinary perspectives from which they were developed. RESTRICTIONS: Open to majors only.

MALS 610 Force, Conflict and Change 3
From antiquity to the present, the use of force and the resolution of conflict have been among humanity's enduring preoccupations. Examines ideas about these issues, and associated questions such as the meaning of "heroism" and "just war." RESTRICTIONS: Open to majors only.