



# COURSE DESCRIPTIONS

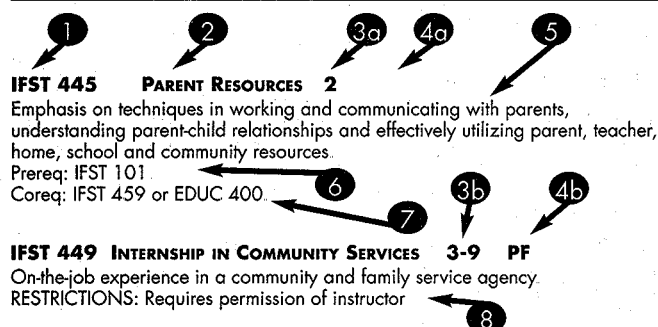
UNIVERSITY OF DELAWARE  
2004-2005



# COURSE DESCRIPTIONS

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2004-2005

## INTERPRETATION OF THE COURSE LISTINGS



1. Subject area and course number.

2. Course title.

3. Credit hours

- When only one number is printed it is a fixed credit hour course.
- 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:

- When blank the course is a letter graded course.
- Course for which the grade is either pass or fail.
- R, RP - Not for baccalaureate credit
- 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 identified 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.

## CODES FOR SUBJECT AREAS

ACCT	Accounting	346
AFSC	Air Force Science	347
AGRI	Agriculture	347
AMCS	American Material Culture Studies	348
ANSC	Animal Science	348
ANTH	Anthropology	350
ARSC	Arts and Sciences	352
ART	Art	352
ARTC	Art Conservation	356
ARTH	Art History	358
ATED	Agricultural and Technology Education	362
BAMS	Black American Studies	362
BISC	Biological Sciences	363
BMBA	Business: Multidisciplinary Business Administration	366
BMSC	Biomechanics and Movement Science	367
BREG	Bioresources Engineering	367
BUAD	Business Administration	367
BUEC	Business and Economics	370
CGSC	Cognitive Science	371
CHEG	Chemical Engineering	372
CHEM	Chemistry and Biochemistry	373
CHIN	Chinese	376
CIEG	Civil and Environmental Engineering	377
CISC	Computer and Information Sciences	381
CMIT	Comparative Literature	386
CNST	Consumer Studies	386
COMM	Communication	388
CPEG	Computer Engineering	391
CRJU	Criminal Justice	392
CSCC	Science and Culture	394
EAMC	Early American Culture	394
ECON	Economics	395
EDLM	Education Library Media	398
EDUC	Education	398
EGTE	Engineering Technology	407
ELEG	Electrical Engineering	409
ENGL	English	412
ENSC	Environmental Science	417
ENWC	Entomology and Wildlife Conservation	417
FINC	Finance	420
FLIT	Foreign Languages and Literatures	421
FOSC	Food Science	422
FREC	Food and Resource Economics	423
FREN	French	425
GEOG	Geography	427
GEOL	Geology	430
GREK	Greek	432
GRAMN	German	432
HEBR	Hebrew	434
HEPP	Human Services, Education and Public Policy	434
HESC	Health and Exercise Sciences	434
HIST	History	440
HLPR	Health Promotion	446
HLTH	Health Studies	446
HRIM	Hotel, Restaurant and Institutional Management	446
HSAD	Health Services Administration	448
IFST	Individual and Family Studies	448
ITAL	Italian	452
JAPN	Japanese	453
JWST	Jewish Studies	454
LATN	Latin	454
LEST	Legal Studies	454
LING	Linguistics	455
MAST	Marine Studies	457
MATH	Mathematics	460
MEDT	Medical Technology	464
MEEG	Mechanical Engineering	465
MLSC	Military Science	469
MSEG	Materials Science	469
MSST	Museum Studies	471
MUED	Music Education	472
MUSC	Music	473
NTDT	Nutrition and Dietetics	479
NIURS	Nursing	481
ORES	Operations Research	485
PHIL	Philosophy	485
PHYS	Physics and Astronomy	487
PHYT	Physical Therapy	489
PLSC	Plant and Soil Sciences	491
PORT	Portuguese	494
POSC	Political Science and International Relations	495
PSYC	Psychology	499
RUSS	Russian	502
SCEN	Science	502
SOCI	Sociology	503
SPAN	Spanish	506
STAT	Statistics	508
THEA	Theatre	510
UAPP	Urban Affairs and Public Policy	513
UNIV	University Course	517
WOMS	Women's Studies	518

## 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.  
RESTRICTIONS: No credit granted for majors within the accounting or business degree programs

**ACCT 207 ACCOUNTING I** 3  
An introduction to financial accounting. Topics: the accounting cycle, merchandise accounting, accounting procedures for cash, receivables, payables, inventories, plant and equipment, stocks and bonds.  
RESTRICTIONS: Not open to freshmen.

**ACCT 208 ACCOUNTING II** 3  
An 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 direct costing.  
PREREQ: ACCT207  
RESTRICTIONS: Not open to freshmen.

**ACCT 261 INTRODUCTION TO BUSINESS INFORMATION SYSTEMS II** 3  
Introduction to management information systems. Programming techniques for problem solving with business productivity tools and software. Emphasis on business applications.  
PREREQ: ACCT160.

**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.  
PREREQ: ACCT208, ACCT160.  
RESTRICTIONS: Requires junior status.

**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.  
PREREQ: ACCT207, ACCT208.  
RESTRICTIONS: Requires junior status.

**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.  
PREREQ: ACCT315.  
RESTRICTIONS: Requires junior status and a grade of C or better in ACCT315.

**ACCT 327 COST ACCOUNTING** 3  
Process, job order and standard costing; direct and absorption costing; budgeting, decentralization, and transfer pricing; and cost analysis for managerial applications.  
PREREQ: ACCT208.  
RESTRICTIONS: Requires junior status.

**ACCT 350 BUSINESS LAW I** 3  
The formation, use and performance of contracts, including both Common Law and the 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.  
PREREQ: ACCT350.

**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.  
RESTRICTIONS: Not open to accounting majors.

**ACCT 366 INDEPENDENT STUDY** 1-6

**ACCT 383 INTRODUCTION TO INTERNATIONAL ACCOUNTING** 3  
Describes the functions of international accounting; foreign currency transactions, financial statement translation, inflation, auditing and taxation. Current issues are covered as appropriate.  
PREREQ: ACCT207

**ACCT 395 SEMINAR: INTERNATIONAL ACCOUNTING** 3  
Seminar on selected topics in international accounting. Combines lectures and visits to local organizations.  
PREREQ: ACCT207.  
RESTRICTIONS: Taught abroad

**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.  
PREREQ: ACCT 316  
RESTRICTIONS: Accounting junior or senior status.

**ACCT 413 INCOME TAX ACCOUNTING** 3  
Analysis of recent revenue acts; use of federal law and regulations to determine tax liability.  
PREREQ: ACCT315  
RESTRICTIONS: Requires junior status and a grade of C or better in ACCT315.

**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.  
PREREQ: ACCT413.

**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.  
PREREQ: ACCT316  
RESTRICTIONS: Requires senior status and a grade of C or better in ACCT316.

**ACCT 417 AUDITING** 3  
An introduction to the standards and procedures underlying contemporary auditing. Topics include ethics, legal liability, internal control, audit evidence, audit reports, statistical sampling, the audit of computerized systems, operational auditing, other engagements and services.  
PREREQ: ACCT316  
RESTRICTIONS: Requires senior status and a grade of C or better in ACCT316

**ACCT 425 STRATEGIC INFORMATION SYSTEMS AND ACCOUNTING** 3  
Explores the role of accounting and information systems in accomplishing the strategic goals of the corporation. Students will be exposed to accounting information from large data bases, enterprise-wide computing environments and cases and projects related to strategic problem solving across functional areas of business.  
PREREQ: ACCT302 and ACCT316.  
RESTRICTIONS: Accounting majors only

**ACCT 466 INDEPENDENT STUDY** 1-6

**ACCT 614 FEDERAL TAX RESEARCH AND PLANNING** 3  
Introduces the master's student to the techniques and tools of technical tax research. Using these developing skills, the student begins exploration of the corporate and partnership taxation area.  
PREREQ: ACCT413 or comparable undergraduate accounting course

**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 & 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, MS: 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; nontaxable transaction; and family tax planning.  
RESTRICTIONS: Not open to students with prior tax courses.

**ACCT 817 ADVANCED AUDITING 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 THE FOUNDATIONS OF THE UNITED STATES AIR FORCE I 1**

Introduces the role in our society of the Department of Defense and Air Force. Emphasis is placed on air force doctrine, mission and organization, as well as U.S. strategic offensive forces. Introduces the concept of professionalism and assesses oral and written communication skills.

**AFSC 111 THE FOUNDATIONS OF THE UNITED STATES AIR FORCE II 1**

Continuation of AFSC110. Emphasis on mission, organization and function of U.S. Air Force strategic, defensive, general purpose and aerospace support forces. Includes understanding the use of army, naval and reserve forces in achieving national security objectives. Assesses oral and written communication skills.

**AFSC 210 THE 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 THE EVOLUTION OF UNITED STATES AIR AND SPACE POWER II 1**

Continuation of AFSC210. Focuses on growth and development of air power since 1945 in response to Korea, the Cold War, Southeast Asia, the Persian Gulf and the Space Age. Also includes peaceful employment of aerospace forces for relief and civic action programs. Assesses oral and written communication skills.

**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 410 NATIONAL SECURITY AFFAIRS I 3**

Focuses on political, economic and social constraints in the international environment and their effects on the formulation of U.S. defense policy. Also includes the impact of technology, doctrine, alliances, arms control and terrorism on national security policy. Emphasizes oral and written communication skills.

**AFSC 411 NATIONAL SECURITY AFFAIRS II 3**

Continuation of AFSC410. Focuses on role and function of the professional officer in a democratic society; the socialization processes, prevailing public attitude and value orientations associated with military service; principal requisites for maintaining national security forces; and the military justice system. Continued emphasis on oral and written communication skills.

**AGRICULTURE**

**AGRI 164 PRACTICAL TEAMWORK EXPERIENCE 1-3**

Examines roles of leaders, strategies for working in teams, and principles of event planning. The final project is the planning and execution of Ag Day, a college-wide community event.  
RESTRICTIONS: Ag Majors only.

**AGRI 165 MASTERING THE FRESHMAN YEAR 1**

Focuses on academic services, career exploration and preparation, campus resources, and practical skills that are helpful in mastering the freshman year.  
RESTRICTIONS: Limited to freshmen in the College of Agriculture and Natural Resources.

**AGRI 211 LITERATURE OF THE AGRICULTURAL AND LIFE SCIENCES 1**

Promotes familiarity with arrangement of the 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 a series of experiences designed to develop skills needed for oral presentations and other forms of public and interpersonal communication.  
RESTRICTIONS: Open to majors only.

## 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 the study of American material culture. Students will develop research projects drawing on the collections of local and regional museums, libraries and historical agencies.  
PREREQ: ANTH216  
RESTRICTIONS: Open to majors only.

**AMCS 464 AMERICAN MATERIAL CULTURE STUDIES INTERNSHIP** 3  
Internship practicum supplementing theoretical and methodological background in administration, collections management, exhibition, research, interpretation, and public programming and services of museums. Students intern at the University Gallery or other acceptable museum, related institution or organization in the United States.  
PREREQ: ANTH216  
RESTRICTIONS: Open to majors only.

## ANIMAL SCIENCE

**ANSC 101 INTRODUCTION TO ANIMAL SCIENCE** 3  
An introduction to the practical nature of animal agriculture. Discusses similarities and differences in the vital life processes and management practices with emphasis on cattle, sheep, swine, horses and poultry.  
COREQ: ANSC111.  
RESTRICTIONS: Corequisite mandatory for majors, optional for nonmajors. Offered in fall only.

**ANSC 111 ANIMAL SCIENCE LABORATORY** 1  
Laboratory providing the opportunity to handle animals and to become familiar with common management practices.  
COREQ: ANSC101.  
RESTRICTIONS: Corequisite mandatory for majors, optional for nonmajors. Offered in fall only.

**ANSC 140 FUNCTIONAL ANATOMY OF DOMESTIC ANIMALS** 4  
Identification of relationship between form and function in domestic farm animals. Comparative examination of body systems in order to better understand the various management practices employed in animal agriculture. Serves as prerequisite for advanced departmental courses.  
RESTRICTIONS: Offered in spring only.

**ANSC 166 SPECIAL PROBLEM** 1-3  
RESTRICTIONS: Contract must have department chair signature. Independent study to involve library or lab research.

**ANSC 220 INTRODUCTION TO EQUINE SCIENCE** 4  
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: ANSC101 or permission of instructor.

**ANSC 251 LIVESTOCK NUTRITION AND FEEDING** 4  
Comparative study of nutrients and their metabolism in animals of agricultural importance, nutrient requirements of animals, nutritional value of food ingredients and the principles of ration formulation. Emphasis on effects of the plane of nutrition on productivity, health and well-being of animals.  
PREREQ: ANSC101 and ANSC140.

**ANSC 262 PRACTICAL VETERINARY EXPERIENCE** 1-3 PF  
Opportunity to gain experience by working with a veterinarian. Student is responsible for making contact with the veterinarian.  
RESTRICTIONS: Not for major credit. Offered in Winter Session only.

**ANSC 265 SOPHOMORE SEMINAR** 1  
Emphasis on career development. Preparation for veterinary medicine and other careers in light of current and future trends in the field.  
RESTRICTIONS: Open only to sophomore animal science majors.

**ANSC 266 SPECIAL PROBLEM** 1-3  
RESTRICTIONS: Contract must have department chair signature. Independent study to involve library or lab research.

**ANSC 270 BIOTECHNOLOGY: SCIENCE AND SOCIOECONOMIC ISSUES** 3  
Introduction to agricultural biotechnology and socio-economic issues. Introduces genetic engineering and the basic scientific theory and the 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 FREC270 and/or PLSC270.

**ANSC 300 PRINCIPLES OF ANIMAL AND PLANT GENETICS** 3  
Introduction to the theory and application of genetics as related to the improvement of plants and animals.  
May be cross-listed with ENWC300 and/or PLSC300  
PREREQ: ANSC101 and ANSC140, or PLSC101

**ANSC 305 FOOD SCIENCE** 3  
See FOSC305 for course description.

**ANSC 310 ANIMAL AND PLANT GENETICS LABORATORY** 1  
Laboratory exercises concerning genetic concepts, methods and applications using various plant and animal systems.  
May be cross-listed with ENWC310 and/or PLSC310  
COREQ: ANSC300.

**ANSC 322 HORSEMANSHIP** 3  
Practical application of principles of equine husbandry, techniques of horsemanship and methods used in selection and evaluation.

**ANSC 328 FOOD CHEMISTRY** 4  
See FOSC328 for course description.

**ANSC 329 FOOD ANALYSIS** 4  
See FOSC329 for course description.  
PREREQ: CHEM214 or CHEM527, and CHEM220

**ANSC 332 INTRODUCTION TO ANIMAL DISEASES** 3  
Nature and mechanisms of disease processes with emphasis on their prevention and control.  
PREREQ: ANSC140.

**ANSC 345 COMPARATIVE PHYSIOLOGY OF DOMESTIC ANIMALS** 4  
Comparative approach to the study of the physiology of domestic animals of economic importance in animal agriculture. Emphasis on cardiovascular physiology, the immune system, excretion, respiration, stress physiology and the control and coordination of body functions via the nervous and endocrine system.  
PREREQ: ANSC140  
RESTRICTIONS: Offered in fall only. Required for prevet and biotech concentrations.

**ANSC 366 INDEPENDENT STUDY** 1-6  
RESTRICTIONS: Contract must have department chair signature. Independent study to involve library or lab research.

**ANSC 399 TEACHING ASSISTANT** 1-2 PF  
Practical teaching experience. Students participate and assist in instruction of an undergraduate course.  
RESTRICTIONS: A GPA of 2.75 (3.0 in major) is required. Students must have taken the course or have equivalent experience.

**ANSC 404 DAIRY PRODUCTION** 4  
Principles of modern dairy production units emphasizing nutrition, reproduction, housing, health, management and lactation.  
PREREQ: ANSC101 and ANSC251.  
RESTRICTIONS: Offered in spring of even-numbered years. Laboratory requires some out of class time for hands-on experience in animal production facilities.

**ANSC 409 FOOD PROCESSING I** 4  
See FOSC409 for course description.

**ANSC 415 VERTEBRATE DEVELOPMENTAL MORPHOLOGY** 3  
See BISC415 for course description.  
PREREQ: BISC207 and BISC208.

- ANSC 417 BEEF CATTLE AND SHEEP PRODUCTION** 4  
Principles of modern beef cattle and sheep production; nutrition, reproduction, housing, health and management.  
PREREQ: ANSC101 and ANSC251  
RESTRICTIONS: Offered in spring of odd-numbered years. Laboratory requires some out-of-class time for hands-on experience in animal production.
- ANSC 418 SWINE PRODUCTION** 4  
Principles of modern swine production: nutrition, reproduction, housing, health and management.  
PREREQ: ANSC101 and ANSC251  
RESTRICTIONS: Offered in spring of even-numbered years. Laboratory requires some out-of-class time for hands-on experience in animal production.
- ANSC 419 TOPICS IN INTERNATIONAL ANIMAL AGRICULTURE** 3-4  
Instruction in animal production taught as apart of a study abroad course. Topics vary with program location and focus  
PREREQ: ANSC 101.
- ANSC 420 EQUINE MANAGEMENT** 4  
History and importance of the horse industry; anatomy, reproduction, physiology, disease and parasites, applied nutrition, marketing, buildings and facilities.  
PREREQ: ANSC140 and ANSC251.
- ANSC 421 POULTRY PRODUCTION** 4  
Application of the 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 436 IMMUNOLOGY OF DOMESTIC ANIMALS** 3  
Comparative study of the immune response of domestic animals including dog, cat, horse, pig, chicken and others. General topics include ontogeny of the immune system, reproductive immunity, neonatal immunity, immunodeficiencies and autoimmunity.  
PREREQ: ANSC332 and BISC207  
RESTRICTIONS: Offered in fall of even-numbered years
- ANSC 438 IMMUNOLOGICAL TECHNIQUES** 1  
Laboratory sessions demonstrating the various types of cellular and humoral immunity in animals and methods of evaluating the immune response.  
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 involves 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 the mammary gland and control of milk composition. Covers mammals of commercial dairy importance as well as rodents, horses and humans.  
PREREQ: ANSC140.
- ANSC 454 RUMINANT NUTRITION** 3  
Practical and applied aspects of ruminant nutrition with an 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 a field related to the 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 the background needed for detailed study of selected topics in animal and plant molecular biology.  
PREREQ: BISC401/411 and ANSC300 or PLSC300 or ENWC300.
- ANSC 615 VERTEBRATE DEVELOPMENTAL BIOLOGY** 3  
See BISC615 for course description.  
PREREQ: BISC401/411 and BISC403/413.  
RESTRICTIONS: Requires approval of instructor.
- ANSC 624 MONOGASTRIC NUTRITION** 3  
Advanced study of the digestion, absorption and metabolism of nutrients in terms of the needs of monogastrics. Application of principles to swine, poultry and equine nutrition.  
May be cross-listed with NTDT624.  
PREREQ: ANSC452 or NTDT400, and CHEM214.  
RESTRICTIONS: Offered in spring of odd-numbered years.
- 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 a result of a disease process.  
PREREQ: ANSC332 or ANSC633  
RESTRICTIONS: Offered in spring of even-numbered years.
- ANSC 633 POULTRY PATHOLOGY** 3  
Study of poultry diseases with emphasis on their causes, prevention, treatment and control.  
PREREQ: ANSC332, ANSC431 and ANSC635.  
RESTRICTIONS: Offered in spring of odd-numbered years.
- ANSC 635 INTRODUCTION TO VIROLOGY** 3  
Biological properties and processes of animal viruses influencing the pathogenesis, diagnosis and control of disease. Laboratory emphasis on standard methods of detecting viral activity  
PREREQ: ANSC431 or BISC300.  
RESTRICTIONS: Offered in fall of odd-numbered years.
- ANSC 636 IMMUNOLOGY OF DOMESTIC ANIMALS** 3  
Comparative study of the immune response of domestic animals including dog, cat, horse, pig, chicken and others. General topics include ontogeny of the 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 the avian immune system covering cellular and humoral immune responses; autoimmunity; neuroendocrine-immune interactions; nutritional effects on the immune system; and immunogenetics.  
RESTRICTIONS: Offered in spring of even-numbered years
- ANSC 638 IMMUNOLOGICAL TECHNIQUES** 1  
Laboratory sessions demonstrating the various types of cellular and humoral immunity in animals and methods of evaluating the immune response  
RESTRICTIONS: Offered in fall of even-numbered years.
- ANSC 639 FOOD MICROBIOLOGY** 4  
See FOSC639 for course description.
- ANSC 644 BIOINFORMATICS** 3  
Examines computer applications to biological sciences with emphasis placed 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 the 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 the background needed for detailed study of selected topics in animal and plant molecular biology  
PREREQ: BISC401/411 and ANSC300 or ENWC300 or PLSC300.

- ANSC 842 AVIAN MICROANATOMY** 3  
Study of avian histology using microscopy. Examines the microscopic structure, cytochemical and functional aspects of cells, tissues and organ systems using domestic fowl as the prototype species. Lectures supplemented with laboratory examination of tissue sections.  
PREREQ: Basic physiology.
- 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 865 SEMINAR** 1
- ANSC 868 RESEARCH** 1-9
- ANSC 869 MASTER'S THESIS** 1-6
- ANSC 874 TOPICS IN MOLECULAR BIOLOGY** 1  
Provides a forum for the discussion of current topics in molecular biology, with critical reading of relevant primary literature.  
May be cross-listed with PLSC874.  
RESTRICTIONS: Requires permission of instructor.
- ANSC 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.
- ANSC 969 DOCTORAL DISSERTATION** 1-12 PF

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## ANTHROPOLOGY

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- ANTH 101 INTRODUCTION TO SOCIAL AND CULTURAL ANTHROPOLOGY** 3  
Major ideas and areas of study in social and cultural anthropology. Use of ethnographic data and film to illustrate the anthropologist's view of societies in their sociocultural and ecological dimensions.
- ANTH 102 INTRODUCTION TO BIOLOGICAL ANTHROPOLOGY** 3  
Genetic basis for human evolution; emergence of racial differences and ongoing human evolution, nonhuman primates and fossil evidence for human evolution.  
RESTRICTIONS: Only one of either ANTH102 or ANTH104 can count for degree credit.
- ANTH 103 INTRODUCTION TO PREHISTORIC ARCHAEOLOGY** 3  
Fundamental concepts and research procedures of archaeology. The history of archaeology, methods of fieldwork and artifact analysis, and theories of human behavior in archaeological research.  
RESTRICTIONS: Only one of either ANTH103 or ANTH104 can count for degree credit.
- ANTH 104 INTRODUCTION TO ARCHAEOLOGY AND BIOLOGICAL ANTHROPOLOGY** 3  
The fossil and archaeological record of human biological and cultural evolution. Emphasis on how archaeological and biological anthropological research are conducted, and how their treatment of data distinguish them as scientific disciplines.  
RESTRICTIONS: Degree credit for ANTH102 or ANTH103 not granted if ANTH104 is taken.
- ANTH 105 INTRODUCTION TO HISTORICAL ARCHAEOLOGY** 3  
Introduces principal ideas, approaches, and research methods in historical archaeology. Presented through a comparative case study of the emergence of the modern world.
- ANTH 202 HUMAN EVOLUTION AND THE FOSSIL RECORD** 3  
A survey of the human fossil record from the origin of the human species to the establishment of agriculture. Includes evolutionary theory, anatomical interpretation and reconstruction of early social behavior.
- ANTH 205 ANTHROPOLOGY AND HUMAN NATURE** 3  
Archaeological, biological and cultural anthropology organized around the theme of human nature.
- ANTH 216 INTRODUCTION TO MATERIAL CULTURE STUDIES** 3  
Introduces students to material culture studies, broadly defined as study of all things people make and all the ways people have altered the physical world. Explores the approaches, concepts, and methods of numerous disciplines that investigate material culture.  
May be cross-listed with AMCS216 and/or HIST216.
- ANTH 222 TECHNOLOGY AND CULTURE** 3  
Primitive and preindustrial technologies. Theoretical issues of innovation, diffusion and adaptation. The relationship between technology and other aspects of culture.
- ANTH 225 PEASANT SOCIETIES** 3  
Comparative study of peasant communities in European, Asian, African and Latin American societies, including case studies of family life, religion and forms of social control and relationships to the ruling classes.
- ANTH 227 AMERICAN CULTURE** 3  
Concepts and methods of cultural anthropology in contemporary America. The culture concept, American social structure, language, values and beliefs.
- ANTH 228 PEOPLES AND CULTURES OF THE SOUTHWEST** 3  
Cultures, institutions and ethnic groups of southwestern United States. Analysis of both prehistoric and historic cultures, continuity and change.
- ANTH 229 INDIANS OF NORTH AMERICA** 3  
An introductory comparative study of Native American cultures as they existed prior to their disruption by European contact. Uses the culture area approach.
- ANTH 230 PEOPLES OF THE WORLD** 3  
Anthropological studies of societies and culture areas throughout the world to illustrate their characteristics and anthropological issues.
- ANTH 239 ARTS AND CRAFTS OF NATIVE NORTH AMERICA** 3  
Anthropological analysis of indigenous technologies, arts, and crafts of native peoples of North America, including textiles, stoneworking, and ceramics.
- ANTH 245 CONTEMPORARY NATIVE AMERICAN CULTURE ISSUES** 3  
An overview of cultural identity issues for Native Americans in the contemporary United States, including how Native Americans view their own cultures and society, perspectives they bring to the Euro-American and native encounters and to persistent denials of their distinctiveness in modern American society.
- ANTH 251 INTRODUCTION TO ETHNIC ARTS** 3  
General survey of the ethnoarts from Africa, the Americas and the Pacific, including sculpture, painting, decoration and their interrelationships with oral literature, music, dance, games and ritual.
- ANTH 255 APPLIED ANTHROPOLOGY** 3  
Anthropology applied to practical problems, including community development, directed change, agrarian reform and urban dislocation, particularly in Third World countries.
- ANTH 259 HUNTING SOCIETIES** 3  
The role of hunting in human evolution, especially as biobehavioral adaptation; the technology and political, social, economic and religious behavior and institutions of a sample of hunting peoples.
- ANTH 261 PEOPLES AND CULTURES OF THE MIDDLE EAST** 3  
Cultures, institutions and ethnic groups of the Middle East. Description and analysis of major cultural traditions and social institutions.  
May be cross-listed with JWST261.
- ANTH 265 HIGH CIVILIZATIONS OF THE AMERICAS** 3  
The origin and development of pre-Columbian civilizations in the Gulf Coast lowlands, Central Mexico, Yucatan peninsula and Andean area.
- ANTH 269 EARLY CIVILIZATIONS OF THE OLD WORLD** 3  
Early civilization in Southeast Asia, the Near East, Egypt, China and India.
- ANTH 275 DELAWARE PREHISTORIC ARCHAEOLOGY** 3  
Overview of the prehistoric life ways of Delaware. Considers the relationships between people and their environments on the Delmarva Peninsula from the first inhabitants at the end of the Ice Age to the arrival of the European colonists.
- ANTH 278 HISTORIC CULTURES OF THE MIDDLE ATLANTIC REGION** 3  
Explores the development of American culture utilizing the Middle Atlantic region - today's states of Delaware, Maryland, New Jersey, Pennsylvania, New York and Virginia - as a microcosm. Takes a comparative and synthetic approach, drawing on the work of scholars in several disciplines.  
May be cross-listed with HIST278.
- ANTH 300 PRIMATOLOGY** 3  
Survey of the nonhuman primates, including their taxonomy and biological characteristics, and the study of their behavior and how it relates to human behavior.
- ANTH 305 THE EVOLUTION OF HUMAN SEX ROLES AND REPRODUCTION** 3  
Survey of the evolution of human reproduction and sex differences. Evidence derived from the 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.  
May be cross-listed with WOMS305.

- ANTH 320 PREHISTORY OF NORTH AMERICA** 3  
Major cultural and social developments of prehistoric humans in North America, from the entrance of the Paleo-Indian to the arrival of the Europeans in the 16th century.
- ANTH 323 PREHISTORY OF SOUTH AMERICA** 3  
Survey of archaeological complexes and chronology, including lower Central America from western Costa Rica to Panama, and South America from the tropical forests to the Andean highlands. Major topics include the domestication of plants and animals and the rise of civilization.
- ANTH 324 OLD WORLD ARCHAEOLOGY** 3  
Survey of world prehistory, excluding the Americans, from the earliest evidence of human activity until the rise of civilizations with particular emphasis on technological, economic and social change.
- ANTH 325 PEOPLES OF EUROPE** 3  
Cultures and subcultures of Europe, with special attention to the rural sectors and their historical development.
- ANTH 328 MAYAN ART AND ARCHITECTURE** 3  
See ARTH338 for course description.  
RESTRICTIONS: Offered abroad only.
- ANTH 330 DEVELOPMENT AND UNDERDEVELOPMENT** 3  
Anthropological perspectives of sociocultural change in Africa, Asia and Latin America. Emphasis on the 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.  
May be cross-listed with BAMS333.
- ANTH 337 SOUTH AMERICAN INDIANS** 3  
Types of Indian cultures in contemporary South America. Cultural traditions and social institutions of Indian communities, especially the 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 the environment, multiculturalism, war, gender, technology and production, and class.
- 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 the developing world, examined in the 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, the elite, the military, the church, students and workers.
- ANTH 379 HISTORICAL ARCHAEOLOGY OF THE EASTERN UNITED STATES** 3  
Surveys the substantive contributions of historical archaeology to the study of the cultural history of eastern North America beginning with the period of initial European contact.  
May be cross-listed with HIST379.
- 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 385 HISTORICAL ARCHAEOLOGY OF AMERICAN BATTLEFIELDS** 3  
Represents the material culture interpretation of selected historical conflicts with an emphasis on the American war sites. Topics vary and include a broad spectrum of social and ethnic groups in battle and the material evidence of armed struggle. Besides the Civil War, interpretation is given from a material culture perspective of the wars of the 20th century as well. The commonality of behavior by individuals subjected to war is emphasized.
- ANTH 390 HONORS COLLOQUIUM** 3  
See ARSC390 for description.  
RESTRICTIONS: Requires a GPA of 3.0 or higher.
- ANTH 401 THE IDEA OF RACE** 3  
The idea of race in historical and anthropological perspective. The interpretation of racial differences in 18th and 19th century Europe and America and an examination of modern approaches to the question of human variability.  
RESTRICTIONS: Requires permission of instructor.
- ANTH 404 HUMAN OSTEOLOGY** 4  
The identification of the human skeleton, including complex and fragmentary materials. Basic bone growth, bone pathology, paleopathology and forensic identification.  
RESTRICTIONS: Requires permission of instructor.
- ANTH 424 INTRODUCTION TO ARCHAEOLOGICAL FIELD METHODS** 6  
Excavation at selected sites; laboratory work and field trips to museum sites.
- ANTH 444 TECHNOLOGY OF CULTURAL MATERIALS: CERAMICS AND GLASS** 3  
See MSST444 for course description.
- ANTH 445 TECHNOLOGY OF CULTURAL MATERIALS: METALS** 3  
See MSST445 for course description.
- ANTH 451 MYTH AND CULTURE** 3  
The relationships between world views, cosmology, mythology and social institutions, illustrating the analytic methods of structuralist and functional anthropology.  
RESTRICTIONS: Requires permission of instructor.
- ANTH 457 SURVEY OF AFRICAN ART** 3  
Major African art styles, their interrelationships, the context of usage and the meanings of African artworks.  
May be cross-listed with ARTH457.
- ANTH 463 HISTORICAL ARCHAEOLOGY AND THE PUBLIC** 3  
Provides practical experience through involvement in a project at an agency, research center or museum which researches, interprets, administers and preserves historical archaeological resources for the public. For students planning careers in historical archaeology, public history, university teaching, the museum field and historic preservation.  
May be cross-listed with HIST463.
- ANTH 466 INDEPENDENT STUDY** 1-6
- ANTH 475 THE TEACHING OF ANTHROPOLOGY** 3  
Emphasis on the structure and coherence of the discipline - identifying central questions and assembling relevant data - as seen from the perspective of an anthropologist offering an introductory-level survey course.  
PREREQ: 15 hours of anthropology  
RESTRICTIONS: Requires permission of instructor teaching the introductory course. Tutorial and primarily for majors.
- ANTH 486 TUTORIAL IN SOCIAL AND CULTURAL ANTHROPOLOGY** 3  
History, theory and method in the field of social and cultural anthropology.  
RESTRICTIONS: Open to majors only. Requires permission of instructor.
- ANTH 487 TUTORIAL IN ARCHAEOLOGY** 3  
History, theory and method in the field of archaeology.  
RESTRICTIONS: Open to majors only. Requires permission of instructor.
- ANTH 488 TUTORIAL IN PHYSICAL ANTHROPOLOGY** 3  
History, theory and method in the field of physical anthropology.  
RESTRICTIONS: Open to majors only. Requires permission of instructor.
- ANTH 604 HUMAN OSTEOLOGY** 4  
The identification of the human skeleton, including complex and fragmentary materials. Basic bone growth, bone pathology, paleopathology and forensic identification.  
RESTRICTIONS: Requires permission of instructor.
- ANTH 644 TECHNOLOGY OF CULTURAL MATERIALS: CERAMICS AND GLASS** 3  
See MSST644 for course description.
- ANTH 645 TECHNOLOGY OF CULTURAL MATERIALS: METALS** 3  
See MSST645 for course description.
- ANTH 657 SURVEY OF AFRICAN ART** 3  
Major African art styles, their interrelationships, the context of usage and the meanings of African artworks.  
May be cross-listed with ARTH657.

**ANTH 663 HISTORICAL ARCHEOLOGY AND THE PUBLIC** 3  
Provides practical experience through involvement in a project at an agency, research center or museum which researches, interprets, administers and preserves historical archaeological resources for the public. For students planning careers in historical archaeology, public history, university teaching, the museum field and historic preservation  
May be cross-listed with HIST663.

## ARTS AND SCIENCES

**ARSC 136 TOPICS: EAST ASIA IN FILM** 1  
Explores East Asian cinema and society via readings, discussion and viewing of films by and/or about East Asians. Topics vary.  
May be cross-listed with HIST136.  
RESTRICTIONS: May be repeated for credit when topics vary

**ARSC 293 HONORS FORUM** 1  
Topics vary.  
RESTRICTIONS: May be repeated for credit when topics vary.

**ARSC 295 HONORS ARTS FORUM** 1  
Attendance at, and critical appreciation of, performing arts events and visual arts events.  
RESTRICTIONS: May be repeated for credit when topics vary.

**ARSC 296 HONORS FORUM: MULTICULTURAL** 1  
Recent topics include Passing the Torch: An Interdisciplinary Look at a World Poised for Change; Living in History; Representations of Race, Class and Gender in the Media; Sexual Identity in Contemporary Culture.  
RESTRICTIONS: May be repeated for credit when topics vary.

**ARSC 316 PEER TUTORING/ADVANCED COMPOSITION** 3  
Course trains a selected group of upper-division students in writing techniques by applying recent composition theories to students' own writing. Will explore and evaluate fundamental theories of teaching writing.  
May be cross-listed with ENGL316.

**ARSC 366 INDEPENDENT STUDY** 1-6

**ARSC 390 HONORS COLLOQUIUM** 3  
First year interdisciplinary Honors seminar. May be team-taught, specific topics vary.

**ARSC 392 HONORS COLLOQUIUM: MULTICULTURAL** 3  
First year interdisciplinary Honors seminar. May be team-taught, specific topics vary.

**ARSC 466 INDEPENDENT STUDY** 1-6

**ARSC 869 MASTER'S THESIS** 1-6

## ART

**ART 110 FOUNDATION DRAWING I** 3  
Basic elements of visual thinking through the manipulation of various drawing media, including pencil, charcoal, ink wash and pastel; and techniques, including contour and gesture drawing. Emphasis on perspective, line, form and spatial relationships through observation.  
COREQ: ART111 or ART113

**ART 111 FOUNDATION 2D DESIGN** 3  
Development of craftsmanship, use of media and techniques for the application of two dimensional design principles. Study includes point, line, plane and volume to indicate form and the exploration of the effect of value, saturation and hue in the perception of color.  
COREQ: ART110 or ART112.

**ART 112 FOUNDATION DRAWING II** 3  
Continuation of work in tonality and exploration of drawing media in both black and white and color. Problems include both representation and abstraction.  
PREREQ: ART110.  
COREQ: ART111 or ART113

**ART 113 FOUNDATION 3D DESIGN** 3  
Introduction to shaping space dynamically using various working styles and artistic research. Assignments stress integration of expressive content in the following: 3D elements and organizing principles, scale and impact, personal and physical interaction, form and function, methods/materials and craftsmanship of construction.  
COREQ: ART110 or ART112.

**ART 114 FOUNDATION COLLOQUIUM** 0 PF  
A weekly forum for the discussion of issues common to beginning level art students concurrently enrolled in foundation art courses. Presentations will include overviews of disciplines within the Art Department and examinations of professional art practices.  
COREQ: ART110, 111, 112 or 113.

**ART 115 FOUNDATION COLLOQUIUM** 0 PF  
A weekly forum for the discussion of issues common to beginning level art students concurrently enrolled in foundation art courses. Presentations will include overviews of disciplines within the Art Department and examinations of professional art practices.  
COREQ: ART110, 111, 112 or 113.

**ART 129 DESIGN IN VISUAL ARTS** 3  
Introduction to design through the physical application of various art media, including charcoal, pencil, ink wash and paint. Study of design criteria and artistic objectives as they relate to the environment.  
RESTRICTIONS: Open to nonmajors and nonminors only

**ART 130 DRAWING I: TOOLS AND TECHNIQUES** 3  
Projects involving black and white and color studies in a 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 the human head in a 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 a 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  
An introduction to communicating visually through conceptual thinking in the visual design process with the use of typography, imagery and layout, and an introduction to computer page layout and imaging.  
COREQ: ART210.  
RESTRICTIONS: Requires permission of instructor.

**ART 201 VISUAL COMMUNICATIONS PROCESS II** 3  
Continuation of the introduction to communicating visually through conceptual thinking in the visual design process and the 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.  
PREREQ: ART210  
COREQ: ART201  
RESTRICTIONS: Requires permission of instructor.

**ART 230 FIGURE DRAWING** 3  
Drawing the human figure with emphasis on structure, proportion, volume and anatomy. Various drawing media explored  
PREREQ: ART112.

**ART 231 BEGINNING PAINTING** 3  
An exploration of color theory as related to oil painting and an examination of both traditional and experimental painting methods as a means for providing students a foundation for discovering their unique potential for self expression.

- ART 241 BEGINNING LITHOGRAPHY** 3  
Introduction to basic lithographic processes including stone and plate lithography.
- ART 243 INTRODUCTION TO PRINTMAKING** 3  
Introduction to a variety of print techniques including silkscreen, lithography, etching, woodcut and monoprinting and to the development of multiple and one-of-a-kind images.
- ART 244 DIGITAL PRINTMAKING** 3  
Use of the computer is investigated as a tool for imagemaking by scanning, originating and manipulating digital imagery, both photographic and hand drawn. Exploration of contemporary and traditional printmaking techniques are used to produce printed editions of created digital images.
- ART 246 BEGINNING SCREENPRINTING** 3  
Introduction to basic water-based screenprinting including blockout, drawing fluid, crayon resist and photo emulsion techniques.
- ART 250 BEGINNING SCULPTURE** 3  
Introduction to basic tools, processes and safety employed in the creation of sculptural ideas. Past and current concepts are 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 the sculpture building viewing space. Individual expression is encouraged.
- ART 274 COMMON THREADS: MULTICULTURAL SURVEY OF FIBER 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 off-loom techniques will probe both process and content.
- ART 280 BEGINNING PHOTOGRAPHY** 3  
Introduction to the tools, techniques, processes and aesthetics of black and white photography.
- ART 290 BEGINNING CERAMICS** 3  
Introduction to the tools, processes and aesthetics of ceramics.
- ART 302 GRAPHIC DESIGN I** 3  
Exploration of visual systems; conceptual principles and procedures underlying the practice of graphic design. In particular the process of problem solving through visual design; the visualization of problems and solutions; and the 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 the medium and message of design through the integration of typography and images.  
PREREQ: ART302  
COREQ: ART305.
- ART 304 ADVERTISING DESIGN I** 3  
Introduction to the design of advertising, emphasizing the responsibilities of the 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 the principles of concept and design to more complex advertising problems. Development of basic presentation and communication skills as well as the analysis and implementation of creative strategies.  
PREREQ: ART304.  
COREQ: ART303.
- ART 306 TELEVISION COMMERCIALS TO MTV** 3  
An introduction multimedia course involving the 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 a complete object that integrates content and form through narratives and/or sequential picture planes. Emphasis on elements of design and the principles of book planning and production.
- ART 310 APPLIED PHOTOGRAPHY** 3  
The 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  
The development of conceptual and technical skills emphasizing photographic applications in an editorial context. Projects include a wide variety of subjects along with the manipulation of images through the 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 a global awareness of the applied design field students will 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 a 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.  
PREREQ: Requires permission of instructor.  
COREQ: ART318.
- 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 the context of modern and contemporary works. Emphasis on the role of professional quality studio practices in realizing student painting goals.  
PREREQ: ART231.
- ART 332 INTERMEDIATE PAINTING II** 3  
Continuation of the investigations established in ART 331 with emphasis on the individual student's development of ideas and techniques through studio practice, fieldtrips and the research of contemporary art.  
PREREQ: ART331.
- ART 333 FIGURE STUDIO** 3  
Advanced conceptual and technical issues in depicting the human figure. Topics include figurative descriptions through the exploration of a wide range of media with special emphasis on color and related concerns.  
PREREQ: ART230 and ART231.
- ART 334 INTERMEDIATE PAINTING: THE FIGURE** 3  
A technical and conceptual guide to interpreting the human figure in oils, with an emphasis on the use of the figure as a 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 will be investigated.  
PREREQ: ART110, ART111
- ART 341 ETCHING** 3  
Introduction to etching and intaglio printing processes including drypoint, line etching, soft ground, liftground, aquatint techniques and non-toxic photo etching.  
PREREQ: ART110, 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 the computer as a tool for imagemaking by scanning, creating and manipulating digital images, both photographic and hand drawn. Exploration of contemporary and traditional printmaking techniques are 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 are guided in seeking choices of media and types of artistic expressions that best suit each individual. Researching modes of contemporary sculptural expression is required.  
PREREQ: ART250
- ART 351 INTERMEDIATE SCULPTURE II** 3  
At this intermediate level, less emphasis is given to tools and techniques, and more attention is given to the student's search for personal artistic expression. Participation in student and local exhibitions is expected. For those interested in a concentration in sculpture, time will be given to portfolio preparation. Research into sculpture is intensified.  
PREREQ: ART350
- ART 366 INDEPENDENT STUDY** 1-6
- ART 380 INTERMEDIATE PHOTOGRAPHY: BLACK AND WHITE** 3  
Use of the 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 will create, alter and manipulate images.  
PREREQ: ART280  
RESTRICTIONS: Ability to work independently.
- ART 383 PHOTOGRAPHIC FACILITIES MANAGEMENT** 3  
First-hand experience of operating and maintaining a 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 the technical properties of clay and glazes.  
PREREQ: ART390
- ART 402 ADVANCED APPLIED DESIGN I** 3  
Mastering the 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 the production of a portfolio which accurately and effectively defines the 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 the 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 the production of a portfolio which accurately and effectively defines the 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 an advertising agency, design studio, illustration studio, or commercial photography studio in the 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 a portfolio that accurately and effectively defines the 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 a portfolio that accurately and effectively defines the student's conceptual and practical skills in applied photography or illustration.  
PREREQ: ART413  
COREQ: ART414  
RESTRICTIONS: Requires permission of instructor.
- ART 416 PROFESSIONAL PRACTICES** 3  
Students who plan to work and exhibit in a fine arts studio discipline will learn how to prepare for a professional career. Topics include making application to galleries, residencies and graduate school; grant writing; tax issues; taking slides; etc.  
RESTRICTIONS: BFA seniors only.
- ART 417 BFA EXHIBITION** 0 PF  
The concluding exhibition required of all Bachelor of Fine Arts candidates and usually held during the final semester of undergraduate study.  
RESTRICTIONS: BFA seniors only.



- ART 418 FINE ARTS INTERNSHIP** 3  
Field experience related to a current fine art discipline offered in the Art Department through a hands on involvement at an 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 will be determined by each student as an 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 shedding undue influences in painting in favor of evolving a 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  
The execution of a mature body of work. Emphasis placed on distilling individual painting ideas down to their essence through a 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 ART 246, 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 the student in finding the best materials and means of personal expression in sculpture and the relationship of differing fields of artistic expression. An increasing emphasis on involvement in the sculpture profession.  
PREREQ: ART351  
RESTRICTIONS: May be repeated up to nine credit hours
- ART 451 ADVANCED SCULPTURE** 3  
At this level, students are expected to have put together a solid body of work with a clear direction. Advanced studio work is based on agreements between the student and the instructor regarding content and quality of work requirements. Each student receives personal instruction and attention in what is planned to become the 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 the course for repeating credit will be engaged in the development of a professional photography portfolio along with the other course requirements  
PREREQ: ART381  
RESTRICTIONS: May be repeated up to nine credit hours
- ART 483 PORTFOLIO & EXHIBITION TECHNIQUE** 3  
Emphasis on professional methods involved in presenting a portfolio for publication or exhibition. Organization, editing and sequencing, as well as attitudes and strategies form the 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, make multiple images and explore other creative techniques.  
PREREQ: ART380  
RESTRICTIONS: Previous photographic experience. May be repeated up to nine credit hours.
- ART 487 LOCATION PHOTOGRAPHY** 3  
A series of interrelated projects and assigned topics on location to develop the visual and technical skills of on site photography. The location and environment may vary. Winter and/or summer session offering  
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 APPLIED DESIGN TUTORIAL** 3  
Studio experience for students whose principal mode of artistic expression and prior studies are in disciplines other than applied design, or where previous applied design work has been with a subject that is substantially different from what is now being studied.  
RESTRICTIONS: May be repeated up to twelve credit hours
- ART 601 APPLIED PHOTOGRAPHY TUTORIAL** 3  
Studio experience for those students whose principal mode of artistic expression and prior studies are primarily in disciplines other than applied photography or where the work in applied photography has been with an aspect of the medium that is substantially different from what is now being studied  
RESTRICTIONS: May be repeated up to twelve credit hours
- ART 602 DRAWING TUTORIAL** 3  
Studio experience for those students whose principal mode of artistic expression and prior studies are primarily in disciplines other than drawing or where the work in drawing has been with an aspect of the medium that is substantially different from what is now being studied  
RESTRICTIONS: May be repeated up to twelve credit hours
- ART 603 PAINTING TUTORIAL** 3  
Studio experience for those students whose principal mode of artistic expression and prior studies are primarily in disciplines other than painting or where the work in painting has been with an aspect of the medium that is substantially different from what is now being studied  
RESTRICTIONS: May be repeated up to twelve credit hours
- ART 604 PRINTMAKING TUTORIAL** 3  
Studio experience for those students whose principal mode of artistic expression and prior studies are primarily in disciplines other than printmaking or where the work in printmaking has been with an aspect of the medium that is substantially different from what is now being studied  
RESTRICTIONS: May be repeated up to twelve credit hours
- ART 605 SCULPTURE TUTORIAL** 3  
Studio experience for those students whose principal mode of artistic expression and prior studies are primarily in disciplines other than sculpture or where the work in sculpture has been with an aspect of the medium that is substantially different from what is now being studied  
RESTRICTIONS: May be repeated up to twelve credit hours

<b>ART 608</b>	<b>PHOTOGRAPHY TUTORIAL</b>	<b>3</b>	Studio experience for those students whose principal mode of artistic expression and prior studies are primarily in disciplines other than photography or where the work in photography has been with an aspect of the medium that is substantially different from what is now being studied. RESTRICTIONS: May be repeated up to twelve hours
<b>ART 609</b>	<b>CERAMICS TUTORIAL</b>	<b>3</b>	Studio experience for those students whose principal mode of artistic expression and prior studies are primarily in disciplines other than ceramics or where the work in ceramics has been with an aspect of the medium that is substantially different from what is now being studied. RESTRICTIONS: May be repeated up to twelve hours
<b>ART 610</b>	<b>ADVANCED APPLIED PHOTOGRAPHY</b>	<b>3</b>	Emphasis on the development of a portfolio and the understanding of the role of the applied photographer. Includes introduction to large format techniques and equipment and the professional studio. PREREQ: ART411. RESTRICTIONS: May be repeated up to twelve credit hours.
<b>ART 611</b>	<b>ADVANCED APPLIED PHOTOGRAPHY</b>	<b>3</b>	Continuation of ART610 directed toward the production of a portfolio which accurately and effectively defines the student's conceptual and practical capabilities in applied photography situations. PREREQ: ART411. RESTRICTIONS: May be repeated up to twelve credit hours.
<b>ART 630</b>	<b>DRAWING STUDIO</b>	<b>3</b>	Works on paper using traditional and non-traditional media. The nature of work is an extension of student's creative direction. RESTRICTIONS: May be repeated up to six credit hours
<b>ART 632</b>	<b>PAINTING</b>	<b>3-6</b>	Advanced problems in the media and aesthetics of painting. RESTRICTIONS: May be repeated up to eighteen credit hours.
<b>ART 633</b>	<b>PAINTING STUDIO</b>	<b>3-6</b>	Advanced studio work based on agreement between student and instructor as to content and quantity of work required. RESTRICTIONS: May be repeated up to eighteen credit hours
<b>ART 640</b>	<b>PRINTMAKING STUDIO</b>	<b>3-6</b>	Advanced studio work based on agreement between student and instructor as to content and quantity of work required. RESTRICTIONS: May be repeated up to eighteen credit hours.
<b>ART 641</b>	<b>PRINTMAKING</b>	<b>3-6</b>	Provides independent work in a chosen print area. Course requirements will be determined by agreement of the student and the teacher. RESTRICTIONS: May be repeated up to eighteen credit hours.
<b>ART 650</b>	<b>SCULPTURE STUDIO</b>	<b>3-6</b>	Concentrates on professional studio practices and the creation of individual sculptural expressions. Advanced studio work is based on agreement with the instructor regarding content and quality of work. RESTRICTIONS: May be repeated up to eighteen credit hours.
<b>ART 651</b>	<b>SCULPTURE</b>	<b>3-6</b>	Advanced level course focusing on becoming professionals. Beyond the studio and the creation of artistic expression, the student artist learns ways voices can be heard. Focuses on all the peripherals involved in the profession of sculpture. RESTRICTIONS: May be repeated up to eighteen credit hours
<b>ART 677</b>	<b>SEMINAR: THE BUSINESS OF ART</b>	<b>3</b>	Examination of some of the practical aspects of being a practicing studio artist, including promotion, copyrighting artwork, art related tax and business law, building a reputation, pricing of art works, and grant writing.
<b>ART 678</b>	<b>SEMINAR: STUDIO INSTRUCTION PRACTICUM</b>	<b>3</b>	Planning, instruction and evaluation of art disciplines at the college or equivalent level. RESTRICTIONS: Requires permission of instructor. May be repeated up to nine credit hours.
<b>ART 679</b>	<b>SEMINAR: ISSUES IN CONTEMPORARY ART</b>	<b>3</b>	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.
<b>ART 681</b>	<b>MATERIALS AND TECHNIQUES OF THE CONTEMPORARY PAINTER AND DRAFTSMAN</b>	<b>3</b>	See MSST681 for course description.
<b>ART 682</b>	<b>STUDIO IN THE MATERIALS AND TECHNIQUES OF DRAWING IN THE WEST</b>	<b>3</b>	See MSST680 for course description.
<b>ART 683</b>	<b>PHOTOGRAPHY</b>	<b>3-6</b>	Individual problems in still photography applied to art education, fine arts, or applied design. RESTRICTIONS: May be repeated up to eighteen credit hours
<b>ART 684</b>	<b>PHOTOGRAPHY STUDIO</b>	<b>3-6</b>	Advanced studio work based on agreement between student and instructor as to content and quantity of work required. RESTRICTIONS: May be repeated up to eighteen credit hours.
<b>ART 685</b>	<b>COLOR MIXING AND MATCHING</b>	<b>3</b>	See MSST685 for course description.
<b>ART 686</b>	<b>ELECTRONIC IMAGING</b>	<b>3</b>	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.
<b>ART 688</b>	<b>STUDIO MATERIALS AND TECHNIQUES OF PAINTING I</b>	<b>3</b>	See MSST688 for course description.
<b>ART 689</b>	<b>STUDIO MATERIALS AND TECHNIQUES OF PAINTING II</b>	<b>3</b>	See MSST689 for course description.
<b>ART 690</b>	<b>STUDIO IN THE MATERIALS AND TECHNIQUES OF PRINTMAKING I</b>	<b>3</b>	See MSST690 for course description.
<b>ART 691</b>	<b>CERAMICS</b>	<b>3-6</b>	Problems in throwing, glazing and firing techniques. RESTRICTIONS: May be repeated up to eighteen credit hours.
<b>ART 692</b>	<b>CERAMICS STUDIO</b>	<b>3-6</b>	Advanced studio work based on agreement between student and instructor as to content and quantity of work required. RESTRICTIONS: May be repeated up to eighteen credit hours
<b>ART 698</b>	<b>MFA EXHIBITION</b>	<b>3</b>	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
<b>ART 699</b>	<b>MFA SUPPORTING PAPER</b>	<b>3</b>	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.
<b>ART 868</b>	<b>RESEARCH</b>	<b>1-12</b>	

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**ART CONSERVATION**


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<b>ARTC 301</b>	<b>CARE AND PRESERVATION OF CULTURAL PROPERTY I</b>	<b>3</b>	Examines philosophy, ethics, practice of art conservation and the issues pertaining to collections management of cultural property. Typical deterioration characteristics and preservation alternatives for a variety of materials including photographs, works of art on paper, archival and library materials, and magnetic media will be presented and discussed.
<b>ARTC 302</b>	<b>CARE AND PRESERVATION OF CULTURAL PROPERTY II</b>	<b>3</b>	Examines the philosophy, ethics, approach and practice of art conservation with primary emphasis on easel paintings and a secondary emphasis on textiles, objects, furniture and conservation science. Deterioration mechanisms, care and conservation treatment issues are covered. PREREQ: ARTC301
<b>ARTC 444</b>	<b>TECHNOLOGY OF CULTURAL MATERIALS: CERAMICS AND GLASS</b>	<b>3</b>	See MSST444 for course description.
<b>ARTC 445</b>	<b>TECHNOLOGY OF CULTURAL MATERIALS: METALS</b>	<b>3</b>	See MSST445 for course description.
<b>ARTC 464</b>	<b>CONSERVATION INTERNSHIP</b>	<b>3</b>	
<b>ARTC 466</b>	<b>INDEPENDENT STUDY</b>	<b>1-6</b>	

<b>ARTC 480</b>	<b>STUDIO IN THE MATERIALS AND TECHNIQUES OF DRAWING IN THE WEST</b>	<b>3</b>	
See MSST480 for course description.			
<b>ARTC 481</b>	<b>SEMINAR IN MATERIALS AND TECHNIQUES OF THE CONTEMPORARY PAINTER AND DRAFTSMAN</b>	<b>3</b>	
Twentieth century artists' materials. Topics: acrylic emulsion, acrylic solution, alkyd resin, and PVA paints; collage-assemblage; solvent-photo transfer; synthetic fiber canvas, paper, panels, oil pastels, paint 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.			
<b>ARTC 485</b>	<b>COLOR MIXING AND MATCHING</b>	<b>3</b>	
See MSST485 for course description.			
<b>ARTC 488</b>	<b>STUDIO MATERIALS AND TECHNIQUES OF PAINTING I</b>	<b>3</b>	
See MSST488 for course description.			
<b>ARTC 489</b>	<b>STUDIO MATERIALS AND TECHNIQUES OF PAINTING II</b>	<b>3</b>	
See MSST489 for course description.			
<b>ARTC 490</b>	<b>STUDIO IN THE MATERIALS AND TECHNIQUES OF PRINTMAKING I</b>	<b>3</b>	
See MSST490 for course description. RESTRICTIONS: Requires permission of instructor.			
<b>ARTC 615</b>	<b>PROPERTIES AND STRUCTURE OF ART MATERIALS I</b>	<b>3</b>	
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.			
<b>ARTC 616</b>	<b>CONSERVATION RESEARCH METHODS</b>	<b>3</b>	
Introduction to the 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.			
<b>ARTC 617</b>	<b>ANALYSIS OF PAINTED SURFACES</b>	<b>3</b>	
Introduction to the analysis and technology of painted and varnished surfaces using reflected, visible and ultraviolet light microscopy techniques. Lectures and lab work include a review of traditional coating materials, color measurement and matching, and analysis and interpretation of cast cross-sections of paint and varnish stratigraphies.			
<b>ARTC 618</b>	<b>CONSERVATION CLEANING METHODS</b>	<b>3</b>	
Introduction to techniques for controlled removal of overpaints, varnishes, and grime from paintings and decorative and architectural objects. Cross-section microscopy techniques are used. Lectures and lab work include discussion of solvent and water-based cleaning systems, use of enzymes and chelating agents, and mixing and testing of customized cleaning materials.			
<b>ARTC 644</b>	<b>TECHNOLOGY OF CULTURAL MATERIALS: CERAMICS AND GLASS</b>	<b>3</b>	
See MSST644 for course description.			
<b>ARTC 645</b>	<b>TECHNOLOGY OF CULTURAL MATERIALS: METALS</b>	<b>3</b>	
See MSST645 for course description.			
<b>ARTC 650</b>	<b>SEMINAR IN ART CONSERVATION</b>	<b>1</b>	
Oral reports on current work in the fields of art conservation, art history, ethics, philosophy and museum science. PREREQ: ARTC655. RESTRICTIONS: Full-time fellowship students only.			
<b>ARTC 654</b>	<b>EXAMINATION AND TREATMENT OF ART OBJECTS I</b>	<b>1-3</b>	
Application of scientific and art historical techniques to the examination, treatment and preservation of works of art on paper, library materials, photographs, textiles, paintings, joined wooden objects, and decorative, ethnographic, and archaeological objects, under the supervision of conservation faculty. RESTRICTIONS: Full-time fellowship students only.			
<b>ARTC 655</b>	<b>EXAMINATION AND TREATMENT OF ART OBJECTS II</b>	<b>1-3</b>	
Application of scientific and art historical techniques to the examination, treatment and preservation of works of art on paper, library materials, photographs, textiles, paintings, joined wooden objects, and decorative, ethnographic and archeological objects under the supervision of conservation faculty. PREREQ: ARTC654. RESTRICTIONS: Full-time fellowship students only.			
<b>ARTC 658</b>	<b>TOPICS IN ADVANCED APPRENTICESHIP AND RESEARCH IN CONSERVATION I</b>	<b>6</b>	
Discussion, demonstration, practice and research relating to the examination, analysis, treatment, and collections care of cultural property including works of art on paper, library materials, photographs, textiles, paintings, joined wooded objects, and decorative, ethnographic, and archeological materials. Requirements for this course may be fulfilled by work in cooperating institutions outside the Winterthur Museum. PREREQ: ARTC654 and ARTC655. RESTRICTIONS: Full-time fellowship students only.			
<b>ARTC 659</b>	<b>TOPICS: ADVANCED APPRENTICESHIP AND RESEARCH IN ART CONSERVATION II</b>	<b>6</b>	
Discussion, demonstration, practice, and research relating to the examination, analysis, treatment, and collections care of cultural property including works of art on paper, library materials, photographs, textiles, paintings, joined wooden objects, and decorative, ethnographic, and archeological materials. Requirement for this course may be fulfilled by work in institutions outside the Winterthur Museum. PREREQ: ARTC655 and ARTC658. RESTRICTIONS: Full-time fellowship students only.			
<b>ARTC 666</b>	<b>INDEPENDENT STUDY</b>	<b>1-12</b>	
<b>ARTC 670</b>	<b>CHEMICAL AND PHYSICAL TECHNIQUES USED IN THE EXAMINATION OF ART MATERIALS I</b>	<b>3</b>	
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.			
<b>ARTC 671</b>	<b>CHEMICAL AND PHYSICAL TECHNIQUES USED IN THE EXAMINATION OF ART MATERIALS II</b>	<b>3</b>	
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.			
<b>ARTC 672</b>	<b>CHEMICAL AND PHYSICAL TECHNIQUES USED IN THE EXAMINATION OF ART MATERIALS III</b>	<b>3</b>	
Classroom discussion and laboratory application of more sophisticated analytical and physical techniques used by the 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.			
<b>ARTC 673</b>	<b>CHEMICAL AND PHYSICAL TECHNIQUES USED IN THE EXAMINATION OF ART MATERIALS IV</b>	<b>3</b>	
Independent research project focusing on the analytical and physical techniques used by the scientist to characterize art materials. PREREQ: ARTC670, ARTC671 and ARTC672. RESTRICTIONS: Full-time fellowship students only.			
<b>ARTC 680</b>	<b>STUDIO IN THE MATERIALS AND TECHNIQUES OF DRAWING IN THE WEST</b>	<b>3</b>	
See MSST680 for course description.			
<b>ARTC 681</b>	<b>MATERIALS AND TECHNIQUES OF THE CONTEMPORARY PAINTER AND DRAFTSMAN</b>	<b>3</b>	
See MSST681 for course description.			
<b>ARTC 685</b>	<b>COLOR MIXING AND MATCHING</b>	<b>3</b>	
See MSST681 for course description.			
<b>ARTC 688</b>	<b>STUDIO MATERIALS AND TECHNIQUES OF PAINTING I</b>	<b>3</b>	
See MSST688 for course description.			
<b>ARTC 689</b>	<b>STUDIO MATERIALS AND TECHNIQUES OF PAINTING II</b>	<b>3</b>	
See MSST689 for course description.			
<b>ARTC 690</b>	<b>STUDIO IN THE MATERIALS AND TECHNIQUES OF PRINTMAKING I</b>	<b>3</b>	
See MSST690 for course description.			
<b>ARTC 870</b>	<b>INTERNSHIP IN CONSERVATION</b>	<b>1-9</b>	
A third year of study at an accredited institution working with a master conservator in the student's field of interest. PREREQ: ARTC869. RESTRICTIONS: Full-time fellowship students only. May be repeated for up to eighteen credits when topics vary.			

**ARTC 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.

**ARTC 969 DOCTORAL DISSERTATION 1-12 PF****ART HISTORY****ARTH 101 VISUAL CULTURE 3**

Explores the ways we make, perceive and experience images and artifacts. Students will 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 the 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**

An introduction to the study of mythical and religious images, types, attributes and symbols on a comparative basis from many ages throughout the world. Includes archetypal images, such as the Great Mother, the Great Father, the hero, images with supernatural powers and satirical images.

**ARTH 152 DESIGN AND EXPRESSION IN THE VISUAL ARTS 3**

An introduction to visual analysis of painting, sculpture and architecture. Principles of two- and three-dimensional design, spatial composition, color and technical methods used by artists to create emotional and aesthetic effects. Examples chosen from a variety of periods and places.

**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 the Renaissance to the present studied in historical and cultural context. RESTRICTIONS: Usually offered in spring semester.

**ARTH 155 ASIAN ART 3**

Introduction to the artistic traditions of China, Japan, India, Korea and Southeast Asia. Emphasis on historical, religious and social context. Focuses on the arts of Buddhism; also considers Hindu, Confucian, Taoist and other localized religious and cultural influences on the visual arts.

**ARTH 156 ROME: FROM CAESAR TO FELLINI 3**

Investigates Rome from antiquity to the twentieth century focusing on art and architecture, archaeology, film, literature, urban planning, law, social history, religion, and politics.

**ARTH 161 ART IN EAST AND WEST 3**

Similarities and differences between works of art typical of Asian and Western traditions and examination of their points of contact, emphasizing such themes as nature, humanity and the divine, world of the ruler, religious art and private art.

**ARTH 162 HISTORY OF ARCHITECTURE 3**

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

**ARTH 166 SPECIAL PROBLEM 1-3****ARTH 204 ART, POWER AND ARCHITECTURE IN AFRICA 3**

Explores several African communities including Bamileke, Yoruba, Shona, Edo, Fon, Kuba and Hasua-Fulani (located among others in Nigeria, Zimbabwe, Benin, Congo). Reveals the 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, 19th Century Mande, 17th century Ethiopia, 15th century Edo, 19th Century Yoruba, Nubian Egypt and the pre-pharaonic Northeast. Lectures thematize art against a backdrop of politics, religions, sensuality and architecture.

**ARTH 207 ART OF ANCIENT EGYPT AND THE NEAR EAST 3**

Survey of the art and architecture of ancient Egypt and Near East. Emphasis on the relationship of art to religion, politics and ritual. Topics include Egyptian pyramids and the after-life, images of kings and the art of propaganda and art in the service of religion.

**ARTH 208 GREEK AND ROMAN ART 3**

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

**ARTH 209 EARLY MEDIEVAL ART: 200-1000 AD 3**

Painting, sculpture and architecture in Europe and the Near East. Surveys the 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 the Christian world, treating later Byzantine, Romanesque and Gothic artistic traditions in their historical and cultural contexts. Development of a distinctively European art and society.

**ARTH 213 ART OF THE NORTHERN RENAISSANCE 3**

Covers late medieval devotional images to the art of the early modern cities (1400-1570), especially in the 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 the 14th and 15th centuries. Special emphasis on the founders of the 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 the 16th century. Emphasis on such artists as Leonardo da Vinci, Raphael, Michelangelo, Bramante, Titian, Tintoretto and El Greco. Also treats the spread of Italian style to France and Spain.

**ARTH 220 ITALIAN RENAISSANCE ARCHITECTURE 3**

Italian architecture and cities from the 14th to the 16th centuries. Emphasis on the 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 the rise of genre, still-life and landscape painting, as well as the role of patronage.

**ARTH 223 BAROQUE AND ROCOCO ARCHITECTURE AND URBANISM 3**

Architecture and urban design in Europe from 1580 to 1750 in its religious, political and cultural context. Studies Italy, France, England and Germany. Architects such as Bernini, Borromini, Le Vau, Mansart and Neumann.

**ARTH 225 EIGHTEENTH CENTURY ART 3**

Examines major trends and artists in 18th century European painting, sculpture and architecture in the framework of the 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**

Important 19th century European movements in art such as Neo-Classicism, Romanticism, Realism and Impressionism studied in their cultural and socio-political context. Artists such as David, Delacroix, Turner, Courbet and Monet.

**ARTH 228 MODERN ART II 3**

Art and theory of major movements from 1880 to the present. Post-Impressionism, Fauvism, Cubism, Futurism, Constructivism, Dada, Surrealism, Abstract Expressionism, Pop Art, Minimalism, Conceptualism, Neo-Expressionism and Post-Modern developments. Painting, sculpture, photography, environments and performance art.

**ARTH 230 AMERICAN ART: 1607-1865 3**

Architecture, painting, sculpture and the decorative arts of the United States from the first Colonial settlements to the Civil War. American art examined in the 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 the United States from the Civil War on. American art in a political, social, economic and cultural framework. The rise of the United States to a position of global power and emergence as an international artistic center.  
RESTRICTIONS: Usually offered in spring semester.
- ARTH 233 ART OF CHINA** 3  
Survey of the arts of China from neolithic times to the 20th century. Discussions center on such phenomena as Confucian thought and political art, the importation of Buddhist beliefs and their Chinese expressions, and the search for harmony with the natural world.
- ARTH 234 ART OF JAPAN** 3  
Survey of the art of Japan from neolithic times to the 20th century. Emphasis on the interaction between imported ideas and native sensibilities, the development of Buddhist imagery and the influence of literature, drama and political change on the visual arts.
- ARTH 235 ART OF INDIA** 3  
Survey of the art of Indian Asia from the prehistoric culture of the Indus Valley through the development of Buddhist, Hindu and Islamic religious structures and imagery. Emphasizes the interrelationships of philosophical, religious and aesthetic concepts in shaping Indian art and the spread of Indic culture.
- ARTH 236 ARTS OF THE ISLAMIC WORLD** 3  
Formation and diffusion of a distinctive artistic tradition from the eighth to the sixteenth century. Considers architecture, painting, metalwork and other media, especially in the 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 242 WOMAN AS IMAGE AND IMAGEMAKER** 3  
Analyzes the depiction of women in art from pre-history to the present in light of recent feminist studies. Topics correspond with particular periods in history. Each class includes a brief discussion of women artists and their works.  
May be cross-listed with WOMS242.
- ARTH 243 AMERICAN DECORATIVE ARTS, 1700-1900** 3  
An introduction to interior decoration and household arts during the 18th and 19th centuries, with an emphasis on furniture, metalwork, glass, ceramics, textiles, prints, and wallpaper. Field trips to Winterthur and the Delaware Art Museum are 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 the ancient, medieval and early modern worlds as they were depicted in contemporary artistic and literary works. Rulers studied include Augustus, Justinian, Saint Louis, Napoleon and Washington. Focuses on rulers' images in the modern world.
- ARTH 301 RESEARCH AND METHODOLOGY IN ART HISTORY** 3  
Methods and major approaches to advanced art historical study, together with the practical aspects of research and work in art historical professions, such as education, historic preservation, museums and galleries. Experience with original works of art.  
RESTRICTIONS: Offered in fall semester.
- ARTH 302 PRINTS AND SOCIETY** 3  
A social history of prints and printmaking techniques, focusing on such major printmakers as Durer, Rembrandt, Piranesi, Goya, Daumier and Picasso. Topics include the role of woodcuts in popular culture, political and satirical prints, posters and advertising, and the connoisseurship of original prints.
- ARTH 304 NORTHERN BAROQUE ART: THE AGE OF RUBENS, REMBRANDT AND VERMEER** 3  
Painting, printmaking and art theory in 17th-century Holland and Flanders in social and historical context. Examines the rise of landscape, genre and portraiture, the nature of Dutch realism, the social role of the artist, art and theater, and the impact of religion on art.
- ARTH 305 ITALIAN BAROQUE ART: METAPHOR AND MARVEL** 3  
Painting, sculpture and architecture from the time of Caravaggio and the Carracci to Bernini and Cortona. Examines topics such as the Counter-Reformation and its impact on the arts, the rise of naturalism and illusionism, the design process and the 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 the 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 308 MODERN ARCHITECTURE I: 1750-1900** 3  
Aesthetic and technological developments in architecture, interior design and the planned environment, beginning with the mid-18th century break from Renaissance tradition to Art Nouveau and the end-of-19th century rise of the skyscraper. Architects such as Ledoux, Soane, Richardson, Sullivan, Horta and Gaudi.
- 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 the role of women in Italian art and society from 1300-1650. Interdisciplinary and feminist readings emphasize a variety of approaches. Topics include gender and power; women as patrons; female eroticism and mysticism; the 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 the present. Emphasis on photography as artistic expression, the importance of technology and photography in relation to the other arts and social history. Photographers such as Negre, Emerson, Stieglitz, Cunningham, Weston and Arbus.
- ARTH 322 INTRODUCTION TO HISTORIC PRESERVATION** 3  
Examines a specific research issue within historic preservation including hypothesis construction, design of research methodology and evaluation of results.
- ARTH 330 REGIONAL ARTS AND ARCHITECTURE** 3  
Explores the historical development and cultural background of traditional material culture. Each seminar focuses on a particular theme such as the Pennsylvania-Germans, Carolina Low Country or New England Settlements. Topics include architecture, landscape, decorative arts and material life.
- ARTH 335 ARTS AND ARCHITECTURE OF PENNSYLVANIA-GERMANS** 3  
The distinctive regional culture of the Pennsylvania-Germans in the 18th and 19th centuries examined through the study of their cultural landscapes, houses and other buildings, decorative arts, gravestones, and manuscript traditions. Explores themes of ethnic aesthetic expression, sectarian culture, community identity, and the functions of art in everyday life.
- ARTH 338 MAYAN ART AND ARCHITECTURE** 3  
Introduction to the civilization of the Maya as evident in the Yucatan Peninsula. Incorporates visits to relevant archeological zones. Examines the geographical framework that shaped the 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 the Romanesque to the Modern eras. 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.
- ARTH 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.
- ARTH 360 HUMANITIES COLLOQUIUM** 3  
See ARSC360 for course description.

- ARTH 366 INDEPENDENT STUDY** 1-6
- ARTH 399 TOPICS IN ART HISTORY** 3  
Detailed investigation in a lecture rather than a seminar format of varying topics, e.g., St. Denis and Problems of 12th Century Art.
- ARTH 402 UNDERGRADUATE SEMINAR IN THE HISTORY OF ART** 1-3  
Emphasis on art historical reading and research. Student oral reports. Recent seminar topics include The Art and Science of Leonardo da Vinci; Caravaggio; Art of the African Diaspora.  
RESTRICTIONS: For undergraduates only. May be repeated for credit when topics vary.
- ARTH 403 HISTORY, PHILOSOPHY, FUNCTIONS AND FUTURE OF MUSEUMS** 3  
See MSST403 for course description.
- ARTH 405 SEMINAR IN GREEK AND ROMAN ART** 3  
The art and architecture of antiquity from the origins of Greek civilization to the fall of Rome. Recent topics include Art in the Everyday Life of Ancient Romans, Hellenistic Greek Sculpture, Late Roman Portraiture and Roman Architecture.  
PREREQ: ARTH208  
RESTRICTIONS: May be repeated for credit when topics vary.
- ARTH 406 SEMINAR IN MEDIEVAL ART** 3  
The art of Europe from the fall of Rome to the late Gothic period. Recent topics include The Court of Charlemagne, Early Irish and Anglo-Saxon Art, and Saint Denis and the Origins of Gothic Architecture.  
PREREQ: ARTH209 or ARTH210  
RESTRICTIONS: May be repeated for credit when topics vary.
- ARTH 408 SEMINAR IN NORTHERN RENAISSANCE ART** 3  
The 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.
- ARTH 413 SEMINAR IN ITALIAN RENAISSANCE ART** 3  
Italian art from 1300 to 1600. Recent topics include Leonardo da Vinci, Michelangelo, Titian and Medici Patronage in the Golden Age.  
RESTRICTIONS: May be repeated for credit when topics vary.
- ARTH 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 the Age of Michelangelo, and Palladio.  
PREREQ: ARTH220  
RESTRICTIONS: May be repeated for credit when topics vary.
- ARTH 415 SEMINAR IN ITALIAN BAROQUE ART** 3  
Painting, sculpture and architecture in Italy in the 17th century. Recent topics include Bernini and Roman Baroque Sculpture, Seicento Poetics and Imagery, Caravaggio, and Origins of the Baroque: The Carracci and their Academy.  
RESTRICTIONS: May be repeated for credit when topics vary.
- ARTH 417 SEMINAR IN NORTHERN BAROQUE ART** 3  
RESTRICTIONS: May be repeated for credit when topics vary.
- ARTH 418 ARCHITECTURE, TOWN PLANNING AND THEORY: 1600-1789** 3  
Focusing on Paris and Versailles, explores how architecture, town planning and architectural theory developed from the reign of Henri IV up to the French Revolution. Buildings and projects to be considered in close relation with their intellectual, political and social contexts.
- ARTH 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.
- ARTH 421 SEMINAR IN NINETEENTH CENTURY ART** 3  
Art from David to Impressionism. Recent topics include Gericault, Delacroix, Cezanne, Art and Politics, The Theory and Practice of Romanticism, Historicism from David to Gerome, and Orientalism.  
PREREQ: ARTH227  
RESTRICTIONS: May be repeated for credit when topics vary.
- ARTH 422 FOLK AND OUTSIDER ART** 3  
Focuses on the traditional and popular arts of the 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 will focus on the relationship of folk arts to questions of ethnicity, class, popular culture, and community aesthetics.
- ARTH 423 SEMINAR IN TWENTIETH CENTURY ART** 3  
Art in Europe, with some reference to American art, from Post-Impressionism to the present. Recent topics include Symbolism, Picasso, Dada and Surrealism, Cubism and Its Influence, and Post-Modernism.  
PREREQ: ARTH227 or ARTH228  
RESTRICTIONS: May be repeated for credit when topics vary.
- ARTH 424 SEMINAR IN NINETEENTH CENTURY PHOTOGRAPHY** 3  
Aspects of the history and aesthetics of 19th-century photography. Topics change with each time of offering. Recent topics include Photography and Art, Documentary Photography, and 'Art' Photography.  
PREREQ: ARTH227 or ARTH318
- ARTH 425 SILENT CINEMA** 3  
Examination of the invention, emergence, and development of silent cinema in Europe, the former USSR, and the United States. Includes study of significant films and filmmakers; social, cultural and artistic contexts; and the critical literature.  
PREREQ: ARTH227 or ARTH228
- ARTH 426 INVENTION OF TRADITION IN NINETEENTH CENTURY EUROPEAN ARCHITECTURE** 3  
All across 19th century Europe, architecture, architectural restoration, and town planning were deeply involved in national traditions, as architects attempted to create authentic national styles. Contemporary theoretical texts, 19th century primary sources, and recent works of scholarship are used to explore this process.
- ARTH 427 SEMINAR IN TWENTIETH CENTURY PHOTOGRAPHY** 3  
Aspects of the history and aesthetics of 20th-century photography. Topics change with each time of offering. Recent topics include Photography and Art, and Photography and Criticism.  
PREREQ: ARTH227 or ARTH228 or ARTH230 or ARTH311.
- ARTH 429 SEMINAR IN MODERN ARCHITECTURE** 3  
Architecture in Europe and/or America from 1750 to the present. Recent topics include the Architecture of Neoclassicism; and Sullivan, Wright and the Prairie School.  
RESTRICTIONS: May be repeated for credit when topics vary.
- ARTH 431 SEMINAR IN AMERICAN ARCHITECTURE** 3  
American architecture from the Colonies to the 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.
- ARTH 435 SEMINAR IN AMERICAN ART** 3  
American art from the Colonies to the present. Recent topics include Eakins and American Realism, Early American Modernism, and American Painting and Sculpture after World War II.  
RESTRICTIONS: May be repeated for credit when topics vary.
- ARTH 454 VERNACULAR ARCHITECTURE** 3  
See HIST454 for course description.
- ARTH 457 SURVEY OF AFRICAN ART** 3  
See ANTH457 for course description.
- ARTH 466 INDEPENDENT STUDY** 1-6
- ARTH 480 STUDIO IN THE MATERIALS AND TECHNIQUES OF DRAWING IN THE WEST** 3  
See MSST480 for course description.
- ARTH 481 SEMINAR IN MATERIALS AND TECHNIQUES OF THE CONTEMPORARY PAINTER AND DRAFTSMAN** 3  
See ARTC481 course description.
- ARTH 488 STUDIO MATERIALS AND TECHNIQUES OF PAINTING I** 3  
See MSST488 for course description.
- ARTH 489 STUDIO MATERIALS AND TECHNIQUES OF PAINTING II** 3  
See MSST489 for course description.
- ARTH 490 STUDIO IN THE MATERIALS AND TECHNIQUES OF PRINTMAKING I** 3  
See MSST490 for course description.
- ARTH 599 TOPICS IN ART HISTORY** 3  
Detailed investigation in a lecture rather than a seminar format of varying topics, e.g., St. Denis and Problems of 12th Century Art.

- ARTH 601 THEORIES AND PRACTICES OF ART HISTORICAL INTERPRETATION** 3  
Critical analysis of selected writings influential in art history and the 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  
The art of antiquity from the origins of Greek civilization to the fall of Rome. Recent topics include Roman Architecture; Religion, Religiosity and Ritual in the Lives of Romans; Visual Culture in Pompeii.  
RESTRICTIONS: May be repeated for credit when topics vary.
- ARTH 606 STUDIES IN MEDIEVAL ART** 3  
The art of Europe from the fall of Rome to the late Gothic period. Recent topics include the 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 Palladio.  
RESTRICTIONS: May be repeated for credit when topics vary.
- ARTH 616 STUDIES IN ITALIAN BAROQUE ART** 3  
Italian art in the 17th century. Recent topics include Bernini and Roman Baroque Sculpture, Seicento Poetics and Imagery, Caravaggio, and Origins of the Baroque: The Carracci and their Academy.  
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; 17th Century Netherlands; and Prints in the Age of Rembrandt.  
RESTRICTIONS: May be repeated for credit when topics vary.
- ARTH 618 18TH CENTURY PARIS: ARCHITECTURE, TOWN PLANNING AND THEORY** 3  
Examines how architectural practice, patronage, and thought were transformed by the radically new ways of understanding the public and public opinion that developed in eighteenth century Paris. Analysis of public debates, their relation to contemporary politics, and their impact on practice.
- ARTH 620 SEMINAR IN AFRICAN ART** 3  
Topics vary from pre-Dagaman art (pre-European 'discovery') to 20th-century painting and contemporary African cinema and may include representations of Africa in Enlightenment art and philosophy, reviews of the literature on the arts of Fulani peoples and its related archive of documentary film.
- ARTH 621 STUDIES IN NINETEENTH CENTURY ART** 3  
Art from David to Impressionism. Recent topics include Gericault; Delacroix; Cezanne; Art and Politics (1780-1880); The Theory and Practice of Romanticism; and Center and Periphery: the French Avante-Garde.  
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  
Art in Europe, with some reference to later American art, from 1900 to the present. Recent topics include Symbolism, Picasso, Dada and Surrealism, and Cubism and French Art.  
RESTRICTIONS: May be repeated for credit when topics vary.
- ARTH 624 FOLK AND OUTSIDER ART** 3  
Focuses on the traditional and popular arts of North America. 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 the relationship of folk arts to questions of ethnicity, class, popular culture and community aesthetics.
- ARTH 625 SILENT CINEMA** 3  
Examination of the invention, emergence, and development of silent cinema in Europe, the former USSR, and the United States. Includes study of significant films and filmmakers; the social, cultural and artistic contexts; and the critical literature.  
RESTRICTIONS: May be repeated for credit when topics vary.
- ARTH 627 STUDIES IN THE HISTORY OF PHOTOGRAPHY** 3  
Aspects of the history and aesthetics of photography. Recent topics include 19th Century Documentary Photography, 19th Century "Art" Photography, 20th Century Photography and Criticism, and 20th Century Photography and Art.  
RESTRICTIONS: May be repeated for credit when topics vary.
- ARTH 628 SEMINAR IN HISTORIC PRESERVATION** 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 the 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  
Architecture in the American Colonies from the anonymous buildings of the 17th century to the designs of Thomas Jefferson and B. H. Latrobe in the early 19th century.  
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  
The Greek, Gothic, Egyptian and Oriental Revivals; High Victorian Style and its culmination in the 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  
Recent topics include Visual Culture in Antebellum America; Common Ground: Dialectics of High and Low in 19th 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  
The art of England, emphasizing the period from the 16th century through the end of the 19th century. Recent topics include the English Country House, British Painting, English Architecture, and Collecting in England.  
RESTRICTIONS: May be repeated for credit when topics vary.
- ARTH 657 SURVEY OF AFRICAN ART** 3  
See ANTH657 for course description.
- 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 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 EAMC801 for course description.

**ARTH 850 RESOURCES IN ART HISTORY 0 PF**

An introduction to the art historical resources of the University of Delaware and to the techniques of scholarly research and bibliographical materials in the historical study of the visual arts.

RESTRICTIONS: Offered every fall semester.

**ARTH 851 SEMINAR IN ART HISTORICAL PEDAGOGY 3 PF**

Discussion of all aspects of teaching in the field of art history (lectures, discussions, materials, examinations, grading), especially in the context of the teaching of a 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 an 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****AGRICULTURAL AND TECHNOLOGY EDUCATION****ATED 166 SPECIAL PROBLEM 1-3****ATED 266 SPECIAL PROBLEM 1-3****ATED 366 INDEPENDENT STUDY 1-6****ATED 466 INDEPENDENT STUDY 1-6****ATED 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.

**ATED 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.

PREREQ: Students must show evidence of passing Praxis I.

RESTRICTIONS: School practicum of 12 hours required.

**ATED 600 INTERNSHIP IN TEACHING 3-6**

Full-time 18-week teaching internship experience in 7-12th grade schools. Students are under the guidance and supervision of a cooperating teacher in the classroom and a University of Delaware supervisor.

PREREQ: Students must show evidence of passing Praxis I.

RESTRICTIONS: Must be repeated for a total of 9 credits.

**ATED 648 MASTER'S PORTFOLIO 1 PF**

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.

**ATED 666 SPECIAL PROBLEM 1-12****ATED 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.

PREREQ: Students must show evidence of passing Praxis I.

RESTRICTIONS: School practicum of 12 hours required.

**ATED 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.

**BLACK AMERICAN STUDIES****BAMS 107 HISTORY OF ROCK 3**

See MUSC107 for course description.

**BAMS 110 INTRODUCTION TO BLACK AMERICAN STUDIES 3**

Assesses the status of Black America in the modern technological order through an examination of the 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 SOC204 for course description.

**BAMS 205 CONTEMPORARY AFRO-AMERICAN ISSUES 3**

The 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. A 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 SOCI215 for course description.

**BAMS 220 THE AMERICAN CIVIL RIGHTS MOVEMENT 3-4**

See HIST220 for course description.

**BAMS 293 HONORS SHORT COURSE 1**

See ARSC293 for course description.

**BAMS 296 HONORS FORUM 1**

See ARSC296 for course description.

**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 the 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 the broad social, political and economic developments that shaped the Black experience during this period: the rise of segregation in the South, the migration from plantation to ghetto and the 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 the thought of significant Black figures.

May be cross-listed with PHIL307.

PREREQ: PHIL201.

**BAMS 308 DELAWARE BLACK HISTORY 3**

A survey course in Delaware Black history. The Black American in Delaware from colonial times to recent developments.

PREREQ: HIST205.



<b>BAMS 313 AFRICAN AMERICAN LITERATURE I</b>	<b>3</b>
See ENGL344 for course description.	
<b>BAMS 322 RACE AND POLITICS</b>	<b>3</b>
See POSC322 for course description.	
<b>BAMS 327 RACE, GENDER, SCIENCE</b>	<b>3</b>
See PHIL327 for course description.	
<b>BAMS 330 RHETORIC OF BLACK AMERICA</b>	<b>3</b>
Rhetoric of Black Americans from early orators to contemporary figures. Oral interpretation and analysis of methods and techniques. PREREQ: Introductory class in communication.	
<b>BAMS 331 HISTORY OF CARIBBEAN I</b>	<b>3</b>
See HIST331 for course description.	
<b>BAMS 332 HISTORY OF CARIBBEAN II</b>	<b>3</b>
See HIST332 for course description.	
<b>BAMS 333 PEOPLES OF AFRICA</b>	<b>3</b>
See ANTH333 for course description.	
<b>BAMS 334 AFRICAN AMERICAN WOMEN'S HISTORY</b>	<b>3</b>
See HIST334 for course description.	
<b>BAMS 345 AFRICAN AMERICAN LITERATURE II</b>	<b>3</b>
See ENGL345 for course description. PREREQ: ENGL110.	
<b>BAMS 347 STUDIES IN AMERICAN LITERATURE</b>	<b>3</b>
See ENGL347 for course description. RESTRICTIONS: May be repeated once for credit when topics vary.	
<b>BAMS 355 RACE, CLASS AND CRIME</b>	<b>3</b>
See CRJU355 for course description.	
<b>BAMS 356 STUDIES IN MODERN/CONTEMPORARY LITERATURE</b>	<b>3</b>
See ENGL356 for course description. RESTRICTIONS: May be repeated once for credit when topics vary.	
<b>BAMS 361 RACIAL INEQUALITY</b>	<b>3</b>
See SOCI361 for course description.	
<b>BAMS 382 STUDIES IN MULTICULTURAL LITERATURE IN ENGLISH</b>	<b>3</b>
See ENGL382 for course description. RESTRICTIONS: May be repeated once for credit when topics vary.	
<b>BAMS 395 PAN AFRICANISM</b>	<b>3</b>
See HIST395 for course description.	
<b>BAMS 411 SEMINAR IN AMERICAN HISTORY</b>	<b>3</b>
See HIST411 for course description.	
<b>BAMS 415 RACE, CLASS AND GENDER</b>	<b>3</b>
See SOCI415 for course description.	
<b>BAMS 418 RACE, GENDER AND POVERTY</b>	<b>3</b>
See SOCI418 for course description. PREREQ: SOCI201.	
<b>BAMS 432 PSYCHOLOGICAL PERSPECTIVES ON THE BLACK AMERICAN</b>	<b>3</b>
See PSYC416 for course description.	
<b>BAMS 439 PROBLEMS IN AFRICAN POLITICS</b>	<b>3</b>
See POSC439 for course description.	
<b>BAMS 440 TOPICS IN BLACK AMERICAN STUDIES</b>	<b>3</b>
Analysis of important themes in the study of Afro-American life and history. Themes may vary each time the course is offered. RESTRICTIONS: Open to juniors and seniors only.	
<b>BAMS 649 CIVIL RIGHTS LAW AND POLICY</b>	<b>3</b>
See UAPP649 for course description.	
<b>BAMS 650 BLACK COMMUNITY STUDIES</b>	<b>3</b>
Investigation and analysis of various topics and developments of interest and significance to the Black community. RESTRICTIONS: May be repeated for credit when topics vary.	
<b>BAMS 660 RESEARCH AND BLACK AMERICAN STUDIES</b>	<b>1-6</b>

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**BIOLOGICAL SCIENCES**


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<b>BISC 100 FRESHMAN SEMINAR</b>	<b>1 PF</b>
Provides a forum for the discussion of topics in biology that relate to material being covered in BISC207. Papers from the scientific literature and/or world wide web may be discussed. RESTRICTIONS: Open to freshman majors by faculty invitation only.	
<b>BISC 103 PRINCIPLES OF BIOLOGY</b>	<b>3</b>
The study of biological principles at multiple levels of organization. Fosters biological literacy through the exploration of concepts, theories, practices, and new developments and their impact on individuals and society. RESTRICTIONS: Open to non-majors only. Students may not receive credit for both BISC103 and BISC104.	
<b>BISC 104 PRINCIPLES OF BIOLOGY WITH LABORATORY</b>	<b>4</b>
The study of biological principles at multiple levels of organization. Fosters biological literacy through the exploration of concepts, theories, practices and new developments and their impact on individuals and society. The laboratory component provides concrete examples of some of the principles discussed in the lecture component. RESTRICTIONS: Open to non-majors only. Students cannot receive credit for both BISC103 and BISC104.	
<b>BISC 105 HUMAN HEREDITY AND DEVELOPMENT</b>	<b>3</b>
Heredity and human affairs; pedigree analysis; physical and chemical basis of heredity; heredity and environment; radiation and mutation; heredity and diseases; and birth defects. RESTRICTIONS: Open to non-majors only.	
<b>BISC 106 ELEMENTARY HUMAN PHYSIOLOGY</b>	<b>3</b>
The structure and function of humans; mechanisms of maintenance and reproductive behavior. RESTRICTIONS: Open to non-majors only.	
<b>BISC 107 ELEMENTARY EVOLUTIONARY ECOLOGY</b>	<b>3</b>
Describes the fundamental processes in ecology and evolution: natural selection, adaptation, population biology, competition, predation, symbiosis and ecosystem dynamics. RESTRICTIONS: Open to non-majors only.	
<b>BISC 110 VIRUSES, GENES AND CANCER</b>	<b>3</b>
Biology of normal and malignant cells, and current knowledge of the genetic lesions causing malignancy. Environmental and inherited factors contributing to one's risk of cancer, and prospects for prevention. Standard and innovative means for detection and treatment of cancer. RESTRICTIONS: Open to non-majors only.	
<b>BISC 113 GENERAL BIOLOGY LABORATORY</b>	<b>1</b>
Structure and function of cells, and selected experiments dealing with the physiology of plants and animals. COREQ: BISC103. RESTRICTIONS: Offered only in Associate in Arts program.	
<b>BISC 115 HUMAN HEREDITY AND DEVELOPMENT LABORATORY</b>	<b>1</b>
Laboratory exercises dealing with probability, selection, karyotyping and pedigrees of humans. COREQ: BISC105. RESTRICTIONS: Offered only in Associate in Arts program.	
<b>BISC 116 ELEMENTARY HUMAN PHYSIOLOGY LABORATORY</b>	<b>1</b>
Selected experiments in physiology that demonstrate some of the concepts developed in BISC106, and a study of human anatomy. COREQ: BISC106. RESTRICTIONS: Offered only in Associate in Arts program.	
<b>BISC 117 ELEMENTARY EVOLUTIONARY ECOLOGY LABORATORY</b>	<b>1</b>
Laboratory exercises to compliment the subject matter of BISC107. COREQ: BISC107. RESTRICTIONS: Open to non-majors only. Offered only in Associate in Arts program.	
<b>BISC 152 BIOLOGY OF HUMAN SEXUALITY</b>	<b>3</b>
Discusses human sexual differentiation plus the anatomy and physiology of reproduction by considering the pertinent areas of genetics, cytology, embryology, endocrinology, immunology and physiology. Topics include genetic sex, gonadal sex, phenotypic sex, hormonal sex and behavioral sex. RESTRICTIONS: Open to non-majors only.	
<b>BISC 171 MICROBIOLOGY IN MODERN SOCIETY</b>	<b>3</b>
Microbial activities and their effect on society and individuals. RESTRICTIONS: Open to non-majors only.	

- BISC 195 BIOLOGICAL EVOLUTION** 3  
Historical background of the idea of evolution, the work of Charles Darwin, an exploration of the modern theory of evolution and the contributions to it from other biological disciplines, and philosophical issues related to evolution.  
RESTRICTIONS: Open to non-majors only.
- BISC 207 INTRODUCTORY BIOLOGY I** 4  
Biology of cells, including both structure and function. The perpetuation of life: cell division, genetics and development. Lastly, the origin and diversity of life. Laboratory focuses on experimentation, data analysis and an introduction to diversity.  
COREQ: CHEM101, CHEM103, CHEM105 or CHEM111  
RESTRICTIONS: Non-majors may not take both BISC103 and BISC207 to fulfill the group D requirement in Arts and Science
- BISC 208 INTRODUCTORY BIOLOGY II** 4  
The physiology of multicellular organisms: fungi, plants and animals. The biology of populations, including behavior, evolution and ecology. Laboratory deals with diversity, structure, function and behavior, and using representatives of the major phyla.  
PREREQ: BISC207  
COREQ: CHEM102, CHEM104, CHEM106 or CHEM112.
- BISC 244 COOPERATIVE EDUCATION: WORK EXPERIENCE** 1-3 PF  
Supervised off-campus work that integrates academic learning with practical experience. Placements may be with medical, environmental, or biotechnology institutions.  
RESTRICTIONS: Not for major credit. Faculty sponsorship and application required.
- BISC 276 HUMAN PHYSIOLOGY** 4  
Physiology of the 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 will be 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 bacteria) are studied. Emphasis is on the physiology, metabolism, diversity and interactions between and among each group and bacteria and their interactions with humans. Lab 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  
The structure and function of eucaryotic cell organelles. Emphasis on dynamic processes such as membrane transport, cell motility and protein trafficking. Current studies from the literature and experimental techniques are 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
- BISC 315 EXPERIMENTAL CELL BIOLOGY** 2  
A series of inquiry-based, multisession laboratory experiences in cell biology. Major techniques include quantitative and fluorescent microscopy, cell culture and gene expression assays. Students will learn to keep laboratory notebooks, troubleshoot technical problems and design critical control experiments. A simulated grant proposal will be critiqued.  
PREREQ: BISC208, BISC305, and CHEM104
- BISC 316 EXPERIMENTAL PHYSIOLOGY** 2  
A series of inquiry-based, multisession laboratory experiences in physiology. Experiments will be performed on various organ systems, using computerized data-acquisition systems and appropriate animal models. Students will 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 a major focus on Costa Rica. Topics include evolution, extinct groups and the orders Gymnophiona, Caudata, Anura, Testudines, 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 the 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 401 MOLECULAR BIOLOGY OF THE CELL** 3  
Introduction to the molecular biology of eucaryotes and procaryotes. Topics include structure and function of proteins and nucleic acids; replication and repair of DNA; biosynthesis of RNA and proteins; membranes, transport, composition and function of the eucaryotic cell, chromosomes, viruses, the immune system and recombinant DNA.  
PREREQ: BISC207 and one semester of organic chemistry.
- BISC 403 GENETIC AND EVOLUTIONARY BIOLOGY** 3  
The physical and chemical basis of heredity, the nature and mechanisms of gene action, genes in populations, speciation.  
PREREQ: BISC207 and one semester of organic chemistry.
- BISC 408 MAMMALIAN HISTOLOGY** 4  
Microscopic organization, identification and functional anatomy of mammalian organ systems and tissues.  
PREREQ: BISC208.
- BISC 411 MOLECULAR BIOLOGY OF THE CELL LABORATORY** 2  
Introduction to the process of scientific inquiry as it relates to cellular molecular biology. Students perform a series of exercises emphasizing experimental design and data analysis. Students then pose related scientific questions, design experiments and present results in written, poster or oral format.  
PREREQ: BISC208, CHEM321 or CHEM213.
- BISC 413 ADVANCED GENETICS LABORATORY** 2  
Areas to be covered include Mendelian genetics and eukaryotic gene mapping; bioinformatics and protein structure; karyotype analysis; population and evolutionary genetics. Computer simulations will illustrate each area. Problems will be posed for student groups to solve after a basic understanding of the phenomena has been acquired.  
PREREQ: BISC208, BISC403.
- BISC 415 VERTEBRATE DEVELOPMENTAL MORPHOLOGY** 3  
Introduces the basic principles of vertebrate development including the formation of the basic body plan and the molecular control of tissue morphogenesis. The importance of each developmental milestone will be illustrated by discussing the underlying causes of birth defects.  
May be cross-listed with ANSC415.  
PREREQ: BISC207 and BISC208
- BISC 422 TEACHING EXPERIENCE** 1-2  
Teaching experience in an undergraduate laboratory. Evaluation based on teaching performance and preparation of required material for laboratory.  
RESTRICTIONS: Prior completion of core requirements necessary. Requires permission of instructor.

- BISC 439 DEVELOPMENTAL NEUROBIOLOGY** 3  
Developmental biology of the 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.
- BISC 440 CONSERVATION OF TROPICAL BIODIVERSITY** 3  
See ENWC444 for course description.  
RESTRICTIONS: Winter or Summer Session only. Taught in Costa Rica or Peru.
- BISC 442 VERTEBRATE MORPHOLOGY** 4  
The vocabulary describing vertebrate anatomy is introduced and discussed by tracing the evolutionary and developmental histories of major vertebrate organ systems. Laboratory involves detailed dissections of representative vertebrates.  
PREREQ: BISC208.
- BISC 446 PLANT CELL BIOLOGY** 3  
Examines the cell as an integrated system of localized protein-protein reactions. Strongly comparative, including examples from yeast and mammals. 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 PLSC446  
PREREQ: Introductory organic chemistry.
- BISC 451 UNDERGRADUATE THESIS I** 3  
Independent research under direction of faculty member.  
PREREQ: Admission to B. S. in Biology in either CMG or EOB concentration.  
RESTRICTIONS: Not for students pursuing degree with distinction.
- 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  
The 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 the 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.  
COREQ: BISC493.  
RESTRICTIONS: BISC403 recommended in addition to prerequisites. Offered in spring of odd-numbered years.
- BISC 493 HUMAN AND MAMMALIAN CYTOGENETICS LABORATORY** 3  
Teaches chromosome analyses in both clinical and research labs using modern techniques. Trains students to obtain preparations from human and experimental animals by culture methods and direct processing. Current banding techniques, microscopic analysis, karyotyping, tissue culture, microphotography and special cytochemical procedures.  
COREQ: BISC492.
- BISC 495 EVOLUTION** 3  
Present status of the theory of biological evolution and its implications in the different areas of biology.  
PREREQ: BISC208.
- BISC 498 TOPICS IN BIOLOGY** 3  
In this multisection course, topics may vary from section to section. Information about each section is available in the Biology Office prior to registration.  
May be cross-listed with CSCC498.  
PREREQ: BISC208 (or two BISC100-level courses).  
RESTRICTIONS: Requires junior or senior status. May be taken more than once but only three credits can count towards the major.
- BISC 510 TOPICS IN MIDDLE SCHOOL BIOLOGY EDUCATION: GENETICS** 3  
Strengthens the content understanding of the 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 the 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 the teaching of evolution in high school.  
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 the 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 eucaryotic genes, synthesis and processing of messenger RNA and control of protein synthesis with emphasis on regulation of normal cellular growth and differentiation and the 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** 3  
Systemic mammalian physiology: cellular mechanisms, muscle, cardiovascular, respiratory, renal, digestive and endocrine systems. Emphasizes human physiology and includes discussions of primary literature in the field of physiology research.  
PREREQ: BISC306 or instructor's approval.  
RESTRICTIONS: Priority given to graduate students and students in the Medical Scholars Program.
- BISC 612 ADVANCED CELL BIOLOGY** 3  
Three major sections: (1) cell structure/function; (2) signaling mechanisms; and (3) integrative cell physiology. Students required to interpret and evaluate data from primary scientific literature.  
RESTRICTIONS: Instructor approval required.
- BISC 615 VERTEBRATE DEVELOPMENTAL BIOLOGY** 3  
Introduces the basic principles of vertebrate development including formation of the basic body plan and the molecular control of tissue morphogenesis. The importance of each developmental milestone will be illustrated by discussing the 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, ultra thin 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: Permission of instructor.  
RESTRICTIONS: Limited by number of computer workstations in laboratory.
- BISC 619 GENE EXPRESSION LABORATORY** 4  
Laboratory course in techniques of molecular biology. Student generates recombinant viruses which can express large amounts of foreign protein. The protein will be purified and characterized functionally and biochemically using such methods as *in vitro* 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.

<b>BISC 626 NEUROSCIENCE I</b>	<b>4</b>	<b>BISC 671 CELLULAR AND MOLECULAR IMMUNOLOGY</b>	<b>4</b>
See PSYC626 for course description. PREREQ: BISC306, PSYC314, and PSYC310 or PSYC312.		Introduces the 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 the resultant molecular responses that lead to immune protection. PREREQ: BISC401 or BISC305 or BISC300. RESTRICTIONS: Requires permission of instructor.	
<b>BISC 627 NEUROSCIENCE II</b>	<b>3</b>	<b>BISC 673 TOPICS IN IMMUNOGENETICS</b>	<b>3</b>
Further study of the structure and function of the nervous system with emphasis on molecular, cellular, and network neurophysiology. May be cross-listed with PSYC627. PREREQ: BISC306, PSYC310 or PSYC312, and PSYC314.		In-depth analysis of important advances in the field of immunology. Groups discuss and present reviews of the primary literature. Topics may include HIV infection, T-cell function and cytokine regulation of the immune response PREREQ: Course in immunology RESTRICTIONS: With instructor's permission, may be repeated once for credit.	
<b>BISC 630 ICHTHYOLOGY</b>	<b>4</b>	<b>BISC 675 CARDIOVASCULAR PHYSIOLOGY</b>	<b>3</b>
Biology of fishes including structure and function, reproduction, development, behavior, geographic distribution and systematics. PREREQ: Physiology course.		The physiology and biophysics of the mammalian heart and circulation PREREQ: A physiology course at or above the 300-level.	
<b>BISC 631 PRACTICE OF SCIENCE</b>	<b>3</b>	<b>BISC 679 VIROLOGY</b>	<b>3</b>
Uses historical, philosophical, and sociological perspectives to better understand the nature of modern science and its practice. Examines "science misconduct," and satisfies the NIH mandate requiring graduate training in "the responsible conduct of research." May be cross-listed with CHEM631.		Molecular biology of animal viruses. Virus structure and organization; mechanisms of penetration, replication, maturation and transformation PREREQ: BISC401 or Biochemistry	
<b>BISC 637 POPULATION ECOLOGY</b>	<b>3</b>	<b>BISC 693 HUMAN GENETICS</b>	<b>3</b>
Theoretical and experimental aspects of single species growth and multispecies interactions. PREREQ: BISC302.		Emphasis on the 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, multi-factoral inheritance and the genetics of cancer. PREREQ: BISC403.	
<b>BISC 639 DEVELOPMENTAL NEUROBIOLOGY</b>	<b>4</b>	<b>BISC 801 SEMINAR IN ECOLOGY</b>	<b>2</b>
Developmental biology of the 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.		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	
<b>BISC 641 MICROBIAL ECOLOGY</b>	<b>3</b>	<b>BISC 806 ADVANCES IN CELL AND ORGAN SYSTEMS</b>	<b>3</b>
Principles of microbial interactions in natural environments, including applications to industrial microbiology and certain types of pollution. PREREQ: BISC300.		Literature-based current topics in cell and organ systems PREREQ: Requires permission of instructor. RESTRICTIONS: May be repeated up to nine credits when topics vary. Offered only in spring.	
<b>BISC 645 BACTERIAL EVOLUTION</b>	<b>3</b>	<b>BISC 827 GRADUATE RESEARCH SEMINAR</b>	<b>1 PF</b>
Explores the development of the enormous bacterial diversity beginning with current theories on the origin of life. Examines the evolution of viruses and the "directed evolution" controversy which concerns mechanisms of bacterial evolution. PREREQ: BISC300 or equivalent.		Seminar allowing graduate students in the Department of Biology to report on the progress of their research projects. Both students and faculty attend presentations.	
<b>BISC 646 PLANT CELL BIOLOGY</b>	<b>3</b>	<b>BISC 833 SPECIAL TOPICS IN BIOLOGY</b>	<b>1-4</b>
Examines the cell as an integrated system of localized protein-protein interactions. Strongly comparative, using examples from yeast and mammals. 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 PLSC646 PREREQ: Introductory organic chemistry.		Various topics in biology.	
<b>BISC 654 BIOCHEMICAL GENETICS</b>	<b>3</b>	<b>BISC 864 RESEARCH TUTORIAL</b>	<b>1-8</b>
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.		First year doctoral students will complete six weeks of research training in the laboratory of a Biological Sciences faculty member. Students may enroll in either one or two sections of BISC864 in a single semester. Students gain breadth of research training and are better able to identify appropriate dissertation advisors. RESTRICTIONS: Requires approval of instructor	
<b>BISC 656 EVOLUTIONARY GENETICS</b>	<b>3</b>	<b>BISC 868 RESEARCH</b>	<b>1-12</b>
Exploration of the 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 the genetics of speciation. PREREQ: BISC403.		<b>BISC 869 MASTER'S THESIS</b>	<b>1-6</b>
<b>BISC 660 ENVIRONMENTAL PHYSIOLOGY</b>	<b>3</b>		
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.		<b>BISC 964 PRE-CANDIDACY STUDY</b>	<b>3-12 PF</b>
<b>BISC 665 ADVANCED MOLECULAR BIOLOGY &amp; GENETICS</b>	<b>3</b>		
Presents concepts and approaches regarding our current understanding of molecular biology and molecular genetics in eukaryotic organisms. The course is team taught and requires a solid background in biochemistry, cell biology and introductory molecular biology. RESTRICTIONS: Requires permission of instructor.		<b>BISC 969 DOCTORAL DISSERTATION</b>	<b>1-12 PF</b>
		Independent dissertation research after completion of the Candidacy Examination.	
<hr/> <b>BUSINESS: MULTIDISCIPLINARY BUSINESS ADMINISTRATION</b> <hr/>			
<b>BMBA 865 CORE UPDATES SEMINAR</b>	<b>1-3</b>		
Topics include accounting, finance, IT, management, marketing and operations management. PREREQ: Bachelors degree in business or business area.			

**BIOMECHANICS AND MOVEMENT SCIENCE**

<b>BMSC 601</b>	<b>MATHEMATICS FOR BIOMECHANICS</b>	<b>3</b>
Mathematical techniques for research in biomechanics and related fields, with emphasis on methods useful for biomedical data acquisition, analysis and modeling. Topics include Fourier analysis, differential equations, and matrix algebra, concentrating on applications. PREREQ: College Calculus (MATH241 and 242 or equivalent).		
<b>BMSC 865</b>	<b>SEMINAR</b>	<b>0 PF</b>
<b>BMSC 866</b>	<b>SPECIAL PROBLEM</b>	<b>1-12</b>
<b>BMSC 868</b>	<b>RESEARCH</b>	<b>1-6</b>
<b>BMSC 869</b>	<b>MASTER'S THESIS</b>	<b>1-6</b>
<b>BMSC 964</b>	<b>PRE-CANDIDACY STUDY</b>	<b>3-12 PF</b>
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		
<b>BMSC 969</b>	<b>DOCTORAL DISSERTATION</b>	<b>1-12 PF</b>

**BIORESOURCES ENGINEERING**

<b>BREG 603</b>	<b>SOIL PHYSICS</b>	<b>3</b>
Relationship of soil moisture, soil temperature, soil structure, shear strength and compaction to irrigation, drainage, plant growth, tillage and erosion. May be cross-listed with PLSC603. PREREQ: PLSC204		
<b>BREG 621</b>	<b>BIORESOURCES MANAGEMENT SYSTEMS</b>	<b>4</b>
Water movement in soil-plant-atmosphere continuum, heat flow in soils, radiant energy in plant environment, ground-water, soil erosion and design of irrigation, drainage and soil erosion control systems. PREREQ: EGTE321, PLSC204, BISC103		
<b>BREG 628</b>	<b>NATURAL WASTEWATER TREATMENT SYSTEMS</b>	<b>3</b>
Land treatment systems for wastewater, biosolids and septage land application, constructed wetlands and aquatic treatment systems, lagoons and decentralized wastewater management. PREREQ: EGTE328 or CIEG233		
<b>BREG 666</b>	<b>SPECIAL PROBLEM</b>	<b>1-12</b>

**BUSINESS ADMINISTRATION**

<b>BUAD 030</b>	<b>COOPERATIVE EDUCATION PROGRAM</b>	<b>1 RP</b>
Assists students to integrate classroom theory with on-the-job experience through analysis of their 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.		
<b>BUAD 100</b>	<b>INTRODUCTION TO BUSINESS</b>	<b>3</b>
A survey of basic business concepts designed for the non-business major. Topics covered will include business organization, management, marketing, operations research and finance. RESTRICTIONS: No majors within the business administration or accounting degree programs may receive credit for this course.		
<b>BUAD 301</b>	<b>INTRODUCTION TO MARKETING</b>	<b>3</b>
Management of the marketing functions, marketing research, product planning, distribution channels, pricing, personal selling and advertising. Emphasis on consumer and industrial markets. PREREQ: ECON100 or ECON152		
<b>BUAD 302</b>	<b>MARKETING RESEARCH</b>	<b>3</b>
Focus on the 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 ACCT160.		

<b>BUAD 306</b>	<b>OPERATIONS MANAGEMENT</b>	<b>3</b>
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 ACCT160		
<b>BUAD 309</b>	<b>MANAGEMENT AND ORGANIZATIONAL BEHAVIOR</b>	<b>3</b>
The processes and procedures used to manage performance effectively, including behavioral implications and an awareness of the individual's impact on others.		
<b>BUAD 341</b>	<b>ENVIRONMENT OF MULTINATIONAL CORPORATIONS</b>	<b>3</b>
Interdisciplinary approach explores the 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: ECON152 RESTRICTIONS: Counts as a BUAD elective for BS candidates. Credit for BUAD/ECON/POSC341 given only once.		
<b>BUAD 346</b>	<b>ANALYSIS OF OPERATIONS PROBLEMS</b>	<b>3</b>
Intensive treatment of topics covered in BUAD306 to include the investigation and development of the decision making process in an operations environment. Emphasis on practical applications. PREREQ: BUAD306		
<b>BUAD 366</b>	<b>INDEPENDENT STUDY</b>	<b>1-6</b>
<b>BUAD 382</b>	<b>INTERNATIONAL BUSINESS MANAGEMENT</b>	<b>3</b>
Decision-making in the management of multinational business organizations. Problems involving constraints of government environment and organization structures. Evaluation of international business practices.		
<b>BUAD 383</b>	<b>SEMINAR ON INTERNATIONAL BUSINESS</b>	<b>3</b>
Surveys the economic, political, and institutional context of international business as well as the strategic operations of the international company. Special attention is given to cross-discipline topics, both in the form of interdisciplinary materials and lectures and institutional and company visits. RESTRICTIONS: Taught abroad		
<b>BUAD 391</b>	<b>SEMINAR ON INTERNATIONAL MANAGEMENT</b>	<b>3</b>
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.		
<b>BUAD 393</b>	<b>SEMINAR ON INTERNATIONAL MARKETING MANAGEMENT</b>	<b>3</b>
Seminar on selected topics in international marketing management. Combines lectures and visits to local organizations. Research paper typically required. PREREQ: BUAD301 RESTRICTIONS: Taught abroad. Counts as BUAD elective for BS candidates.		
<b>BUAD 394</b>	<b>SEMINAR ON INTERNATIONAL OPERATIONS MANAGEMENT</b>	<b>3</b>
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.		
<b>BUAD 420</b>	<b>LABOR RELATIONS</b>	<b>3</b>
Treatment of labor-management relationships, with an emphasis on collective bargaining behavior and the settlement of disputes. The various environmental factors (history, philosophy, law and structure) which have greatly affected union-management affairs are first inspected, as a vital background to understanding. PREREQ: BUAD309		
<b>BUAD 421</b>	<b>HUMAN RESOURCE MANAGEMENT</b>	<b>3</b>
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		
<b>BUAD 422</b>	<b>DESIGNING EFFECTIVE ORGANIZATIONS</b>	<b>3</b>
Concepts of administration at the 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		
<b>BUAD 423</b>	<b>NEGOTIATION</b>	<b>3</b>
Introduction to principles for effective negotiation provides 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 the changing global marketplace. May focus on regional issues, global business sectors, current issues in the globalization of business, or a combination of these.  
PREREQ: Senior standing, and at least one of ACCT383, BUAD382, ECON340, or FINC415.
- 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.  
PREREQ: Twelve credit hours of management courses.
- BUAD 441 STRATEGIC MANAGEMENT** 3  
Case studies and concepts in the determination of top-level company policy and the 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  
Principles of managing a small business and differences in approach between large and small companies. Characteristics of the entrepreneur. Interpersonal and skill relationships in partnerships. The functions of accounting, finance, marketing, personnel and production forecasting for the small business.  
PREREQ: BUAD309.
- BUAD 446 OPERATIONS PLANNING AND CONTROL** 3  
Management of operations and inventories in a 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  
The 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, ACCT160.  
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 placed 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 BUEC432. Senior operations management majors only.
- BUAD 466 INDEPENDENT STUDY** 1-6
- 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 the 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, the client-agency relationship, regulation, and the social and economic effects of advertising.  
PREREQ: BUAD301.
- BUAD 472 MARKETING, SOCIETY AND THE ENVIRONMENT** 3  
Focuses on the interface between marketing management and the social-environmental dynamics of the 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 473 BUYER BEHAVIOR** 3  
The decision processes associated with buying and consumption. Social, cultural and psychological influences on consumer decisions and consumption patterns. The relationship between buyer behavior and marketing decision making.  
PREREQ: BUAD301.
- BUAD 474 MARKETING CHANNELS AND RETAILING** 3  
Focus on decision processes involved in establishing the paths for the movement of products, title, payment, and information between producers and users. Emphasis on the decisions necessary for successful retail operations.  
PREREQ: BUAD301.
- BUAD 475 INTERNATIONAL MARKETING** 3  
Analysis of the concepts and practices relating to the marketing of products and services internationally. Focus on the uncontrollable environmental forces facing an international marketer, issues relating to the standardization of marketing strategies across countries and the 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 their 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 the 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.
- BUAD 800 STRATEGIC THINKING FOR THE EXECUTIVE LEADER** 3  
A broad introduction to the MBA program and the nature of management thought. Topics include strategy, decision-making and organizational behavior. Emphasizes understanding underlying assumptions/limitations of different business perspectives. Provides a foundation for the MBA program and gives students practical skills.
- BUAD 807 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 808 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 809 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 811 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 the challenges and opportunities of globalization and the implications of globalization to professional development.

**BUAD 820 DATA ANALYSIS AND QUALITY MANAGEMENT 3**

Emphasizes quality management primarily via statistical process control. Focuses on data analysis for the purpose of 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 3**

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 3**

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 are emphasized. PREREQ: BUAD831

**BUAD 833 INTERNATIONAL OPERATIONS 3**

Focuses on issues concerning the 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 1-3**

Covers various topics in operations management at all levels of the firm. Individual inquiry stressed. PREREQ: BUAD831.

**BUAD 835 MANAGING NEW PRODUCT DEVELOPMENT PROJECTS 3**

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 3**

Introduces problem structuring and analysis for decision making under risk. Emphasizes both applications and methodology. Examines the effects of creativity and problem definition on decision making. Uses various problems involving uncertainty to enhance decision making skills and expand students' awareness and understanding of business problems. PREREQ: BUAD831.

**BUAD 837 DECISION SUPPORT AND EXPERT SYSTEMS FOR BUSINESS 3**

Focuses on using decision support systems (DSS) and expert systems (ES) to enhance decision making in business. Critically examines the literature on the development of information systems. Discusses technical and behavioral issues related to the design and implementation of effective DSS and ES. PREREQ: BUAD831.

**BUAD 840 ETHICAL ISSUES IN DOMESTIC AND GLOBAL BUSINESS ENVIRONMENTS 3**

Topics include ethics in organizations, and problems and challenges dealing with external environment demands including global issues.

**BUAD 841 MANAGING THE GLOBAL ENTERPRISE 3**

Focuses on the 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 1-3**

Examines selected topics in the management of technology. Individual inquiry stressed. PREREQ: BUAD870.

**BUAD 843 SPECIAL TOPICS IN GLOBAL BUSINESS 3**

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 3**

With an emphasis on research methodology, individual inquiry, and communication of results, students will pursue areas of interest and prepare formal presentations of their findings. PREREQ: Requires 24 MBA credits

**BUAD 851 CREATIVITY AND INNOVATION FOR NEW VENTURES 1**

NVC module explores the creative and innovative process and the linkages between creativity and innovation both within a corporate environment as well as in an entrepreneurial venture. Students gain an understanding of the creative and innovative process, know how to stimulate creativity and break down barriers to innovation. PREREQ: BUAD870.

**BUAD 852 MARKET RESEARCH FOR NEW VENTURES 1**

NVC 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 will be given to business-to-business and business-to-consumer markets. PREREQ: BUAD880

**BUAD 853 PROJECT PLANNING AND MANAGEMENT 1**

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. The 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 1**

New Venture module develops the principle that effective strategies follow from the 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 1**

Extension of the legal and regulatory module in the 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 3**

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 3**

Specialized modules designed for students pursuing a concentration in New Venture Creation. Topics include: creativity and innovation 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 1-6 PF**

Fieldwork designed to allow a student to apply 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 869 MASTER'S THESIS 3-6**

Can be taken for up to 6 credits in the MS program.

**BUAD 870 UNDERSTANDING PEOPLE IN ORGANIZATIONS 3**

Develops a knowledge base and requisite skills for managing individual, group and organizational processes through the use of diagnostic models, cases and/or experimental experiences.

**BUAD 871 MANAGING FOR CREATIVITY AND INNOVATION 3**

Focuses on individual characteristics and group and organizational factors that influence the 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 3**

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 the 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 the 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 is 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  
Acquaints students with theory and research on negotiation and conflict resolution and involves students in active negotiation exercises with discussions, including feedback on students' negotiation skills. Negotiation is 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: ACCT800 and ECON503
- BUAD 881 RESEARCH METHODS FOR MARKETING DECISIONS** 3  
Focuses on the techniques of research design, data collection, and data analysis for making marketing decisions. Helps students develop an appreciation for the potential contributions and limitations of marketing research data, enabling them to evaluate 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 is given to the use of conceptual frameworks and analytical methods that may be used to improve product and price decisions. The concepts and methods are 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 placed on understanding the behavioral dimension of the channel relationship after focusing on the economic and structural aspects of retailing, wholesaling, and physical distribution. Governmental and other constraints on channel activities are also studied.  
PREREQ: BUAD880.
- BUAD 886 ADVERTISING STRATEGY** 3  
Intended for those with little or no prior experience in advertising. Intended to improve students' skills with respect to determining advertising strategy. Features a mixture of lecture, 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 the 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 the issues faced by senior and middle level marketing executives in an organization. Emphasizes developing a comprehensive marketing strategy that is consistent with corporate plans. Issues explored include: opportunity assessment and competitive analysis, segmentation and positioning, and the development of integrated marketing mix programs.  
PREREQ: BUAD880.
- BUAD 889 INDUSTRIAL MARKETING** 3  
Studies the 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 the perspective of both the buyer and the 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 a computer simulation to help students integrate marketing concepts learned in core and elective classes.  
PREREQ: BUAD880.
- BUAD 898 PROFESSIONAL PROJECT SEMINAR** 3  
Students are 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. May be taken twice for up to 6 credits.  
PREREQ: Must have completed at least 12 credits in the MS in OEDC program or permission of instructor
- BUAD 899 BUSINESS CONSULTING PROJECT** 1-6  
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.

## BUSINESS AND ECONOMICS

- BUEC 325 MODERN BUSINESS COMPUTING** 3  
Use of higher level contemporary computing languages to structure solutions to business problems. Prototyping applications of systems.  
PREREQ: ACCT160.  
RESTRICTIONS: MIS minors only. Not open to CIS majors in the MIS minor
- BUEC 330 DATABASE DESIGN AND IMPLEMENTATION** 3  
Covers the design and implementation of enterprise databases in the business environment. A networked setting and its effect on database management will be emphasized.  
PREREQ: BUEC325 or CISC181.  
RESTRICTIONS: MIS majors and minors only. Not open to CIS majors in the MIS minor.
- BUEC 366 INDEPENDENT STUDY** 1-6
- BUEC 427 INFORMATION TECHNOLOGY APPLICATIONS IN MANAGEMENT** 3  
Explores practical applications of information technology in all aspects of management including organizational behavior, human resource management, international management and strategic decision making. Issues of managing emerging technologies, integrating technologies with people, organizational culture and structure and strategic decision making will be discussed.  
PREREQ: BUAD309.  
RESTRICTIONS: Open to management majors only



**BUEC 430 SYSTEMS ANALYSIS AND IMPLEMENTATION 3**

Covers the challenges of developing and managing systems analysis and design projects. Students learn to determine systems requirements, analyze systems problems, model potential solutions and design and implement these solutions. Other current topics will be included to reflect the changing information systems environment.

PREREQ: BUEC325 and BUEC330, or CISC181 and CISC437.  
RESTRICTIONS: Open to MIS majors and minors only.

**BUEC 431 TECHNOLOGICAL PROBLEM SOLVING 3**

Design and implementation of behavioral and quantitative models to aid decision makers. A project designing and implementing an actual decision support system is required. Emphasis on an effective design, implementation and use of existing models of decision support.

PREREQ: BUEC430.  
COREQ: BUEC432.

RESTRICTIONS: Open to MIS majors and minors only.

**BUEC 432 PROBLEM SOLVING PROJECT MANAGEMENT 3**

Capstone course in the Business and Economics MIS minor. Emphasis on applying the concepts of project management to real management information problems.

PREREQ: BUEC430.  
COREQ: BUEC431.

RESTRICTIONS: Open to MIS majors and minors only.

**BUEC 466 INDEPENDENT STUDY 1-6****BUEC 810 TELECOMMUNICATIONS & NETWORKS I 3**

See CPEG810 for course description.

RESTRICTIONS: Preference given to students in the M.S. in Information Systems and Technology Management program.

**BUEC 811 TELECOMMUNICATIONS & NETWORKS II 3**

See CPEG811 for course description.

PREREQ: CPEG/BUEC810.  
COREQ: CPEG/BUEC810.

RESTRICTIONS: Preference given to students in the M.S. in Information Systems and Technology Management Program.

**BUEC 830 DECISION SUPPORT AND ANALYSIS 3**

Considers how to structure and define complex business decision problems; the analytical framework and techniques required to understand the problem; where the data needed for the analysis resides in the organization and the tools and techniques needed to obtain it.

RESTRICTIONS: Preference given to students in the M.S. in Information Systems and Technology Management program.

**BUEC 840 PROJECT MANAGEMENT AND COSTING 3**

Provides the technical knowledge and skills needed to successfully plan, execute and evaluate IT projects. Strong emphasis on the costing of IT projects.

RESTRICTIONS: Preference given to students in the M.S. in Information Systems and Technology Management program.

**BUEC 850 SECURITY AND CONTROL 3**

Considers state-of-the-art technological and organizational approaches to enhancing the security and integrity of corporate information resources in a cost-effective manner.

RESTRICTIONS: Preference given to students in the M.S. in Information Systems and Technology Management program.

**BUEC 860 HIGH TECHNOLOGY ENTREPRENEURSHIP 3**

Focuses on the critical financial, legal, scientific and engineering issues that must be confronted during the initial planning stages of a start-up enterprise. Students work in teams to develop a business plan for a real world business product offering.

**BUEC 865 SEMINAR 1-3**

Taught from an IT perspective and provides a background for understanding the information needs of an organization's business processes. Topics include accounting for an IT environment; business processes and operations management; finance; marketing; management; and programming.

RESTRICTIONS: Open only to students in the M.S. in Information Systems and Technology Management program.

**BUEC 870 STRATEGIC IT MANAGEMENT 2**

Explores how information technologies are used to enhance the strategic goals of the organization. Examines the relationship between broad strategic goals and organizational mission, and specific tactical IT responses. Considers the strategic importance of ERP, CRM, corporate intelligence, knowledge sharing, etc.

RESTRICTIONS: Preference given to students in the M.S. in Information Systems and Technology Management program.

**BUEC 871 HIGH TECHNOLOGY SEMINAR 1**

Series of guest speakers on various IT topics.

RESTRICTIONS: Preference given to students in the M.S. in Information Systems and Technology Management program.

**BUEC 873 INFORMATION TECHNOLOGY AND ORGANIZATIONAL EFFECTIVENESS 3**

Examines how information and communication technologies combine with work processes and organizational structures to enhance organizational performance. Develops skills in recognizing opportunities for technology interventions and in effectively implementing technologically enhanced change.

PREREQ: BUAD870.

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**COGNITIVE SCIENCE**

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**CGSC 266 SPECIAL PROBLEM 1-3****CGSC 270 INTRODUCTION TO COGNITIVE SCIENCE 3**

Introduces the symbolic view of mind embodied in cognitive science. Concentrates on the 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 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 441 COMPUTERS AND COGNITION 3**

See PSYC441 for course description.

**CGSC 481 ARTIFICIAL INTELLIGENCE 3**

See CISC481 for course description.

**CGSC 485 SEMINAR IN COGNITIVE SCIENCE 3**

Intensive study of topics in cognitive science, such as mental representation, vision, computational modeling, disorders.

RESTRICTIONS: May be repeated for credit as topic changes.

**CGSC 496 PSYCHOLINGUISTICS 3**

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 630 NEURONS AND NETWORKS 3**

See CPEG630 for course description.

PREREQ: Senior standing or graduate student standing.

**CGSC 642 MENTAL REPRESENTATION AND MEMORY 3**

See PSYC642 for course description.

**CGSC 666 SPECIAL PROBLEM 1-12****CGSC 681 ARTIFICIAL INTELLIGENCE 3**

See CISC681 for course description.

**CGSC 685 SEMINAR IN COGNITIVE SCIENCE 3**

Intensive study of topics in cognitive science, such as mental representation, vision, computational modeling, disorders.

RESTRICTIONS: May be repeated for credit as topic changes.

**CGSC 696 PSYCHOLINGUISTICS 3**

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 866 INDEPENDENT STUDY 1-12****CGSC 890 STUDIES IN COGNITIVE SCIENCE 3**

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** **3**  
Development of quantitative models for physical systems using a combination of conservation principles and carefully focused experimental data. Stresses the conservation of matter and energy  
PREREQ: A minimum grade of C- in MATH242  
COREQ: MATH243

**CHEG 166 SPECIAL PROBLEM** **1-3**  
RESTRICTIONS: Course will not count toward graduation in Chemical Engineering

**CHEG 231 CHEMICAL ENGINEERING THERMODYNAMICS** **3**  
The first law energy balance; the entropy balance; thermodynamic constitutive equations for gases and liquids; thermodynamic cycles and energy conversion; and stability. Kinetic Theory and Partition functions.  
PREREQ: A minimum grade of C- in CHEG112 or, for environmental engineering majors, in CIEG233. A minimum grade of C- in MATH243  
COREQ: CHEM443.

**CHEG 266 SPECIAL PROBLEM** **1-3**  
RESTRICTIONS: Course will not count toward graduation in chemical engineering.

**CHEG 305 APPLIED MATHEMATICS FOR CHEMICAL ENGINEERING** **3**  
See MATH305 for course description  
PREREQ: A minimum grade of C- in MATH243 and CHEG112.

**CHEG 320 ENGINEERING ECONOMICS AND RISK ANALYSIS** **3**  
Principles of engineering economics, uncertainty and risk assessment within the context of chemical engineering analysis and design.  
PREREQ: A minimum grade of C- in MATH305 and CHEG112.

**CHEG 325 CHEMICAL ENGINEERING THERMODYNAMICS** **3**  
A continuation of CHEG231. The thermodynamics of mixtures; phase and chemical equilibrium. Application to staged separation processes, particularly distillation.  
PREREQ: A minimum grade of C- in CHEG231.

**CHEG 332 CHEMICAL ENGINEERING KINETICS** **3**  
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: A minimum grade of C- in MATH302 and CHEG325.

**CHEG 341 FLUID MECHANICS** **3**  
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: A minimum grade of C- in CHEG231 and MATH302.

**CHEG 342 HEAT AND MASS TRANSFER** **3**  
Theory of heat transfer in flow and nonflow systems. Fundamentals of mass transfer. Empirical correlations for transfer in free and forced convection; and application to process engineering problems  
PREREQ: A minimum grade of C- in CHEG341, or for environmental engineering majors, in CIEG305.

**CHEG 345 CHEMICAL ENGINEERING LABORATORY I** **3**  
Laboratory studies demonstrating the principles of fluid mechanics, heat transfer, mass transfer and thermodynamics. Emphasis on correlation of experimental results and on written and oral presentation.  
PREREQ: A 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**  
Analysis of transient behavior of chemical processing equipment and chemical reactors. Modeling and identification of process systems. Design of linear control systems. Introduction to model-based, multivariable and statistical process control  
PREREQ: A minimum grade of C- in MATH305, CHEG332 and CHEG342  
COREQ: CHEG443.

**CHEG 432 CHEMICAL PROCESS ANALYSIS** **3**  
A study of the economic/energy utilization/environmental principles of conceptual process design. The optimization of a design along with the safety and ethics issues are taught by several case process synthesis studies.  
PREREQ: A minimum grade of C- in CHEG320, CHEG332, CHEG401 and CHEG443.

**CHEG 443 MASS TRANSFER OPERATIONS** **3**  
Application of chemical engineering fundamentals to the 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: A minimum grade of C- in CHEG325 and CHEG342

**CHEG 445 CHEMICAL ENGINEERING LABORATORY II** **3**  
Intensive laboratory experiments illustrate the application of chemical and physical principles to industrial processes. Expands upon CHEG332 and CHEG443. Technical report writing emphasized.  
PREREQ: A minimum grade of C- in CHEG332, CHEG342 and CHEG345.  
COREQ: CHEG443

**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

**CHEG 474 CHEMICAL ENGINEERING PROJECTS** **3**  
A 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. First course in the polymer science sequence  
May be cross-listed with MSEG600.

**CHEG 601 STRUCTURE AND PROPERTIES OF POLYMER MATERIALS** **3**  
See MSEG601 for course description.

**CHEG 602 POLYMER PROCESS ANALYSIS AND DESIGN** **3**  
Development of the tools of continuum mechanics necessary for the 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 605 MULTIPHASE FLUID MECHANICS** **3**  
Presents topics in fluid dynamics of practical importance in the 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 610 INDUSTRIAL AND ENGINEERING CHEMISTRY** **3**  
Investigation of the role of chemistry and engineering in important industrial processes. Emphasis on innovations in chemical processing routes based on the 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 the case study approach. Emphasis on analyzing heat balance and heat transfer equations with their proper boundary conditions.  
PREREQ: CHEG342.

**CHEG 615 SPECIAL TOPICS IN MIXING** **3**  
Introduces basic principles of fluid dynamics, rheology and turbulence that dictate the mixing behavior required to implement a desired process result. Agitation in vessels and pipeline and viscous mixing discussed. Emphasis on recent research on the 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: CHEG325 and CHEM444.

**CHEG 617 COLLOID SCIENCE AND ENGINEERING 3**

Surface thermodynamics and intermolecular forces are related to the 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 the foundation for understanding the transport and fate of chemical materials in the environment, and how these materials may possibly affect human health and ecology. The principles of heat, mass and momentum transfer, and chemical reaction kinetics are used to develop a quantitative understanding of transport and fate. These are used in conjunction with risk analysis and risk assessment practices to understand how environmental policy evolves.

PREREQ: CHEG325 and CHEG341.

COREQ: CHEG342.

**CHEG 650 BIOMEDICAL ENGINEERING I 3**

Application of engineering concepts and techniques to problems in biomedicine. Mass transfer and chemical reactions in the body, drug distribution, kidney and other organ physiology, and artificial organs.

PREREQ: Upper division or graduate standing in engineering or equivalent.

COREQ: CHEG443.

**CHEG 801 PROCESS CONTROL AND DYNAMICS 3**

Advanced concepts on MIMO system modeling, identification, analysis and control appropriate to the chemical and allied industries. Model Predictive Control; robust control and Nonlinear control; statistical methods.

Introduction to control systems in physiological processes.

PREREQ: Undergraduate control course.

**CHEG 823 TRANSMISSION ELECTRON MICROSCOPY IN MATERIALS SCIENCE 3**

See MSEG823 for course description.

**CHEG 825 CHEMICAL ENGINEERING THERMODYNAMICS 3**

Applications of classical and molecular thermodynamics to industrial problems in chemical and phase equilibrium. Topics include nonideal solutions, high pressure systems, complex reaction equilibria, generalized correlations and equations of state.

PREREQ: CHEG325 and CHEM444.

**CHEG 827 CHEMICAL ENGINEERING PROBLEMS 2-3**

The application of numerical methods for the solution of chemical engineering problems. Linear and nonlinear analysis. Numerical methods applied to the solution of ODE's, PDE's and optimization problems with applications to fluid flow, heat and mass transfer reaction engineering. Monte-Carlo and molecular dynamics.

PREREQ: Undergraduate linear algebra and differential equations course.

**CHEG 828 STATISTICAL THERMODYNAMICS 2-3**

A discussion of the concepts of classical statistical mechanics, with special emphasis on applications, thermodynamic modeling and physical properties correlations.

PREREQ: CHEG825 or equivalent.

**CHEG 830 FLUID MECHANICS 3**

Use of field equations of motion and a variety of constitutive assumptions to solve problems involving both laminar and turbulent flows. Emphasizes polymer processing, fluids transport and boundary layer theory.

PREREQ: Undergraduate study in fluid mechanics or transport phenomena.

**CHEG 832 TRANSPORT AND RELAXATION PHENOMENA IN POLYMERS 3**

Modeling and key experimental findings of transport and relaxation phenomena in polymer melts and solutions. Macroscopic descriptions are connected to microstructure with emphasis on structure property relations. Polymer rheology and linear viscoelasticity. Nonisothermal flows, heat transfer and diffusion in polymers stress induced migration, phase transitions and crystallization.

PREREQ: Graduate courses on fluid mechanics, thermodynamics and diffusional operations.

**CHEG 835 APPLIED CHEMICAL KINETICS 3**

Application of modern computational methods and recent experimental data to the analysis of reaction mechanisms and reacting flows. Applications from catalytic, polymerization, materials and biological processes are discussed.

PREREQ: Requires undergraduate reaction engineering and physical chemistry.

**CHEG 836 ADVANCED CHEMICAL KINETICS 3**

Examination of the physical interpretation of kinetic rate expressions via elementary reaction steps, transition state theory, estimation of enthalpies and entropies of activation. Development of reaction networks from elementary kinetic steps using concepts of the steady-state approximation, rate determining step and most abundant reaction intermediate. Application to thermal cracking, pyrolysis, polymerization, combustion and heterogeneous catalysis.

**CHEG 863 DIFFUSIONAL OPERATIONS 3**

Advanced coverage of the latest theoretical and experimental studies in several fields involving mass transfer. These fields include humidification, absorption, extraction, distillation, ion exchange and adsorption.

PREREQ: CHEM444.

**CHEG 868 RESEARCH 1-9****CHEG 869 MASTER'S THESIS 1-6**

Laboratory study of some phase of chemical engineering on which information is lacking, with the goals of contributing new data and theory. Although supervised, work will be independent in nature to encourage the development of initiative.

**CHEG 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.

**CHEG 969 DOCTORAL DISSERTATION 1-12 PF**

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**CHEMISTRY AND BIOCHEMISTRY**

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**CHEM 100 CHEMISTRY AND HUMAN ENVIRONMENT 3**

Non-mathematical introduction to chemistry, emphasizing how chemistry can be employed to help understand phenomena in the student's environment, demonstrating relationships between chemistry and energy, food, toxic and solid waste, air and water pollution, drugs and other student-generated topics.

**CHEM 101 GENERAL CHEMISTRY 4**

Fundamental laws of chemical action and the properties, uses and methods of preparation of the more important elements and their compounds. Includes one three-hour laboratory per week that introduces basic experiments in general chemistry.

RESTRICTIONS: One year of high school chemistry recommended; high school algebra or concurrent enrollment in MATH010 or higher mathematics course strongly recommended. Only one course among CHEM101, CHEM103, CHEM105 and CHEM111 can count toward graduation.

**CHEM 102 GENERAL CHEMISTRY 4**

A continuation of CHEM101. Includes one three-hour lab per week that is a continuation of the laboratory experience begun in CHEM101.

PREREQ: CHEM101.

RESTRICTIONS: Only one course among CHEM102, CHEM104 and CHEM112 can count toward graduation.

**CHEM 103 GENERAL CHEMISTRY 4**

Matter, the changes that matter undergoes, and the laws governing these changes, with greater emphasis on atomic and molecular structure, chemical bonding, and energy relationships. Properties of gases, liquids, solids and solutions. Includes one three-hour laboratory per week.

COREQ: MATH114 or higher.

RESTRICTIONS: For majors in the physical and natural sciences, mathematics and engineering. One year of high school chemistry strongly recommended. Only one course among CHEM101, CHEM103, CHEM105 and CHEM111 can count toward graduation.

- CHEM 104 GENERAL CHEMISTRY** 4  
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.
- CHEM 105 GENERAL CHEMISTRY** 4  
Nuclear chemistry, periodicity, structure and bonding, classes of reactions, stoichiometry, solution chemistry, chemical 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.
- CHEM 106 ELEMENTARY BIOORGANIC CHEMISTRY** 5  
Survey of organic chemistry and biochemistry. Includes one three-hour laboratory per week that deals with selected concepts in biochemistry and bioorganic chemistry.  
PREREQ: CHEM105.  
RESTRICTIONS: For nursing majors.
- CHEM 111 GENERAL CHEMISTRY** 3  
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, chemical engineering and environmental engineering majors. Only one course among CHEM101, CHEM103, CHEM105 and CHEM111 can count toward graduation.
- CHEM 112 GENERAL CHEMISTRY** 3  
Introduction to most of the major sub-fields 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, chemical engineering and environmental engineering majors. Only one course among CHEM102, CHEM104 and CHEM112 can count toward graduation.
- CHEM 119 QUANTITATIVE CHEMISTRY I** 2  
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, chemical engineering and environmental engineering majors.
- CHEM 120 QUANTITATIVE CHEMISTRY II** 3  
The 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.
- CHEM 166 SPECIAL PROBLEM** 1-3 PF
- CHEM 213 ELEMENTARY ORGANIC CHEMISTRY** 4  
Fundamentals of organic chemistry. Includes one three-hour laboratory per week that introduces basic laboratory techniques of organic chemistry.  
PREREQ: CHEM102 or CHEM104 or CHEM105.  
RESTRICTIONS: Designed for students of agriculture, human resources and medical technology.
- CHEM 214 ELEMENTARY BIOCHEMISTRY** 3  
Principal classes of biomolecules and their structural and metabolic interrelationships.  
PREREQ: CHEM213.
- CHEM 216 ELEMENTARY BIOCHEMISTRY LABORATORY** 1  
Basic manipulations and techniques for the characterization of biomolecules.  
PREREQ: CHEM213.  
COREQ: CHEM214.
- CHEM 220 QUANTITATIVE ANALYSIS** 3  
Chemical equilibria in aqueous solutions; volumetric and gravimetric analysis; and introduction to chromatography and spectrometry.  
PREREQ: CHEM102, CHEM104 or CHEM105.  
COREQ: CHEM221.
- CHEM 221 QUANTITATIVE ANALYSIS LABORATORY** 1  
The practice and application of volumetric and gravimetric analysis, as well as basic chromatographic and spectrometric measurements.  
PREREQ: CHEM102, CHEM104 or CHEM105.  
COREQ: CHEM220.
- CHEM 311 SURVEY OF ORGANIC CHEMISTRY I** 3  
First half of a two-semester survey of the structure, synthesis, and reactions of organic compounds.  
PREREQ: CHEM104.  
RESTRICTIONS: Not for credit for CHEM BS majors. Neither CHEM311 and CHEM321 nor CHEM311 and CHEM331 can both count toward graduation.
- CHEM 312 SURVEY OF ORGANIC CHEMISTRY II** 3  
Second half of a two semester survey of the structure, synthesis and reactions of organic compounds.  
PREREQ: CHEM311.  
RESTRICTIONS: Not for credit for CHEM BS majors. Neither CHEM312 and CHEM322 nor CHEM312 and CHEM332 can both be counted toward graduation.
- CHEM 321 ORGANIC CHEMISTRY** 4  
First half of a two-semester survey of the structure, synthesis, and reactions of organic compounds. Includes one three-hour laboratory per week that introduces the basic laboratory techniques of organic chemistry.  
PREREQ: CHEM104.  
RESTRICTIONS: Not for CHEM BS majors. CHEM321 and CHEM331 cannot both be counted toward graduation.
- CHEM 322 ORGANIC CHEMISTRY** 4  
Second half of a two-semester survey of the structure, synthesis and reactions of organic compounds. Includes one three-hour laboratory per week that introduces the basic laboratory techniques of organic chemistry.  
PREREQ: CHEM321.  
RESTRICTIONS: Not for B.S. credit in chemistry. CHEM322 and CHEM332 cannot both be counted toward graduation.
- CHEM 331 ORGANIC CHEMISTRY** 3  
Major classes and reactions of organic compounds, emphasizing stereochemistry, reaction mechanisms and synthetic methods.  
PREREQ: CHEM104, CHEM112 or CHEM120.  
COREQ: CHEM333.  
RESTRICTIONS: For chemistry, biochemistry, chemical engineering and other majors desiring fuller treatment than in CHEM321. Neither CHEM311 and CHEM321, nor CHEM321 and CHEM331 can both count toward graduation.
- CHEM 332 ORGANIC CHEMISTRY** 3  
Major classes and reactions of organic compounds, emphasizing stereochemistry, reaction mechanisms and synthetic methods.  
PREREQ: CHEM331, CHEM333.  
COREQ: CHEM334.  
RESTRICTIONS: For chemistry, biochemistry, chemical engineering and other majors desiring fuller treatment than in CHEM322. Neither CHEM312 and CHEM322, nor CHEM322 and CHEM332 can both be counted toward graduation.
- CHEM 333 ORGANIC CHEMISTRY MAJORS LABORATORY I** 1-2  
The theory and practice of basic techniques of laboratory work with organic compounds, including separation methods and instrumental methods of analysis and identification.  
PREREQ: CHEM104, or preferably CHEM112, or CHEM120.  
COREQ: CHEM331.  
RESTRICTIONS: Registration for two credits involves both a lecture period and a laboratory period each week.
- CHEM 334 ORGANIC CHEMISTRY MAJORS LABORATORY II** 2  
Continuation of CHEM333. Two lab periods each week.  
PREREQ: CHEM333.  
COREQ: CHEM332.
- CHEM 342 INTRODUCTION TO BIOCHEMISTRY** 3  
Discussion of the nature of scientific research, ethics of science, impact of science on society, role of scientific publication and use of the library. Reading of a series of research papers to gain an understanding of what a biochemist does. Perspectives on the history of biochemistry.  
PREREQ: CHEM331.
- CHEM 366 INDEPENDENT STUDY** 1-3 PF
- CHEM 401 TUTORIAL METHODS OF INSTRUCTION** 1-2  
For group tutor-facilitators in courses where problem-based learning (PBL) is used as a mode of instruction.  
COREQ: Being a Tutor-Facilitator in a PBL course.  
RESTRICTIONS: Open to juniors and seniors only.

<b>CHEM 410 HISTORY OF CHEMISTRY</b>	<b>3</b>	<b>CHEM 527 INTRODUCTORY BIOCHEMISTRY</b>	<b>3</b>
A survey of the development of chemistry's fields of study emphasizing the nature of individual contributions to the subfields of chemistry.		A one-semester survey of the fundamentals of biochemistry PREREQ: CHEM321 or CHEM331; CHEM322 or CHEM332 recommended RESTRICTIONS: For undergraduate majors in biology and chemistry, graduate students in agriculture, biology, nutrition, marine sciences and engineering not using biochemistry professionally. BISC104 or BISC207 strongly recommended	
<b>CHEM 418 INTRODUCTORY PHYSICAL CHEMISTRY I</b>	<b>3</b>	<b>CHEM 608 ENVIRONMENTAL SOIL CHEMISTRY</b>	<b>3</b>
Introduction to the principles of physical chemistry with a focus on thermodynamics, using minimal calculus, for B.A. chemistry and B.S. biochemistry majors. PREREQ: General chemistry; MATH241; PHYS202 or PHYS208. RESTRICTIONS: Not acceptable for B.S. degree in chemistry CHEM418 and CHEM443 cannot both be counted toward graduation		See PLSC608 for course description	
<b>CHEM 419 INTRODUCTORY PHYSICAL CHEMISTRY</b>	<b>3</b>	<b>CHEM 620 ANALYTICAL SPECTROSCOPY</b>	<b>3</b>
Introduction to the principles of physical chemistry with a focus on kinetics and spectroscopy, using minimal calculus, for B.A. chemistry and B.S. biochemistry majors. PREREQ: CHEM418. RESTRICTIONS: Not acceptable for B.S. degree in chemistry CHEM419 and CHEM444 cannot both be counted toward graduation		Experimental aspects of electronic and vibrational spectroscopy. Linear and nonlinear optics; photon counting; Fourier transformation; and topics from the current literature. PREREQ: CHEM437 and CHEM438	
<b>CHEM 424 QUANTUM MECHANICS</b>	<b>3</b>	<b>CHEM 621 CHEMICAL SEPARATIONS</b>	<b>2</b>
See PHYS424 for course description.		Fundamental description of chemical separations. Zone broadening and separation efficiency; and chemistry of separations. Application of fundamental principles to chromatography, electrophoresis, field-flow fractionation and newly emerging techniques. PREREQ: CHEM437 and CHEM438	
<b>CHEM 437 INSTRUMENTAL METHODS</b>	<b>3</b>	<b>CHEM 622 ELECTROANALYTICAL CHEMISTRY</b>	<b>3</b>
Study of the principles of design and application of spectroscopic, chromatographic and electroanalytical instrumentation in chemical analysis. PREREQ: CHEM322 or CHEM332. COREQ: CHEM418 or CHEM443		Analytical applications of electrochemistry: dynamic and steady-state methods of potentiometry, coulometry, voltammetry, and ancillary techniques. RESTRICTIONS: Requires senior or graduate status in chemistry. Offered in fall of even-numbered years	
<b>CHEM 438 INSTRUMENTAL METHODS LABORATORY</b>	<b>1</b>	<b>CHEM 623 CHEMOMETRICS</b>	<b>3</b>
Application of spectroscopic, chromatographic and electroanalytical techniques to the solution of chemical problems PREREQ: CHEM322 or CHEM334. COREQ: CHEM445		An introduction to modern methods of reducing and analyzing chemical data using computers. Covers probability and simple statistics, optimization methods, pattern recognition, factor analysis, chemical calibration, regression, time series analysis of chemical data and data transformation methods PREREQ: CHEM437	
<b>CHEM 443 PHYSICAL CHEMISTRY I</b>	<b>3</b>	<b>CHEM 624 PRINCIPLES OF MASS SPECTROMETRY</b>	<b>3</b>
Application of the principles and methods of mathematics and physics to the quantitative study of chemistry, focusing on thermodynamics. PREREQ: CHEM119, or CHEM220 and CHEM221; MATH242 (MATH243 recommended); PHYS208 (recommended) or PHYS202. RESTRICTIONS: CHEM418 and CHEM443 cannot both be counted toward graduation		Principles of mass spectral measurements for the elucidation of molecular structure; applications to biomolecular materials and topics from the current literature. PREREQ: CHEM437	
<b>CHEM 444 PHYSICAL CHEMISTRY II</b>	<b>3</b>	<b>CHEM 625 CHEMICAL IONIZATION MASS SPECTROMETRY</b>	<b>1</b>
Application of the principles and methods of physics and mathematics to the 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		Analytical applications of ion/molecule reactions. Mechanisms and thermochemical kinetics of gaseous ionic reactions. Correlations of spectra with molecular structure RESTRICTIONS: Requires junior, senior or graduate status in chemistry/biochemistry	
<b>CHEM 445 PHYSICAL CHEMISTRY LABORATORY I</b>	<b>1</b>	<b>CHEM 626 INSTRUMENTAL METHODS IN MASS SPECTROMETRY</b>	<b>1</b>
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		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	
<b>CHEM 446 PHYSICAL CHEMISTRY LABORATORY II</b>	<b>1</b>	<b>CHEM 627 PRACTICAL MASS SPECTROMETRY</b>	<b>1</b>
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		Laboratory experimentation with mass spectrometry. COREQ: CHEM624 recommended as corequisite or prerequisite. RESTRICTIONS: Requires permission of instructor	
<b>CHEM 457 INORGANIC CHEMISTRY</b>	<b>3</b>	<b>CHEM 631 PRACTICE OF SCIENCE</b>	<b>3</b>
Basic theoretical concepts of inorganic chemistry with emphasis on structure, bonding and reactions PREREQ: CHEM418 or CHEM443, and CHEM112		See BISC631 for course description	
<b>CHEM 458 INORGANIC CHEMISTRY LABORATORY</b>	<b>1</b>	<b>CHEM 633 ADVANCED ORGANIC CHEMISTRY: PHYSICAL</b>	<b>3</b>
Laboratory synthesis and characterization of inorganic and organometallic compounds and independent study COREQ: CHEM457		Stereochemistry and reactivity of organic compounds; and reaction mechanisms, structure and bonding PREREQ: CHEM332	
<b>CHEM 465 SENIOR SEMINAR</b>	<b>1 PF</b>	<b>CHEM 634 ADVANCED ORGANIC CHEMISTRY: SYNTHESIS AND REACTIVITY</b>	<b>3</b>
RESTRICTIONS: Requires senior status.		Reactions of organic compounds with emphasis on synthetic methods. PREREQ: CHEM332	
<b>CHEM 466 INDEPENDENT STUDY</b>	<b>1-3 PF</b>	<b>CHEM 641 BIOCHEMISTRY</b>	<b>3</b>
		Structure and function of proteins, enzymes and coenzymes; kinetics and mechanisms; carbohydrate metabolism and its regulation; and citric acid cycle. PREREQ: CHEM322 or CHEM332	
<b>CHEM 468 UNDERGRADUATE RESEARCH</b>	<b>1-6 PF</b>	<b>CHEM 642 BIOCHEMISTRY</b>	<b>3</b>
Chemistry research on an assigned subject under the supervision of a member of the faculty. RESTRICTIONS: Requires permission of instructor. (Letter grade upon completion of written report)		DNA: The vehicle of inheritance. The topology of DNA. Central dogma of molecular biology. The mechanisms of replication, transcription and translation. DNA recombination and repair. Recombinant DNA technology. Chromosomal DNA and its packaging. Gene expression and its control. PREREQ: CHEM641	

<b>CHEM 643 INTERMEDIARY METABOLISM</b>	<b>3</b>	<b>CHEM 673 PRACTICAL NMR SPECTROSCOPY</b>	<b>1</b>
General principles of intermediary metabolism with emphasis on biosynthetic pathways of amino acids, nucleotides, coenzymes, antibiotics and toxic secondary metabolites PREREQ: CHEM642		Elements of NMR spectroscopic techniques, the practical operation of NMR spectrometers, spectral acquisition and special analysis techniques COREQ: CHEM444 recommended RESTRICTIONS: Requires permission of instructor	
<b>CHEM 644 MECHANISMS OF ENZYME CATALYSIS</b>	<b>3</b>	<b>CHEM 674 CHEMICAL DYNAMICS</b>	<b>3</b>
Detailed chemical mechanism of enzyme catalysis for several representatives. Emphasis on kinetic and physical organic methods. PREREQ: CHEM641 or CHEM527		Experimental methods in chemical kinetics, rate laws and mechanisms, statistical and dynamical theories of reaction rates, and applications of the principles and techniques of kinetics to a variety of systems. PREREQ: CHEM444	
<b>CHEM 645 PROTEIN STRUCTURE AND FUNCTION</b>	<b>3</b>	<b>CHEM 677 CHEMICAL THERMODYNAMICS</b>	<b>3</b>
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 a protein's structure relates to its function. PREREQ: CHEM641		The elements of classical and statistical thermodynamics and their application to chemical problems. PREREQ: CHEM443	
<b>CHEM 646 DNA-PROTEIN INTERACTIONS</b>	<b>3</b>	<b>CHEM 680 INTRODUCTORY POLYMER SCIENCE</b>	<b>3</b>
Current topics of DNA-protein interactions which focus on DNA replication, DNA recombination, DNA damage repair, transcription and translation processes PREREQ: CHEM642		Provides a broad foundation in the 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	
<b>CHEM 647 BIOCHEMICAL EVOLUTION</b>	<b>3</b>	<b>CHEM 810 KINETICS AND SURFACE CHEMISTRY OF SOILS</b>	<b>3</b>
The origins and evolution of life as reconstructed from geochemical, biochemical and genetic evidence. PREREQ: CHEM642 or CHEM527		See PLSC810 for course description	
<b>CHEM 648 MEMBRANE BIOCHEMISTRY</b>	<b>3</b>	<b>CHEM 820 SPECIAL TOPICS IN ANALYTICAL CHEMISTRY</b>	<b>1-3</b>
Recent advances in the structure and function of biomembranes and related model systems, with particular reference to molecular and physicochemical mechanisms. PREREQ: CHEM527 or CHEM641		Advanced topics in analytical methods and techniques from the current literature. PREREQ: CHEM620, CHEM621, CHEM622 or CHEM623 RESTRICTIONS: May be repeated for credit when topics vary	
<b>CHEM 649 MOLECULAR BIOPHYSICS</b>	<b>3</b>	<b>CHEM 830 SPECIAL TOPICS IN ORGANIC CHEMISTRY</b>	<b>1-3</b>
Biophysical principles and methods: thermodynamic and kinetic analysis of folding; protein-nucleic acid interactions; ligand binding; spectroscopy; structural methods; modeling; calorimetry; ultracentrifugation; SPR. Problem solving in macromolecular interactions: protein refolding; altering ligand affinity; increasing protein stability; drug design and HTS; protein expression and solubility; protein engineering. PREREQ: CHEM641		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	
<b>CHEM 651 ADVANCED INORGANIC CHEMISTRY I</b>	<b>3</b>	<b>CHEM 840 MODERN TOPICS IN BIOCHEMISTRY</b>	<b>1-3</b>
Inorganic chemistry: application of the principles of structure and reactivity, examples from compounds of both the representative elements and the transition metals. PREREQ: CHEM444 and CHEM457		Detailed examination of a number of problems of current research interest in biochemistry. PREREQ: CHEM641 RESTRICTIONS: May be repeated for credit when topics vary	
<b>CHEM 652 ORGANOMETALLIC CHEMISTRY</b>	<b>3</b>	<b>CHEM 850 SPECIAL TOPICS IN INORGANIC CHEMISTRY</b>	<b>1-3</b>
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; fluxional processes. Followed by applications in homogeneous catalysis and stoichiometric organic synthesis. PREREQ: CHEM444 and CHEM457		Advanced topics selected from the chemistry of the 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	
<b>CHEM 653 BIOINORGANIC CHEMISTRY</b>	<b>3</b>	<b>CHEM 855 MARINE INORGANIC CHEMISTRY</b>	<b>3</b>
Overview of our current understanding of the role of metal ions in the structure and function of proteins, enzymes and nucleic acids including applications in medicine. Emphasis is placed on the synergism between biochemical and synthetic model studies with examples provided by the current literature PREREQ: CHEM457		See MAST850 for course description	
<b>CHEM 654 ADVANCED INORGANIC CHEMISTRY II</b>	<b>3</b>	<b>CHEM 865 SEMINAR</b>	<b>0 PF</b>
A group theoretical approach to structure and bonding in inorganic compounds. PREREQ: CHEM444 and CHEM457		<b>CHEM 868 RESEARCH</b>	<b>1-9</b>
<b>CHEM 671 QUANTUM CHEMISTRY</b>	<b>3</b>	<b>CHEM 869 MASTER'S THESIS</b>	<b>1-6</b>
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		<b>CHEM 874 SPECIAL TOPICS IN PHYSICAL CHEMISTRY</b>	<b>1-3</b>
<b>CHEM 672 ADVANCED QUANTUM CHEMISTRY</b>	<b>3</b>	RESTRICTIONS: Requires permission of instructor. May be repeated for credit when topics vary	
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		<b>CHEM 964 PRE-CANDIDACY STUDY</b>	<b>3-12 PF</b>
		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	
		<b>CHEM 969 DOCTORAL DISSERTATION</b>	<b>1-12 PF</b>
		<b>CHINESE</b>	
		<b>CHIN 105 CHINESE I - ELEMENTARY</b>	<b>4</b>
		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.	

<b>CHIN 106 CHINESE II - ELEMENTARY/INTERMEDIATE</b>	<b>4</b>
Continued practice in the aural, oral, reading and writing skills of Mandarin Chinese including the identification and reproduction of basic Chinese characters. Introduction to formality levels and to reading and writing texts in Chinese characters. PREREQ: CHIN105	
<b>CHIN 107 CHINESE III - INTERMEDIATE</b>	<b>4</b>
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 formality levels, and further comprehending spoken (Koutouyu) and written (Shumianyu) language differences. PREREQ: CHIN106 RESTRICTIONS: Satisfies College of Arts and Science language requirement.	
<b>CHIN 200 CHINESE GRAMMAR AND COMPOSITION</b>	<b>3</b>
Further study of Mandarin Chinese grammar, and further development of all four language skills for communication. Emphasis on grammar and essay writing. PREREQ: CHIN107 or instructor's permission.	
<b>CHIN 205 CHINESE CONVERSATION</b>	<b>3</b>
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: CHIN107 or instructor's permission.	
<b>CHIN 206 CULTURE THROUGH CONVERSATION</b>	<b>3</b>
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: CHIN107 RESTRICTIONS: Taught abroad only.	
<b>CHIN 208 CONTEMPORARY CHINESE SOCIETY</b>	<b>3</b>
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 Science language requirement.	
<b>CHIN 266 SPECIAL PROBLEM</b>	<b>1-4</b>
<b>CHIN 305 CHINESE CONVERSATION AND COMPOSITION</b>	<b>3</b>
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 CHIN200 or CHIN205 or instructor's permission.	
<b>CHIN 355 SPECIAL TOPICS</b>	<b>3</b>
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 CHIN200 or CHIN205 or instructor's permission. RESTRICTIONS: May be repeated for credit when topics vary.	

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**CIVIL AND ENVIRONMENTAL ENGINEERING**


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<b>CIEG 125 INTRODUCTION TO CIVIL ENGINEERING</b>	<b>2 PF</b>
An 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.	
<b>CIEG 126 INTRODUCTION TO SURVEYING AND COMPUTER AIDED DRAFTING</b>	<b>3</b>
Introduction to computer aided drafting with applications from land surveying. Fundamental principals 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.	
<b>CIEG 135 INTRODUCTION TO ENVIRONMENTAL ENGINEERING</b>	<b>1</b>
Overview of environmental engineering discipline. Physical, chemical, biological interactions within the 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 an introduction to proper design approach.	

<b>CIEG 211 STATICS</b>	<b>3</b>
Analysis of force systems and equilibrium of rigid bodies in two and three dimensions. Determination of centers of gravity and of centroids. Analysis of statically determinate trusses, simple frames and "machines". Introduction to the analysis of beams. COREQ: MATH243	
<b>CIEG 212 SOLID MECHANICS</b>	<b>3</b>
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: CIEG211. COREQ: MATH302 or MATH351	
<b>CIEG 213 CIVIL ENGINEERING MATERIALS LABORATORY</b>	<b>1</b>
Experiments in the mechanics of materials and the strength of materials to complement the content of CIEG212. Emphasis on the behavior of civil engineering materials including steel, aluminum, concrete and timber. COREQ: CIEG212.	
<b>CIEG 223 SURVEYING</b>	<b>3</b>
See EGTE223 for course description. PREREQ: EGTE104 or CIEG126.	
<b>CIEG 233 ENVIRONMENTAL ENGINEERING PROCESSES</b>	<b>3</b>
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: CHEM104 or CHEM120; MATH242. RESTRICTIONS: Open to majors only.	
<b>CIEG 301 STRUCTURAL ANALYSIS</b>	<b>4</b>
Design procedures and criteria. Moment, shear and axial force diagrams of statically determinate structures like beams, frames and arches. Displacement, stress and stability analyses of statically determinate and indeterminate structures, using differential equations and the slope deflection method. Energy methods. Introduction to matrix methods. PREREQ: CIEG212, MATH302 COREQ: MATH302 or MATH351	
<b>CIEG 302 STRUCTURAL DESIGN</b>	<b>3-4</b>
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: CIEG301.	
<b>CIEG 305 FLUID MECHANICS</b>	<b>3</b>
Incompressible fluid mechanics: fluid statics, control volume analysis of fluid flows, differential analysis of inviscid and viscous fluid flows and dimensional analysis. PREREQ: MATH302 or MATH351, and CIEG311 or MEEG211.	
<b>CIEG 306 FLUID MECHANICS LABORATORY</b>	<b>1</b>
Experiments in fluid mechanics COREQ: CIEG305	
<b>CIEG 311 DYNAMICS</b>	<b>3</b>
An intermediate-level development of the kinematics and dynamics of particles, systems of particles and rigid bodies. Vibrations of machines and structures. Emphasis on solution of engineering problems by force, energy and momentum methods of analysis. Applications to the dynamics of machines, structures and vehicles. PREREQ: PHYS207 and MATH243.	
<b>CIEG 315 PROBABILITY AND STATISTICS FOR ENGINEERS</b>	<b>3</b>
The 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.	
<b>CIEG 320 SOIL MECHANICS</b>	<b>3</b>
Soil properties, soil-water interaction, soil stresses, two-dimensional flow, soil compressibility, shear strength and lateral earth pressures. PREREQ: CIEG212 and CIEG305 COREQ: CIEG323	



- CIEG 321 GEOTECHNICAL ENGINEERING** 3  
Introduction to Geotechnical Engineering. Topics include shallow foundation analysis and design, deep foundation analysis and design, earth retaining structure analysis and design and introduction to slope stability analysis. PREREQ: CIEG320 and CIEG323.
- CIEG 323 SOIL MECHANICS LABORATORY** 1  
Demonstrates soil properties, soil-water interaction, soil stresses, two-dimensional flow, soil compressibility, shear strength and lateral earth pressures. PREREQ: CIEG212 and CIEG305. COREQ: CIEG320.
- CIEG 331 INTRODUCTION TO ENVIRONMENTAL ENGINEERING** 3  
Introduction to important environmental engineering topics faced by consulting engineers and public works and regulatory agencies, including water treatment, water quality management, wastewater treatment, air pollution control, solid waste management and hazardous waste management. PREREQ: CIEG305.
- CIEG 337 ENVIRONMENTAL ENGINEERING LABORATORY** 3  
Unit operations and unit processes in environmental engineering, with an emphasis on biological processes. Introduction to contaminant transport processes in the subsurface. Utilizes collaborative, problem-based learning within a laboratory context. PREREQ: CIEG438.
- CIEG 351 TRANSPORTATION ENGINEERING** 3  
Four 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** 1-6
- CIEG 381 CIVIL ENGINEERING ANALYSIS** 3  
The study and application of automatic digital computation; the calculus of finite differences; matrices; iterative, numerical and relaxation procedures; and special applications to civil engineering problems. PREREQ: MATH302.
- CIEG 401 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 404 PRESTRESSED CONCRETE DESIGN** 3  
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: CIEG403.
- CIEG 405 MATRIX STRUCTURAL ANALYSIS** 3  
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** 3  
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** 3  
Provides practical insight into the art and science of bridge design. Various design methodologies in use today in the field of bridge design and evaluation are investigated. Bridges of steel, reinforced concrete, prestressed concrete, wood and composite materials are included. PREREQ: CIEG302.
- CIEG 409 FORENSIC ENGINEERING** 3  
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. The main objective is to learn sound engineering practices through the study of failures. PREREQ: CIEG301 and CIEG302.
- CIEG 410 EXPERIMENTAL MECHANICS OF COMPOSITE MATERIALS** 3  
See MSEG410 for course description.
- CIEG 411 STRUCTURAL DYNAMICS DESIGN** 3  
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 415 PROBABILITY-BASED DESIGN** 3  
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, MATH250, MATH450 or equivalent.
- CIEG 417 ADVANCED STRUCTURAL ANALYSES** 3  
Nonlinear vs. linear beam analyses. Nonlinear beam bending equations. Structures with composite cross-section. Structures subjected to mechanical and thermal loads. Superposition principle. Analysis of problems that partially separate from base. Generalized functions and their application for the analysis of structures. Method of initial parameters. Influence line method. PREREQ: CIEG212 and MATH302.
- CIEG 418 CONTINUOUSLY SUPPORTED STRUCTURES** 3  
Analytical properties of various elastic, viscoelastic and elasto-plastic foundation models for describing the base response. Embedded rods subjected to axial forces, torsion and temperature changes. Glued lap joints, long riveted joints and threaded connections. Continuously supported beams and plates. Analysis of mat foundations, concrete pavements for highways and airports, and railroad tracks. Problems in geophysics and composite materials. PREREQ: CIEG212 and MATH302.
- CIEG 421 FOUNDATIONS AND SUBSTRUCTURES** 3  
Design of earth dams, embankments, retaining structures, cofferdams, footings, caissons and piles. Numerical methods, combining soil mechanics and structural analysis. PREREQ: CIEG320/323.
- CIEG 422 EARTH STRUCTURES ENGINEERING** 3  
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** 3  
Geotechnical aspects of waste disposal facilities including landfills, clay liners, and geosynthetic liners. Engineering properties of liner materials, geotechnical characteristic of wastes. Cover systems, leachate collection and removal systems. Contaminant transport. Stability and deformation analysis. RESTRICTIONS: Engineering or science background required.
- CIEG 430 WATER QUALITY MODELING** 3  
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 MECH305.
- 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 the 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 the origins, characteristics and environmental and health effects of priority air pollutants and the equipment commonly used to control emissions of these pollutants from stationary sources. Emphasis placed on understanding the principles, operation and design of different control devices.

PREREQ: CIEG233, CIEG305, and CHEG231 or equivalent.

**CIEG 436 SOLID WASTE MANAGEMENT 3**

Regulatory aspects of solid and hazardous wastes management. Characteristics, generation and collection of solid wastes from an engineering perspective. Landfill regulations; sifting, design, operation, closure; leachate control. Separation processes; composting; incineration. Financing and cost accounting. Resource conservation and recovery.

PREREQ: CIEG233 and CHEG325.

**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: CIEG 233.

**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**

The 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 the 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: CIEG351.

**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 471 INTRODUCTION TO COASTAL ENGINEERING 3**

Problems of design in the 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 the Ocean Engineering Laboratory.

PREREQ: CIEG305.

**CIEG 482 SYSTEMS DESIGN AND OPERATION 3**

Methodology and technique for the 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: CIEG305 and MATH302, 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**

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: CIEG302.

**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 608 INTRODUCTION TO BRIDGE DESIGN 3**

Provides practical insight into the art and science of bridge design. Various design methodologies in use today in the field of bridge design and evaluation are investigated. Bridges of steel, reinforced concrete, prestressed concrete, wood and composite materials are included.

PREREQ: CIEG302.

**CIEG 610 EXPERIMENTAL MECHANICS OF COMPOSITE MATERIALS 3**

See MSEG610 for course description.

**CIEG 611 STRUCTURAL DYNAMICS DESIGN 3**

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 3**

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** 3  
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.
- CIEG 617 ADVANCED STRUCTURAL ANALYSES** 3  
Nonlinear vs. linear beam analyses. Nonlinear beam bending equations. Structures with composite cross-section. Structures subjected to mechanical and thermal loads. Superposition principle. Analysis of problems that partially separate from base. Generalized functions and their application for the analysis of structures. Method of initial parameters. Influence line method. PREREQ: CIEG212 and MATH302.
- CIEG 618 CONTINUOUSLY SUPPORTED STRUCTURES** 3  
Analytical properties of various elastic, viscoelastic and elasto-plastic foundation models for describing the base response. Embedded rods subjected to axial forces, torsion and temperature changes. Glued lap joints, long riveted joints and threaded connections. Continuously supported beams and plates. Analysis of mat foundations, concrete pavements for highways and airports, and railroad tracks. Problems in geophysics and composite materials. PREREQ: CIEG212 and MATH302.
- CIEG 620 SOIL MECHANICS II** 3  
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: CIEG302/323.
- CIEG 621 FOUNDATION ENGINEERING** 3  
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** 3  
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 623 SOIL MECHANICS LAB** 3  
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** 3  
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 GEOENVIRONMENTAL ENGINEERING** 3  
Geotechnical aspects of waste disposal facilities including landfills, clay liners, and geosynthetic liners. Engineering properties of liner materials, geotechnical characteristic of wastes. Cover systems, leachate collection and removal systems. Contaminant transport. Stability and deformation analysis. RESTRICTIONS: Engineering or science background required.
- CIEG 630 WATER QUALITY MODELING** 3  
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** 3  
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** 3  
The principles and applications of aqueous chemistry to environmental systems. Includes a review of general chemistry, with emphasis on the 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** 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 the 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** 3  
Applies the fundamentals of physical phenomena governing the behavior of pollutants to practical problems.
- CIEG 635 AIR POLLUTION AND ITS CONTROL** 3  
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** 3  
Presents fundamental molecular biological concepts which pertain to cellular function in the environment and in engineered environmental treatment systems. Briefly reviews elementary organic chemical classifications. PREREQ: CIEG233.
- CIEG 637 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 639 OCEAN FLUID DYNAMICS** 4  
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 a rotating planet, density vary flows, boundary layers, turbulence. May be cross-listed with MAST691. PREREQ: CIEG305.
- CIEG 650 URBAN TRANSPORTATION SYSTEMS** 3  
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. May be cross-listed with ORES650. RESTRICTIONS: Requires permission of instructor.
- CIEG 652 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 case studies and existing transportation facilities. RESTRICTIONS: Requires permission of instructor.
- CIEG 654 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. RESTRICTIONS: Requires permission of instructor.
- CIEG 659 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 672 WATER WAVE MECHANICS** 3  
Primary emphasis on linear water 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.

<b>CIEG 678</b>	<b>TRANSPORT AND MIXING PROCESSES</b>	<b>3</b>	Application of hydrodynamics to mixing and transport processes in the water environment. PREREQ: CIEG672.
<b>CIEG 679</b>	<b>SEDIMENT TRANSPORT MECHANICS</b>	<b>3</b>	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 the vicinity of structures, and practical applications. PREREQ: CIEG305.
<b>CIEG 680</b>	<b>LITTORAL PROCESSES</b>	<b>3</b>	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.
<b>CIEG 681</b>	<b>WATER WAVE SPECTRA</b>	<b>3</b>	Concepts of amplitude and energy spectra, covariances and cross-spectra; linear response functions; use of the 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
<b>CIEG 682</b>	<b>NEARSHORE HYDRODYNAMICS</b>	<b>3</b>	The mechanics of waves and currents in the 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
<b>CIEG 683</b>	<b>PROBABILISTIC ENGINEERING ANALYSIS</b>	<b>3</b>	Operational techniques, derived distributions and expectations are used to develop random models to analyze and design in a random environment. Applications may span topics in mechanics, stream and reservoir flows and technologic decision making and management
<b>CIEG 693</b>	<b>WAVES IN THE MARINE ENVIRONMENT</b>	<b>3</b>	See MAST693 for course description
<b>CIEG 698</b>	<b>GROUNDWATER FLOW AND CONTAMINANT TRANSPORT</b>	<b>3</b>	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: CIEG305 and MATH302, or permission of instructor.
<b>CIEG 801</b>	<b>ADVANCED TOPICS IN FINITE ELEMENT ANALYSIS</b>	<b>3</b>	Review of elementary aspects of the finite element method. Application of the 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.
<b>CIEG 802</b>	<b>ADVANCED STEEL DESIGN</b>	<b>3</b>	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 the basis and limitations of codes and specifications for steel structures. PREREQ: CIEG302
<b>CIEG 803</b>	<b>ADVANCED CONCRETE DESIGN</b>	<b>3</b>	Application of ultimate strength design procedures to continuous beams and frames, composite members, slabs and arches. Projects and special topics focus attention to the basis and limitations of codes and specifications for concrete structures. PREREQ: CIEG302.
<b>CIEG 811</b>	<b>ADVANCED STRUCTURAL DYNAMICS DESIGN</b>	<b>3</b>	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
<b>CIEG 815</b>	<b>RELIABILITY OF ENGINEERING SYSTEMS</b>	<b>3</b>	Examination of the 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.
<b>CIEG 817</b>	<b>STABILITY OF STRUCTURES</b>	<b>3</b>	Structural instability phenomena caused by static and dynamic loads. Stability analyses of structures by equilibrium, energy and dynamic methods. Conservative and non-conservative problems. Elastic and non-elastic buckling of beams, frames and arches caused by mechanical and thermal loads. Buckling of continuously supported beams, plates, and shells. Delamination buckling in composites. PREREQ: CIEG212 and MATH302
<b>CIEG 820</b>	<b>INELASTIC BEHAVIOR OF GEOMATERIALS</b>	<b>3</b>	Introduces constitutive laws and numerical methods used to characterize the 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 CIEG620 is highly recommended.
<b>CIEG 831</b>	<b>THEORY OF WATER TREATMENT</b>	<b>3</b>	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
<b>CIEG 832</b>	<b>THEORY OF WASTEWATER TREATMENT</b>	<b>3</b>	Composition of wastes; physical, chemical and biological methods of wastewater treatment; treatment and disposal of sludges produced at wastewater treatment plants PREREQ: CIEG636.
<b>CIEG 833</b>	<b>FATE OF ORGANIC POLLUTANTS IN THE ENVIRONMENT</b>	<b>3</b>	Study of processes governing the 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.
<b>CIEG 865</b>	<b>CIVIL ENGINEERING SEMINAR</b>	<b>1</b>	
<b>CIEG 868</b>	<b>RESEARCH</b>	<b>1-6</b>	
<b>CIEG 869</b>	<b>MASTER'S THESIS</b>	<b>1-6</b>	An independent investigation under supervision of a member of the civil engineering graduate faculty.
<b>CIEG 870</b>	<b>OFFSHORE DESIGN</b>	<b>3</b>	Naval hydrodynamics, behavior of submerged and floating bodies, and ship waves. Tsunamis and harbor response. PREREQ: CIEG672 and CIEG639
<b>CIEG 871</b>	<b>COASTAL STRUCTURES</b>	<b>3</b>	Advanced design procedures of coastal structures. Includes statistics and spectra of random sea waves, random sea transformation in the nearshore, design of vertical and rubble mound breakwaters, harbor oscillations and tranquility, and hydraulic model tests
<b>CIEG 872</b>	<b>ADVANCED WATER WAVE MECHANICS</b>	<b>3</b>	Development of finite amplitude wave theories such as solitary, cnoidal stokes and stream function. Application to coastal and ocean engineering problems. PREREQ: CIEG639, CIEG672.
<b>CIEG 964</b>	<b>PRE-CANDIDACY STUDY</b>	<b>3-12 PF</b>	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.
<b>CIEG 969</b>	<b>DOCTORAL DISSERTATION</b>	<b>1-12 PF</b>	

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**COMPUTER AND INFORMATION SCIENCES**


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<b>CISC 101</b>	<b>COMPUTERS AND INFORMATION SYSTEMS</b>	<b>3</b>	Introduces general concepts of computer organization, terminology, usage and discusses the 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 ACCT160 or 260, or FREC135.
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- 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. C is the dominant language of systems and applications development on UNIX platforms and PC's.  
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 the high level language, Fortran. Programming projects illustrate computational problems, styles, and issues that arise in numeric computational science and engineering.
- CISC 135 TOPICS: PROGRAMMING LANGUAGE** 2  
Learning and using a second programming language, with an emphasis on style. Each section will deal with one language: possibilities include ADA, C, COBOL, FORTRAN, LISP or MODULA-2.  
PREREQ: Computer programming course.  
RESTRICTIONS: Credit for CISC135 in a given language is not allowed toward degree when another course in which that language is taught is also taken.
- 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 equivalent programming experience in a high level language  
COREQ: MATH115, MATH 117, 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: A minimum grade of C- in CISC181.  
COREQ: MATH210 or MATH241.
- CISC 250 BUSINESS TELECOMMUNICATION NETWORKS** 3  
Examines the technologies of information transmission currently utilized in the business environment and the implications of these technologies upon the development and implementation of information systems. Provides a basic background in the convergence of voice, data and video services into a common digital network. 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 the basics of machine organization. Programming tools and techniques at the machine and assembly levels. Assembly language programming and computer arithmetic techniques.  
PREREQ: A minimum grade of C- in CISC181. CISC220 recommended.
- 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 the program development process.  
PREREQ: A minimum grade of C- in CISC220  
COREQ: MATH221 or MATH241.
- CISC 301 ELEMENTS OF LOGIC AND AUTOMATA THEORY** 3  
Propositional and predicate logic for general reasoning and advanced applications in knowledge representation in artificial intelligence and data base, logic programming, program correctness and programming semantics. Automata and formal language theory. Background for advanced applications in compilers, computer networks, operating systems and natural language processing.  
PREREQ: A minimum grade of C- in both MATH210 and CISC220.
- CISC 320 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 360 COMPUTER ARCHITECTURE** 3  
Principles and techniques used in the architecture of digital computers. Machine elements and their interrelation. Instruction sets, 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 the development of operating systems and their control programs. Includes management of memory, processors, I/O devices.  
PREREQ: A minimum grade of C- in both CISC220 and CISC260. CPEG222 may be substituted for CISC260. CISC360 recommended.
- CISC 366 INDEPENDENT STUDY** 1-6
- CISC 370 OBJECT ORIENTED PROGRAMMING USING JAVA** 3  
Object oriented programming through use of the Java programming language. Use of Java's extensive library of API's (application programming interfaces). Study of the 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 will 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 insolubility.  
PREREQ: CISC301  
RESTRICTIONS: Credit cannot be received for both CISC401 and CISC601.
- CISC 403 PROGRAM VALIDATION** 3  
Specification and verification of programs. Testing through the use of formal and informal verification techniques, program design is made more effective and product quality (meeting specifications) is enhanced.  
PREREQ: CISC301  
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: CISC301  
RESTRICTIONS: Credit cannot be received for both CISC404 and CISC604.
- CISC 409 TOPICS IN THEORETICAL COMPUTER SCIENCE** 3  
Contents vary to coincide with the 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 423 APPLIED SYMBOLIC COMPUTATION** 3  
Introduction to one or more computer algebra systems, algebraic computation applied to problems in applied mathematics, and individual student projects using symbolic computation to solve a problem from student's own discipline.  
RESTRICTIONS: Credit cannot be received for both CISC423 and CISC623. Offered in alternate years.
- CISC 427 COMPUTER SIMULATION TECHNIQUES** 3  
Modeling and computer simulation of discrete and continuous systems - those characterized by stochastic discrete events and those characterized by differential equations. Study and use of simulation languages.  
PREREQ: CISC220  
RESTRICTIONS: Credit cannot be received for both CISC427 and CISC627.

- CISC 429 TOPICS IN ALGORITHMS AND COMPLEXITY THEORY** 3  
Contents vary to coincide with the interests of students and current faculty.  
RESTRICTIONS: Credit cannot be received for both CISC429 and CISC629
- CISC 437 DATABASE SYSTEMS** 3  
Physical and logical organization of databases. Data retrieval languages, relational database languages, security and integrity, concurrency, distributed databases.  
PREREQ: A 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. CISC320 recommended.  
RESTRICTIONS: Credit cannot be received for both CISC440 and CISC640
- CISC 449 TOPICS IN COMPUTER APPLICATIONS** 3  
Contents will vary to coincide with the 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: CISC301, CISC360 and MATH205  
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  
Important approaches to data and multimedia compression. Lossless techniques: Huffman, dictionary, arithmetic, run length. Lossless applications: GIF, lossless JPEG, Unix compress, facsimile. Lossy techniques: scalar/vector quantization, differential/subband/transform/wavelet encoding. Lossy applications: JPEG, JPEG200, MPEG, MP3.  
PREREQ: CISC220, MATH210, MATH241, MATH205
- CISC 452 TELECOMMUNICATIONS SYSTEMS** 3  
Presents basic concepts in telecommunications, emphasizing topics such as SONET, Cell and Frame Relay and multimedia switching. Concepts of the operation and maintenance of large communications networks are discussed.  
PREREQ: CISC250, or CISC450, or CPEG419.  
RESTRICTIONS: Restricted to CISC and ELEG/CPEG majors and minors.
- 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 the 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 466 INDEPENDENT STUDY** 1-6
- 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 the design and implementation of compilers, with a focus on lexical analysis, parsing and syntax directed translation.  
PREREQ: CISC260 and CISC301.
- 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 the technologies for implementing high performance, sophisticated web sites for applications like e-commerce. Students learn how to install and set-up 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 CISC370  
COREQ: CISC437
- 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: A 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 students to the internals of UNIX, trouble-shooting system and network problems, hardware and software configuration and installation, and security aspects of hosts on the internet. Multi-operating system integration will also be discussed.  
PREREQ: CISC361
- CISC 479 TOPICS IN ARCHITECTURE AND SOFTWARE** 3  
Contents will vary to coincide with the 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 CGSC481  
PREREQ: CISC280 and CISC301  
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
- CISC 489 TOPICS: ARTIFICIAL INTELLIGENCE** 3  
Contents vary to coincide with the 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 the 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 the use of formal and informal verification techniques, program design is made more effective and product quality (meeting specifications) is enhanced.  
PREREQ: CISC301 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: CISC301 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 the 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 the 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 623 APPLIED SYMBOLIC COMPUTATION** 3  
Introduction to one or more computer algebra systems, algebraic computation applied to problems in applied mathematics, and individual student projects using symbolic computation to solve a problem from student's own discipline. May be cross-listed with MATH613.  
RESTRICTIONS: Offered in alternate years. Credit cannot be received for both CISC623 and CISC423
- CISC 633 INTRODUCTION TO COMPUTER INSTRUCTION** 3  
See EDUC633 for course descriptions.
- 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 CISC301 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 649 TOPICS IN COMPUTER APPLICATIONS** 3  
Contents will vary to coincide with the interests of students and current faculty.  
RESTRICTIONS: Credit cannot be received for both CISC649 and CISC449.
- CISC 650 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: CISC360; CISC361 or CISC663  
RESTRICTIONS: Credit cannot be received for both CISC650 and CISC450. Knowledge of probability recommended.
- CISC 651 DATA COMPRESSION IN MULTIMEDIA** 3  
Important approaches to data and multimedia compression. Lossless techniques: Huffman, dictionary, arithmetic, run length. Lossless applications: GIF, lossless JPEG, Unix compress, facsimile. Lossy techniques: scalar/vector quantization, differential/subband/transform/wavelet encoding. Lossy applications: JPEG, JPEG200, MPEG, MP3.  
PREREQ: CISC220, MATH210, MATH241, MATH205, or equivalent.
- CISC 652 TELECOMMUNICATIONS SYSTEMS** 3  
Presents basic concepts in telecommunications emphasizing topics such as SONET, Cell and Frame Relay and multimedia switching. Concepts of the operation and maintenance of large communications networks are discussed.  
PREREQ: CISC450 or CPEG419 or equivalent.  
RESTRICTIONS: Open to CISC, ELEG, and CPEG majors and minors only
- CISC 659 TOPICS IN COMMUNICATIONS, DISTRIBUTED COMPUTING AND NETWORKS** 3  
Contents vary to coincide with the interests of students and faculty.  
PREREQ: CISC650.  
RESTRICTIONS: Credit cannot be received for both CISC659 and CISC459.
- CISC 662 COMPUTER SYSTEMS: ARCHITECTURE** 3  
Recent advances in computer architecture and their impact on architectural design. Multicomputer and multiprocessor architectures. Parallel machines.  
PREREQ: CISC360 or equivalent.  
RESTRICTIONS: Credit cannot be received for both CISC662 and CISC462
- CISC 663 OPERATING SYSTEMS** 3  
Comparison and analysis of strategies for the management of memory, processors, I/O devices and file systems.  
PREREQ: CISC260 or equivalent.  
RESTRICTIONS: Not open to students with credit for CISC361.
- CISC 670 PROGRAMMING LANGUAGES** 3  
Selection, use and implementation of appropriate language(s) for given problems. Syntax, semantics, pragmatics, parameter passing and abstract data types.  
PREREQ: CISC301 or equivalent.  
RESTRICTIONS: Credit cannot be received for both CISC670 and CISC470
- CISC 672 ADVANCED COMPILER CONSTRUCTION** 3  
Advanced design and implementation of programming language translators. Emphasis on parsing methods, run-time, storage management techniques, code generation and optimization.  
PREREQ: CISC320 or equivalent, and CISC601 recommended.  
RESTRICTIONS: Undergraduates must obtain instructor's permission
- CISC 675 OBJECT-ORIENTED SOFTWARE ENGINEERING** 3  
Introduction to software engineering concepts, methodologies and tools. Requirement analysis, specification, design and implementation of object oriented software development process. Students will be presented with several real life examples and homework projects to cover all aspects of object oriented lifecycle, from the requirements to coding in C++.  
RESTRICTIONS: Requires C/C++ and permission of instructor. Credit cannot be received for both CISC675 and CISC475.
- 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 CISC301, 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.
- CISC 689 TOPICS: ARTIFICIAL INTELLIGENCE** 3  
Contents vary to coincide with the interests of students and faculty.  
PREREQ: CISC681  
RESTRICTIONS: Credit cannot be received for both CISC689 and CISC489
- CISC 699 GRADUATE INTERNSHIP** 1 PF  
On-the-job experience performing technical computer science related work.  
RESTRICTIONS: Requires permission of the instructor.
- CISC 801 RECURSIVE FUNCTION THEORY** 3  
Advanced abstract computability (or recursive function) theory with emphasis on the tools underpinning research in the area. Topics include universal programming systems, complexity results, oracular computations and quantifier hierarchies, classification of algorithmically enumerable sets, machine self-reference and priority arguments.  
PREREQ: CISC601.
- CISC 805 THEORY OF MACHINE LEARNING** 3  
Mathematically circumscribes the absolute boundaries of what algorithms can do about learning grammars for languages and programs for functions. Proves results in the 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 the interests of students and faculty.  
PREREQ: CISC601
- CISC 822 ALGEBRAIC ALGORITHMS** 3  
Algorithms for exact symbolic computation with integers of arbitrary size, polynomials, matrices, fields of quotients and modular domains. Key algorithmic problems: GCD, factorization and solution of equations. Key issues: correctness, cost analysis and system design. Key techniques: Chinese remaindering, Hensel lifting and Transforms (FFT).  
PREREQ: CISC621 or CISC623 (preferably both). MATH450 or MATH650 recommended.  
RESTRICTIONS: Offered in alternate years
- CISC 829 ADVANCED TOPICS IN ALGORITHMS AND COMPLEXITY THEORY** 3  
Contents vary to coincide with the interests of students and faculty.



- CISC 841 BIOINFORMATICS 3**  
Algorithms and models for analyzing biological sequences of DNA, protein, and RNA to infer functions, predict structures, and understand evolutionary relationships. Pairwise and multiple alignment, phylogenetic trees, pattern discovery and recognition, hidden Markov models, stochastic context-free grammars and dynamic programming.  
PREREQ: CISC220 or consent of instructor.
- CISC 849 ADVANCED TOPICS IN COMPUTER APPLICATIONS 3**  
Contents vary to coincide with the interests of students and faculty.  
RESTRICTIONS: Requires permission of instructor.
- CISC 852 COMPUTER NETWORK PERFORMANCE 3**  
Performance analysis of local area, wide area and interconnected networks. Queuing delay models, ARQ retransmission strategies, multi-access communication, routing, flow control, congestion control, and network reliability and availability.  
PREREQ: CISC650.
- 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/P). Design of management agents and clients. Concepts of performance management, fault management, configuration management and other management applications.  
PREREQ: CISC650.
- CISC 856 TCP/IP AND UPPER LAYER PROTOCOLS 3**  
Advanced principles and techniques of the 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, IMPP, CNDN, ICMP, SCTP.  
PREREQ: CISC650.
- 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, or equivalent.
- CISC 859 ADVANCED TOPICS IN COMMUNICATIONS, DISTRIBUTED COMPUTING NETWORKS 3**  
Contents vary to coincide with the interests of students and faculty.  
PREREQ: CISC650.
- CISC 861 WIRELESS NETWORKS AND MOBILE COMPUTING 3**  
Provides an 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.
- 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 management; project: developing large scale E-trade software application.  
PREREQ: Good Java programming skills; CISC650 is recommended.  
RESTRICTIONS: Preference given to CIS; EE and CPEG graduate students.
- CISC 868 RESEARCH 1-9**  
Upper-level graduate research oriented toward a student's potential master's thesis or Ph.D. dissertation.
- 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 register allocation, code generation for pipelined, superscalar, VLIW architectures, dependence analysis, locality transformations, 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 codes 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 879 ADVANCED TOPICS IN ARCHITECTURE AND SOFTWARE SYSTEMS 3**  
Contents vary to coincide with the interests of students and faculty.  
PREREQ: CISC662 or CISC663.
- CISC 881 KNOWLEDGE-BASED SYSTEMS 3**  
Architecture of knowledge-based systems, development and application of knowledge bases in systems for expert performance in specialized domains. Knowledge sources, rule-based inference, uncertainty of facts and explanation of reasoning.  
PREREQ: CISC681.
- 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 the 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 the 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 the heterogeneous database, information retrieval and agent-oriented communities. Text indexing, vector-based and probabilistic retrieval, ontological representations and related 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 the interests of students and faculty.  
PREREQ: CISC681.
- CISC 890 COLLOQUIUM: COMPUTER SCIENCE 0 PF**  
Weekly lectures by faculty and visiting researchers provide a broad overview of the scope as well as an 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

<b>CMLT 202</b>	<b>BIBLICAL AND CLASSICAL LITERATURE</b>	<b>3</b>
See ENGL202 for course description.		
<b>CMLT 207</b>	<b>GREAT WRITERS OF THE WESTERN WORLD I: 1100-1700</b>	<b>3</b>
Studies writers such as Dante, Chaucer, Rabelais and Cervantes, in translation. May be cross-listed with ENGL211.		
PREREQ: ENGL110		
<b>CMLT 208</b>	<b>GREAT WRITERS OF THE WESTERN WORLD II: 1650-1950</b>	<b>3</b>
Studies writers such as Moliere, Voltaire, Goethe, Dostoevski, Thomas Mann and Herman Hesse, in translation.		
May be cross-listed with ENGL212.		
PREREQ: ENGL110		
<b>CMLT 217</b>	<b>INTRODUCTION TO FILM</b>	<b>3</b>
See ENGL217 for course description.		
<b>CMLT 218</b>	<b>INTRODUCTION TO DRAMA</b>	<b>3</b>
See ENGL208 for course description.		
<b>CMLT 219</b>	<b>INTRODUCTION TO THE NOVEL</b>	<b>3</b>
See ENGL209 for course description.		
<b>CMLT 293</b>	<b>HONORS SHORT COURSE</b>	<b>1</b>
See ARSC293 for course description.		
<b>CMLT 314</b>	<b>INTRODUCTION TO FOLKLORE AND FOLKLORE</b>	<b>3</b>
See ENGL314 for course description.		
<b>CMLT 316</b>	<b>CLASSICAL MYTHOLOGY</b>	<b>3</b>
See FLT316 for course description.		
<b>CMLT 317</b>	<b>FILM HISTORY</b>	<b>3</b>
See ENGL317 for course description.		
<b>CMLT 318</b>	<b>STUDIES IN FILM</b>	<b>3</b>
See ENGL318 for course description.		
<b>CMLT 320</b>	<b>VARYING AUTHORS AND GENRES</b>	<b>3</b>
See FLT320 for course description.		
<b>CMLT 321</b>	<b>MEDIEVAL LITERATURE AND CULTURE</b>	<b>3</b>
See ENGL321 for course description.		
<b>CMLT 322</b>	<b>TOPICS: CLASSICAL LITERATURE IN TRANSLATION</b>	<b>3</b>
See FLT322 for course description.		
<b>CMLT 330</b>	<b>VARYING AUTHORS, THEMES AND MOVEMENTS</b>	<b>3</b>
See FLT330 for course description.		
<b>CMLT 341</b>	<b>THEATRE/DRAMA: CLASSIC/MEDIEVAL</b>	<b>3</b>
See THEA341 for course description.		
<b>CMLT 342</b>	<b>THEATRE/DRAMA: RENAISSANCE TO 1700</b>	<b>3</b>
See THEA342 for course description.		
<b>CMLT 343</b>	<b>THEATRE/DRAMA: 1700 TO 1900</b>	<b>3</b>
See THEA343 for course description.		
<b>CMLT 344</b>	<b>THEATRE/DRAMA: 1900 TO PRESENT</b>	<b>3</b>
See THEA344 for course description.		
<b>CMLT 360</b>	<b>HUMANITIES COLLOQUIUM</b>	<b>3</b>
See ARSC360 for course description.		
<b>CMLT 361</b>	<b>LITERARY CRITICISM AND THEORY</b>	<b>3</b>
See ENGL361 for course description.		
<b>CMLT 365</b>	<b>STUDIES IN LITERARY GENRES, TYPES AND MOVEMENTS</b>	<b>3</b>
See ENGL365 for course description.		
<b>CMLT 366</b>	<b>INDEPENDENT STUDY</b>	<b>1-3</b>
<b>CMLT 385</b>	<b>STUDIES IN LITERARY CRITICISM AND THEORY</b>	<b>3</b>
See ENGL385 for course description.		
<b>CMLT 390</b>	<b>HONORS COLLOQUIUM</b>	<b>3</b>
See ARSC390 for course description.		
<b>CMLT 465</b>	<b>STUDIES IN LITERATURE GENRES, TYPES AND MOVEMENTS</b>	<b>3</b>
See ENGL365 for course description.		
<b>CMLT 466</b>	<b>INDEPENDENT STUDY</b>	<b>1-3</b>

## CONSUMER STUDIES

<b>CNST 100</b>	<b>LEADERSHIP, INTEGRITY AND CHANGE</b>	<b>3</b>
Introduces students to concepts and theories of leadership to help them develop the skills essential to becoming leaders in the workplace, community and society.		
<b>CNST 101</b>	<b>UNDERSTANDING CONSUMERS</b>	<b>3</b>
Consumer diversity, consumer needs, and how consumer wants are shaped. Questions of social responsibilities will be explored.		
<b>CNST 110</b>	<b>SEEING AND BEING IN A VISUAL WORLD</b>	<b>3</b>
Focuses on how people see, process and respond to visual information embedded in the world, from immediate personal environments to the larger places in which we live. Creative problem solving and innovation are highlighted.		
<b>CNST 114</b>	<b>FASHION, STYLE AND CULTURE</b>	<b>3</b>
Introduces the concepts of fashion, style, and culture as they relate to how products are conceived and developed. The impact of cultural contexts and societal diversity on apparel industry practices are considered.		
<b>CNST 122</b>	<b>APPAREL PRODUCT ASSEMBLY</b>	<b>3</b>
Basic clothing construction procedures, fitting techniques and methods of evaluation for apparel.		
<b>CNST 200</b>	<b>CONSUMER ECONOMICS</b>	<b>3</b>
Consumer decision making, theory of consumer markets, analysis of consumption activities of individuals and families, interaction of consumers, government and the marketplace.		
<b>CNST 201</b>	<b>INTRODUCTION TO CONSUMER POLICY</b>	<b>3</b>
Explores general models of how consumer policies come into being and examines how the relationships between consumers, government and business impact the formulation of these consumer policies.		
<b>CNST 205</b>	<b>LEADERSHIP IN CONSUMER VOICE AND CUSTOMER SERVICE</b>	<b>3</b>
Explores how consumers can use voice to obtain more satisfactory service and how organizations can encourage and use consumer voice for mutual benefit.		
<b>CNST 209</b>	<b>PRESENTATION METHODS AND MEDIA</b>	<b>3</b>
Emphasis is on the development and delivery of presentations including the mechanics of assembly of presentation materials, use of visual-graphic approaches, and use of electronic formats.		
<b>CNST 211</b>	<b>APPAREL PRODUCT DEVELOPMENT</b>	<b>3</b>
Basic clothing construction procedures, fitting techniques and methods of evaluation for apparel.		
RESTRICTIONS: For students with limited or no construction experience. Credit cannot count for both CNST211 and CNST221 except for apparel design majors.		
<b>CNST 213</b>	<b>TWENTIETH CENTURY DESIGN: ETHNIC INFLUENCE</b>	<b>3</b>
Examines the culture and clothing practices of various ethnic groups and their influences on Western apparel fashion and textile arts during the 20th Century.		
<b>CNST 214</b>	<b>COSTUME HISTORY BEFORE 1700</b>	<b>3</b>
Costume as a mirror of civilization in Western Europe and the Near East from antiquity through the 17th century. Influence of societal, economic and aesthetic factors upon the development of costume.		
<b>CNST 215</b>	<b>FUNDAMENTALS OF TEXTILES I</b>	<b>3</b>
Fundamental concepts related to textile materials. Emphasis on structure/property relationships in fibers and yarns. Includes standards and testing.		
PREREQ: CNST114 or CNST211/221 and CHEM102.		
<b>CNST 217</b>	<b>ACCOUNTING PRACTICE FOR MERCHANDISE</b>	<b>3</b>
Introduction to basic accounting principles used in the retailing of apparel and other fashion products. Emphasis placed on the retail method of inventory, perpetual and periodic systems, LIFO, FIFO, development of gross margin statement and the effects of cash/trade discounts and cumulative mark-on on profitability.		
<b>CNST 218</b>	<b>FASHION MERCHANDISING</b>	<b>3</b>
An overview of the fashion industry which examines the interrelationship between primary, auxiliary and retail fashion markets; trends in fashion retailing, promotion and manufacturing.		
<b>CNST 220</b>	<b>FUNDAMENTALS OF TEXTILES II</b>	<b>3</b>
Fundamental concepts of textile materials emphasis on structure/property relationships in cloth forms, and finishing processes (including dye and print application); standards, laws and regulations. It is the second course of a textile sequence.		
PREREQ: CNST215		

- CNST 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: CNST211
- CNST 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: CNST122 for APD majors
- CNST 224 CLOTHING DESIGN AND PRODUCTION SINCE 1700** 3  
Clothing design and production in America and Western Europe since 1700. Study of craft skills, growth of ready-to-wear industry, couture and 20th century manufacturing and fashion centers.
- CNST 225 ARCHITECTURAL DRAWING** 3  
Introduction to the handling of the tools, techniques and terms of architectural drawing and the designing of plans, elevations, sections and drawing of isometrics and perspectives.
- CNST 233 FASHION DRAWING AND RENDERING** 3  
Drawing from the 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
- CNST 235 FAMILY RESOURCE MANAGEMENT** 3  
The study of effective assessment and allocation of human and material resources by individuals and families at different stages in the life cycle
- CNST 242 THE CONSUMER MOVEMENT** 3  
Examines the evolution of the consumer movement over time and the impact of leadership upon the movement's effectiveness.
- CNST 304 LEADERSHIP, POWER AND SOCIAL RESPONSIBILITY** 3  
Examines power as a set of internal and external resources that leaders can use to promote social responsibility to and by consumers.  
PREREQ: CNST100
- CNST 305 CUSTOMER SERVICE AND CONSUMER VOICE** 3  
Explores incentives for seller to respond to consumer requests, comments, and complaints and to encourage customer feedback after purchase and investigates incentives for consumers to request, to comment, and to complain after purchase. Identifies alternative models of consumer satisfaction and dissatisfaction and complaining behaviors. Students design, develop, and evaluate a consumer response system
- CNST 310 HOUSING** 3  
Selection of housing as related to varying income levels and stages in the life cycle; types of housing, government agencies, and design considerations for special groups.
- CNST 311 TOPICS IN CONSUMER RESOURCE MANAGEMENT** 3  
Topics relating to the development of human and economic resources and productive capacity to meet consumer needs over the life span. Topics will vary.
- CNST 312 AMERICAN RESIDENTIAL STYLE** 3  
Historic survey of residential architectural styles from 1700 to present. Emphasis on exterior design elements as they relate to interior layouts, details, ornamentation and furnishings. Field trips
- CNST 313 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 will be emphasized. Students will produce accessories inspired by self-conducted research.  
PREREQ: CNST211
- CNST 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 the torso block. Execution of apparel utilizing dressmaker tailoring techniques.  
PREREQ: CNST221
- CNST 318 FASHION MERCHANDISE PRODUCTS** 3  
Examines various types of fashion merchandise including the range of characteristics, sources and manufacturing processes. Emphasis on leather, furs, jewelry, kitchen and home furnishings, and allied merchandise areas
- CNST 319 DRESS AND CULTURE** 3  
Examination of similarities and differences in the dress of culturally distinct groups: analysis of functions served by dress and factors influencing changes in cultural forms of dress.  
PREREQ: PSYC100 and SOCI201
- CNST 320 FASHION MERCHANDISING INTERNSHIP** 3-6  
An off-campus supervised and coordinated field study program in selected retail stores.  
PREREQ: CNST218  
RESTRICTIONS: Requires permission of instructor. Students may register for 3 or 6 credits. May be repeated once for a maximum of 6 credits total
- CNST 321 TRAVEL STUDY PROGRAM** 1-6  
Study of the domestic and/or international textiles, apparel, interior and allied fashion industries through visits and research projects  
RESTRICTIONS: Requires CNST faculty approval through an application process. Offered at regular intervals.
- CNST 322 RETAIL DESIGN AND CONSUMER BEHAVIOR** 3  
Exploration of the effects of retail design on consumer behavior. Logos, packaging, point-of-purchase display, signage, personnel and store layout shall be examined.  
May be cross-listed with HRIM322.
- CNST 324 APPAREL DESIGN BY DRAPING** 3  
Exploration of three dimensional methods of apparel design. Design and execution of draped garment structures required.  
PREREQ: CNST314
- CNST 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.
- CNST 328 FASHION ADVERTISING AND PROMOTION** 3  
An introduction to advertising and promotion in the fashion industry. Emphasis on the role of advertising and other promotional mix elements that support an integrated marketing communications (IMC) program in the textiles and apparel industry  
PREREQ: CNST218, CNST318, BUAD301
- CNST 330 APPAREL DESIGN INTERNSHIP** 4  
An off-campus, supervised field study program in selected business concerns dealing with apparel design and/or manufacture.  
RESTRICTIONS: Requires permission of instructor
- CNST 332 CONSUMERS, HEALTH AND MEDICAL CARE** 3  
Economic perspective on consumer interests in health, medical insurance and medical care. Emphasis on unusual aspects of health care and health insurance markets and relationships between the markets. Includes important effects of uncertainty on decision making, market institutions and public policy  
PREREQ: ECON151 or ECON100
- CNST 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: CNST233
- CNST 335 CONSUMER FINANCIAL MANAGEMENT** 3  
Analysis of financial models utilized in planning, organizing and initiating a strategy for generating and allocating earned and unearned income. Emphasis on studying consumer financial decision making during various stages of an individual's life cycle (e.g., single, newly-married, single parent, etc.).
- CNST 340 CONSUMER AFFAIRS INTERNSHIP** 3-6  
An off-campus supervised and coordinated field study in selected agencies and organizations.  
RESTRICTIONS: May be repeated once for credit. Requires permission of instructor
- CNST 341 DECISION-MAKING AND LEADERSHIP** 3  
Explores basic decision making theories and models. Examines decision-making as an integral part of leadership in addressing consumer issues  
PREREQ: CNST100
- CNST 342 CONSUMER LAWS AND REGULATIONS** 3  
In-depth examination of consumer legislation and regulation policies at the federal and state level. Major pieces of consumer legislation and the regulatory agencies responsible for implementing and enforcing these policies are examined  
PREREQ: CNST201

<b>CNST 365 FASHION MERCHANDISING AND APPAREL DESIGN SEMINAR</b>	<b>1 PF</b>	Creates awareness of career opportunities and develops techniques for success in apparel design and textile clothing career options. RESTRICTIONS: APD and FM majors only
<b>CNST 366 INDEPENDENT STUDY</b>	<b>1-6</b>	
<b>CNST 380 PRODUCT DEVELOPMENT</b>	<b>3</b>	Introduces concepts and methods that buyers/merchandisers use to create store-branded merchandise for targeted customer segments. The process of developing products, from trend research to production to distribution, is studied. PREREQ: CNST218, CNST222
<b>CNST 401 TOPICS IN CONSUMER POLICY ANALYSIS</b>	<b>3</b>	Topics examine the effects of consumer-oriented policies upon consumer well-being. Topics will vary. PREREQ: CNST201
<b>CNST 404 LEADERSHIP IN ORGANIZATIONS</b>	<b>3</b>	Understanding the process of change and positively affecting change in organizations through the exercise of leadership knowledge. PREREQ: CNST100
<b>CNST 405 CONTROVERSIAL ISSUES: CONSUMER AND FAMILY BEHAVIOR</b>	<b>3</b>	Uses an economic approach to consumer and family behavior to examine how various economic, social, legal and corporate policies impact family investment in human capital. Issues vary by term.
<b>CNST 411 TOPICS IN LEADERSHIP DYNAMICS</b>	<b>3</b>	Topics relating to aspects of leadership. Themes in leadership dynamics will be explored. PREREQ: CNST100
<b>CNST 415 TOPICS IN TEXTILES</b>	<b>3</b>	One topic is covered each semester; either fiber science, textile analysis, or textile dyeing and finishing.
<b>CNST 416 MULTI-CHANNEL MERCHANDISING</b>	<b>3</b>	Examines the scope and application of retail delivery systems including direct marketing technologies. Target market segmentation and product fulfillment will be examined as they apply to the fashion industry. PREREQ: CNST218, CNST318
<b>CNST 418 MERCHANDISE PLANNING</b>	<b>4</b>	Focuses on computer applications related to mathematical concepts and calculations used in developing merchandise budgets. Spreadsheets are used to develop merchandise plans for sales, inventories, markdowns, shrinkage, receipts, open-to-buy and gross margin. Other industry-related planning systems are examined. PREREQ: CNST218, BUAD301, ACCT207 or CNST217, and ACCT160
<b>CNST 419 SOCIAL PSYCHOLOGICAL ASPECTS OF CLOTHING</b>	<b>3</b>	Study of clothing and appearance as contributors to human interactions; consideration of the importance of clothing in individual and collective behavior. Analysis of how dress reflects self-feelings, establishes social identities and affects interpersonal encounters. PREREQ: CNST114, PSYC100 and SOCI201
<b>CNST 420 ASSORTMENT PLANNING AND BUYING STUDIO</b>	<b>2</b>	Explores how merchandise budgets translate into buying decisions. Emphasis on assortment planning and purchasing. Computer applications are involved. PREREQ: CNST418
<b>CNST 421 PROFESSIONAL PORTFOLIO DEVELOPMENT</b>	<b>1</b>	Conceptualization and development of a professional portfolio of design work. Design conceptualization, fashion illustration, and photo documentation techniques will be emphasized. PREREQ: CNST424 RESTRICTIONS: Open to apparel design seniors only
<b>CNST 422 FAMILY FINANCIAL MANAGEMENT</b>	<b>3</b>	Problem-solving approach for resolving family financial problems using a variety of financial management techniques. Primary focus oriented toward financial counseling, financial planning or a combination of the two. PREREQ: CNST335
<b>CNST 424 APPAREL COLLECTION DEVELOPMENT</b>	<b>3</b>	Conceptualization, design and execution of a coordinated apparel collection. Advances and expands knowledge and skills from previous courses. PREREQ: CNST324
<b>CNST 426 FUNDAMENTALS OF TEXTILE CONSERVATION</b>	<b>3</b>	Introduces scientific principles relevant to the cleaning, repair, storage and exhibition of antique textiles. Evaluates treatment procedures that eliminate damaging agents, retard their effects, or shield textiles from them.
<b>CNST 430 TOPICS IN FASHION MARKETING AND PROMOTION</b>	<b>3</b>	Topics related to aspects of marketing and promotional activities in the fashion industry. Current practices and trends within the industry are explored. Topics will vary. PREREQ: CNST218, BUAD301
<b>CNST 433 PRODUCT DEVELOPMENT AND MANAGEMENT STUDIO</b>	<b>3</b>	Focuses on all phases of apparel product development for a targeted market from conceptualization through execution of sample garments for mass production. Further develops skills in computer-aided pattern designing, grading, marker making and data management (e.g., sizing, specifications, operations and costing). Includes field trip. PREREQ: CNST314, CNST333
<b>CNST 435 CONSUMER AND THE ENVIRONMENT</b>	<b>3</b>	Analysis of dwindling energy resources and their effect upon consumer alternatives in the marketplace; sociocultural, family and income aspects of consumer behavior in a high energy consuming society. PREREQ: CNST200, ECON151 or ECON152
<b>CNST 440 DECISION-MAKING AND LEADERSHIP</b>	<b>3</b>	Using systems thinking for decision-making relating to consumer issues. Considerations of leadership in bringing decisions and plans to fruition. Deals with problems arising from economic aspects of systems. PREREQ: CNST100 or CNST404; one of either CNST200, ECON100, ECON151 or ECON152. RESTRICTIONS: Open to juniors and seniors only
<b>CNST 442 CONSUMER WELFARE AND EMPLOYEE BENEFITS</b>	<b>3</b>	A critical analysis and evaluation of employee benefits, emphasizing the employee's needs, rights and alternatives. Benefits to be analyzed include social insurance; group, life, health, dental and disability insurance; qualified retirement plans; and other direct and indirect benefits.
<b>CNST 450 THE HISTORIC INTERIOR</b>	<b>3</b>	Survey of the design and function of interior spaces and furnishings in the context of the cultures and the times from which they evolved. Primary emphasis on Western Europe and America. Primitive cultures, early civilizations and the Orient also explored. Field trips.
<b>CNST 451 CONTEMPORARY FURNISHINGS</b>	<b>3</b>	A survey of modern design evolution in furniture, textiles and the minor arts from the late 19th century to the present. Emphasis on styling and technological forces shaping 20th century design of interior furnishings. Field trips.
<b>CNST 455 TRENDS IN THE GLOBAL ECONOMY</b>	<b>3</b>	Global interdependencies that influence production, distribution, and consumption of goods and services. The diverse roles of government, industry, and consumers in the global economy. PREREQ: ECON151 or ECON152
<b>CNST 465 SEMINAR</b>	<b>1-3 PF</b>	May be repeated to a maximum of three credits.
<b>CNST 466 INDEPENDENT STUDY</b>	<b>1-6</b>	
<b>CNST 490 SENIOR CAPSTONE</b>	<b>3</b>	Students will integrate, synthesize and reflect on the importance of personal ethical conduct and social responsibility as both a producer and consumer of products and services. RESTRICTIONS: Senior CNST majors only
<b>CNST 665 SEMINAR</b>	<b>1-3</b>	
<b>CNST 668 RESEARCH</b>	<b>1-6</b>	
<b>CNST 868 RESEARCH</b>	<b>1-6</b>	
<b>CNST 869 MASTER'S THESIS</b>	<b>1-6</b>	
<b>COMMUNICATION</b>		
<b>COMM 200 TOPICS: HUMAN COMMUNICATION SYSTEMS</b>	<b>3</b>	Analysis of various human communication systems which may include interpersonal, organizational and/or mass.

<b>COMM 245 MASS COMMUNICATION AND CULTURE</b>	<b>3</b>	
The relationship between media and culture; how media affect culture (i.e., socialization and role modeling); and exploration of new forms of mass communication.		
<b>COMM 250 ELECTRONIC COMMUNICATION SKILLS</b>	<b>1 PF</b>	
Provides students with a basic understanding of the Internet and various Internet tools as they are used at the University of Delaware. Course is self-paced and all instruction is on the World Wide Web.		
<b>COMM 251 THE DEVELOPMENT OF VERBAL COMMUNICATION</b>	<b>3</b>	
Investigation of the physiological, linguistic, psychological and social bases of verbal communication. Application of these insights to communicative disorders and to educational and family settings.		
<b>COMM 255 FUNDAMENTALS OF COMMUNICATION</b>	<b>3</b>	
Introduction to theories in communication with applications. Developing, analyzing and critiquing communication in different settings. Includes the practice of oral communication skills. RESTRICTIONS: Not open to seniors or communication majors. Credit not given for both COMM255 and COMM312.		
<b>COMM 256 PRINCIPLES OF COMMUNICATION THEORY</b>	<b>3</b>	
Introduction to theories and research in communication including a survey of the areas of the field.		
<b>COMM 263 INTERNATIONAL SOCIAL CONDUCT</b>	<b>3</b>	
Introduction to basic attitudes toward interpersonal relations and socioeconomic and political responsibilities in various cultures. An experiential course integrating foreign and U.S. students. RESTRICTIONS: Offered only in Winter. Not for major credit.		
<b>COMM 300 INTRODUCTION TO COMMUNICATION PRINCIPLES</b>	<b>3</b>	
A 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 the same material as COMM312, but without the practice of oral communication skills. RESTRICTIONS: Not open to communication majors. Students cannot earn credit for COMM300 and COMM312 or COMM255.		
<b>COMM 301 INTRODUCTION TO COMMUNICATION RESEARCH METHODS</b>	<b>3</b>	
The conceptual bases of research methodology: formulating questions, designing, conducting and analyzing research.		
<b>COMM 309 INTRODUCTION TO PUBLIC RELATIONS</b>	<b>3</b>	
Examination of the public relations process, practices and principles in various settings, including corporations, non-profit organizations, educational institutions and government. Insights are gained through case studies and interviews with public relations professionals.		
<b>COMM 310 TOPICS: MASS COMMUNICATION HONORS PRO-SEMINAR</b>	<b>1-4</b>	
Focus on areas of study in mass communication. Will enhance and expand on other communication courses offered as a co-requisite. May be repeated for credit when topics vary. COREQ: A list of co-requisites will be available to students each semester. RESTRICTIONS: Students with 3.0 or higher GPA.		
<b>COMM 311 PUBLIC RELATIONS WRITING</b>	<b>3</b>	
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 and ENGL307.		
<b>COMM 312 ORAL COMMUNICATION IN BUSINESS</b>	<b>3</b>	
Includes an analysis of the types and principles of the communication inherent in the business and professional setting; a concentration upon the 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 COMM312 and COMM255.		
<b>COMM 313 COMMUNICATION PRINCIPLES IN ADVERTISING</b>	<b>3</b>	
Provides students with the basic concepts of advertising, including an exploration of the role of advertising in marketing, the use of various advertising media and the processes and features of advertising campaigns.		
<b>COMM 318 TOPICS IN MASS COMMUNICATION</b>	<b>1-3</b>	
Focus on introductory areas of study in mass communication. RESTRICTIONS: May be repeated three times for credit when topics vary.		
<b>COMM 319 TOPICS IN POLITICS AND BROADCAST JOURNALISM</b>	<b>3</b>	
Topics vary and may include the influence of the media on foreign policy, the responsibility of the media on foreign policy or for policy failures or successes. May be cross-listed with POSC319. RESTRICTIONS: For majors only.		
<b>COMM 320 TOPICS: INTERPERSONAL COMMUNICATION HONORS PRO-SEMINAR</b>	<b>1-4</b>	
Focus on areas of study in interpersonal communication. Will enhance and expand on other communication courses offered as a co-requisite. May be repeated for credit when topics vary. COREQ: Co-requisite courses offered will vary from semester to semester. Students will be supplied with a list of co-requisites each semester. RESTRICTIONS: Students with a 3.0 GPA or higher.		
<b>COMM 325 STUDIO TELEVISION PRODUCTION</b>	<b>3</b>	
Television as a mass communication media. Background, programming, production and studio procedures in educational television, broadcasting and closed circuit. Laboratory observation and practices.		
<b>COMM 326 FIELD TELEVISION PRODUCTION</b>	<b>3</b>	
Analysis and synthesis of the production, planning and videotaping of TV programs; news and public affairs, drama, variety and instructional programming.		
<b>COMM 327 TELEVISION PRODUCTION LABORATORY I</b>	<b>1 PF</b>	
Practice of TV production techniques. RESTRICTIONS: Permission required from department.		
<b>COMM 328 TELEVISION PRODUCTION LABORATORY II</b>	<b>1 PF</b>	
Further practice of TV production techniques. RESTRICTIONS: Permission required from department.		
<b>COMM 330 COMMUNICATION AND INTERPERSONAL BEHAVIOR</b>	<b>3</b>	
Introduces key principles of interpersonal communication and discusses their application across diverse contexts.		
<b>COMM 340 POLITICS AND THE MEDIA</b>	<b>3</b>	
See POSC340 for course description. RESTRICTIONS: For majors only.		
<b>COMM 341 THEORIES OF INTERPERSONAL COMMUNICATION</b>	<b>3</b>	
Survey of concepts and theories in interpersonal communication. Focuses on dyadic interaction and relationships as created, maintained, and modified through verbal and nonverbal behavior.		
<b>COMM 342 TOPICS IN ORGANIZATIONAL COMMUNICATION</b>	<b>1-3</b>	
Focuses on introductory areas of study in organizational communication. RESTRICTIONS: May be repeated three times for credit when topics vary.		
<b>COMM 343 TOPICS IN INTERPERSONAL COMMUNICATION</b>	<b>1-3</b>	
Focuses on introductory areas of study in interpersonal communication. RESTRICTIONS: May be repeated three times for credit when topics vary.		
<b>COMM 345 LEGAL ISSUES OF THE MASS MEDIA</b>	<b>3</b>	
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.		
<b>COMM 350 PUBLIC SPEAKING</b>	<b>3</b>	
Analyzes and applies theory and research in public speaking. Develops skills in preparation, presentation and evaluation of speeches. Includes classroom performances.		
<b>COMM 356 SMALL GROUP COMMUNICATION</b>	<b>3</b>	
Examines basic group processes, structures and functions. Emphasizes both theory and practical applications. RESTRICTIONS: Requires permission of instructor.		
<b>COMM 364 INTERNSHIP</b>	<b>1-3 PF</b>	
Practical, on-the-job training in the 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.		
<b>COMM 366 INDEPENDENT STUDY</b>	<b>1-3</b>	
<b>COMM 370 THEORIES OF MASS COMMUNICATION</b>	<b>3</b>	
An examination of the 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.		

<b>COMM 388 TELEVISION PRODUCTION PRACTICUM</b>	<b>3</b>	<b>COMM 440 TOPICS IN INTERPERSONAL COMMUNICATION</b>	<b>3</b>
A special topics video/audio course that acts as the 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.		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.	
<b>COMM 401 CAREERS IN COMMUNICATION</b>	<b>1 PF</b>	<b>COMM 442 TOPICS IN ORGANIZATIONAL COMMUNICATION</b>	<b>3</b>
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		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.	
<b>COMM 408 NEW MEDIA PROJECT DEVELOPMENT</b>	<b>3</b>	<b>COMM 444 GLOBAL AGENDA</b>	<b>3</b>
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.		See POSC444	
<b>COMM 409 PUBLIC RELATIONS CAMPAIGN PLANNING</b>	<b>3</b>	<b>COMM 450 MASS COMMUNICATION EFFECTS</b>	<b>3</b>
Application of the public relations process in designing a public relations plan for a non-profit client. Includes conducting research, setting objectives, developing strategies, designing special events and making recommendations for implementation and evaluation. PREREQ: COMM309 and ENGL307.		Examines the history and nature of research on the effects of the mass media, particularly television, in such areas as attitude change, socialization, role modeling and sex and violence. PREREQ: COMM370. RESTRICTIONS: Requires permission of instructor.	
<b>COMM 413 PUBLIC RELATIONS MANAGEMENT</b>	<b>3</b>	<b>COMM 452 COMMUNICATION AND PERSUASION</b>	<b>3</b>
Examination of the effects of management systems on the public relations function and the managerial role of the public relations practitioner. Includes in-depth analysis of complex cases, preparation of a crisis communications plan for a non-profit client and several writing projects geared to specific audiences. PREREQ: ENGL307 and COMM309		An examination of how influence is 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 the various content areas studied.	
<b>COMM 417 COMMUNICATION AND THE MANAGEMENT OF CONFLICT</b>	<b>3</b>	<b>COMM 454 CHILDREN AND THE MASS MEDIA</b>	<b>3</b>
An overview of communication and the conflict process in face-to-face interaction. Emphasis on theories concerning the structure, analysis, and management of conflict situations.		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 the media's contribution to social values and roles.	
<b>COMM 418 TOPICS IN MASS COMMUNICATION</b>	<b>3</b>	<b>COMM 456 COMMUNICATION IN ORGANIZATIONS</b>	<b>3</b>
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.		Introduction to concepts and research related to communication processes in organizational settings. Both traditional and interpretive approaches are emphasized.	
<b>COMM 421 INTERCULTURAL COMMUNICATION: APPLICATIONS IN INTERNATIONAL CONTEXTS</b>	<b>3</b>	<b>COMM 466 INDEPENDENT STUDY</b>	<b>1-3</b>
Students critically assess current intercultural communication theory and apply that theory to practical situations in various international contexts. RESTRICTIONS: Requires permission of instructor. Offered in Madrid, Spain and Costa Rica only		<b>COMM 485 ANALYSIS OF FACE-TO-FACE COMMUNICATION</b>	<b>3</b>
<b>COMM 424 MEDIA MESSAGE ANALYSIS</b>	<b>3</b>	An examination of methods for analyzing face-to-face interaction, message construction, and message interpretation.	
Examination of methodology used to study media content and effects. Focus on past and ongoing research in broadcast, nonbroadcast and print media. The method of how to conduct and assess research relating to the mass media. PREREQ: COMM370. RESTRICTIONS: Requires permission of instructor.		<b>COMM 486 MULTIMEDIA LITERACY</b>	<b>3</b>
<b>COMM 425 ADVANCED TOPICS IN POLITICS AND BROADCAST JOURNALISM 3</b>		See EDUC485 for course description	
Topics vary and may include the influence of crisis news on national and international politics, the effectiveness of political documentaries and the 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.		<b>COMM 601 EPISTEMOLOGY AND THEORY IN COMMUNICATION</b>	<b>3</b>
<b>COMM 427 BROADCAST NEWS</b>	<b>4</b>	General issues in the philosophy of knowledge and science critical for the understanding of theoretical conceptions and a comprehensive survey of theories in communication. RESTRICTIONS: Open to graduate students only.	
Communication students learn the 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 a weekly news program in the lab. RESTRICTIONS: Open to communication majors only.		<b>COMM 603 COMMUNICATION RESEARCH METHODS - PROCEDURES</b>	<b>3</b>
<b>COMM 438 SPEECH, LANGUAGE AND COMMUNICATION</b>	<b>3</b>	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 an introduction to using the computer in research. RESTRICTIONS: Open to graduate students only.	
Analysis of theories of meaning, models of language use and acquisition, and the relationship between language and cognition		<b>COMM 604 COMMUNICATION RESEARCH METHODS - ANALYSIS</b>	<b>3</b>
		Introduction to the 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.	
		<b>COMM 609 PUBLIC RELATIONS CAMPAIGN PLANNING</b>	<b>3</b>
		Application of the public relations process in designing a public relations plan for a non-profit client. Includes conducting research, setting objectives, developing strategies, designing special events and making recommendations for implementation and evaluation.	
		<b>COMM 610 ORGANIZATIONAL COMMUNICATION THEORY</b>	<b>3</b>
		An 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**

3

Examination of the effects of management systems on the public relations function and the managerial role of the public relations practitioner. Includes in-depth analysis of complex cases, preparation of a crisis communications plan for a non-profit client and several writing projects geared to specific audiences.

**COMM 617 COMMUNICATION AND THE MANAGEMENT OF CONFLICT**

3

An 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**

3

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**

3

Students 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**

3

Examination of methodology used to study media content and effects. Focus on past and ongoing research in broadcast, nonbroadcast and print media. The method of how to conduct and assess research relating to the mass media.

**COMM 625 ADVANCED TOPICS IN POLITICAL AND BROADCAST JOURNALISM**

3

Topics vary and focus on significant areas in politics and broadcast journalism. Topics may include crises news, political documentaries, broadcast presentations and credibility.  
RESTRICTIONS: Open to graduate students only.

**COMM 630 INTERPERSONAL COMMUNICATION THEORY**

3

An examination of the theoretical orientations taken by scholars who study interpersonal relationships as well as a number of focused research areas. Of particular importance is the development of an understanding of the role of communication in creating and maintaining relationships.  
RESTRICTIONS: Open to graduate students only.

**COMM 638 SPEECH, LANGUAGE AND COMMUNICATION**

3

Analysis of theories of meaning, models of language use and acquisition, and the relationship between language and cognition.

**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

An examination of how influence is 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 the 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 the media's contribution to social values and roles.  
RESTRICTIONS: Open to graduate students only.

**COMM 656 COMMUNICATION IN ORGANIZATIONS**

3

An introduction to concepts and research related to communication processes in organizational settings. Both traditional and interpretive approaches are emphasized.

**COMM 657 CHILDREN, TELEVISION AND EDUCATION**

3

Issues relating to education, academic achievement, and the development of critical viewing skills; media and comprehension; content of children's television programming and advertising directed toward children; and the 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 the student with practical, on-the-job training in the field of his or her 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 the individual; sociocultural influences; the social context of the 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

An 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

**COMPUTER ENGINEERING****CPEG 202 INTRODUCTION TO DIGITAL SYSTEMS**

4

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 the 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.  
PREREQ: CPEG210.

**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 the interfacing of microprocessor systems. A project is required that includes the design and implementation of a 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 the 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: ELEG309 and CPEG221 or CPEG222.

**CPEG 324 COMPUTER SYSTEMS DESIGN I**

3

Principles of computer system design are studied 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 a computer subsystem.  
PREREQ: CPEG323.

**CPEG 410 SIGNALS AND COMMUNICATIONS DESIGN**

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 are described and models are developed to analyze network performance. Other topics include multiple access, local area networks and integrated networks  
PREREQ: ELEG310.

**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, superscaler 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 the design and simulation of VLSI. Topics include the performance and limitations of VLSI systems, low level circuit design and system design with an emphasis on digital systems. Major chip design project required.  
PREREQ: CPEG221 and ELEG312

**CPEG 490 CAREER SKILLS FOR ENGINEERS 1**

Covers a variety of skills engineers need in their careers, including ethics, the 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**

Introduction to computational neuroscience: computing by real and artificial neurons and networks, and modeling of brain function. Covers theoretical background and involves hands-on projects to explore processing of sensory information, pattern discrimination, learning, memory and behavior.  
May be cross-listed with CGSC630 and/or PSYC630  
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 the design and simulation of VLSI. Topics include the performance and limitations of VLSI systems, low level circuit design and system design with an 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 a system-level understanding of computer networks and the internet.  
May be cross-listed with BUEC810  
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 the global economy. Topics include the convergence of computation and communications; emerging standards in high-capacity cellular telephony; the impact of global positioning systems on business applications; and the future capabilities of the internet. May be cross-listed with BUEC811.  
PREREQ: CPEG810  
COREQ: CPEG810  
RESTRICTIONS: Preference given to students in the M.S. in Information Systems and Technology Management Program

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**CRIMINAL JUSTICE**

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**CRJU 110 INTRODUCTION TO CRIMINAL JUSTICE 3**

Responses in American society to the problems of crime. Examines criminal behavior, criminal law, the police, the courts and corrections, as well as selected issues in criminal justice.

**CRJU 120 ILLICIT DRUG USE IN AMERICA 3**

The nature and extent of illicit drug use in the United States and the sociocultural context. The history and effects of the major drugs of abuse and the social issues since the 1950s that contributed to the increased use of illicit drugs

**CRJU 134 GREAT CRIMES 3**

Examines the realities of securing justice in light of crimes that have generated intense interest and critical analysis (Lindbergh kidnapping, Rosenberg spy case, etc.) Using the 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 a range of historical, political, philosophical and sociological problems in institutions vested with the responsibility to enforce laws and/or preserve order.

**CRJU 202 PROBLEMS OF CRIMINAL JUDICIARY 3**

Focuses on problems and issues found in the American criminal court system. Includes judicial procedure, organization, judicial personnel and basic criminal law.

**CRJU 203 PROBLEMS OF CORRECTIONS 3**

General overview of the American corrections system and a survey of the most pressing correctional problems of the twenty-first century. Philosophy of punishment extensively discussed. Major emphasis on the nature of the prison experience, alternatives to incarceration, judicial intervention in correctional affairs and the controversy over the 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 the law of capital punishment. Emphasizes the U. S. Supreme Court's major death-penalty decisions and the effects of these decisions.  
PREREQ: CRJU110 or CRJU203.

**CRJU 312 CRIME AND PUNISHMENT IN AMERICAN HISTORY 3**

Examines changes in the criminalization of deviant behavior and the social, institutional, and legal development of criminal justice administration in the United States from colonial times to the present.  
May be cross-listed with HIST312.

**CRJU 313 THE STUDY OF MURDER 3**

An historical and contemporary analysis of criminal homicide, examining the nature and extent of murder, including those related to assassination and war.

**CRJU 320 INTRODUCTION TO CRIMINAL LAW 3**

An analysis of the evolution of criminal law within the larger societal context, and an overview of the basic structure and administration of criminal law in the United States.  
PREREQ: CRJU110.



<b>CRJU 322 CROWDS, CULTS AND REVOLUTIONS</b>	<b>3</b>	<b>CRJU 375 CRIMINAL PROCEDURE</b>	<b>3</b>
See SOCI322 for course description. PREREQ: SOCI201.		Intensive analysis of criminal court procedures that occur once a case is actually brought against an accused. Emphasis on trial tactics and procedures.	
<b>CRJU 324 AMERICAN CONSTITUTIONAL HISTORY</b>	<b>3</b>	<b>CRJU 414 DATA ANALYSIS</b>	<b>3</b>
A survey of the development of judicial review since Reconstruction, emphasizing the Supreme Court's response to urbanization and industrialization, the growth of executive authority, and the extension of civil rights and civil liberties in the twentieth century. May be cross-listed with HIST324.		See SOCI414 for course description.	
<b>CRJU 332 CRIMINAL VIOLENCE IN AMERICA</b>	<b>3</b>	<b>CRJU 420 CRIMINAL JUSTICE ADMINISTRATION</b>	<b>3</b>
Investigates the 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 the criminal justice system. Places trends of violence in cross-national perspective.		Aids those planning a career as an administrator in the criminal justice system. Topics typically include basic administrative policy and budgetary matters. PREREQ: CRJU110	
<b>CRJU 335 CRIME AND JUSTICE IN FILM AND LITERATURE</b>	<b>3</b>	<b>CRJU 425 CRIMINAL LAW AND SOCIAL POLICY</b>	<b>3</b>
Examines the 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 the practices of criminal justice institutions.		Analyzes the role of the American judiciary in making social policy and examines the manner in which the courts have adjudicated controversial socio-legal issues. Topics typically include capital punishment, abortion, the right to privacy, search and seizure, the Miranda rule, and freedom of speech and press.	
<b>CRJU 336 THE DETECTIVE IN FILM AND FICTION</b>	<b>3</b>	<b>CRJU 428 CORPORATE CRIME</b>	<b>3</b>
Study of detective fiction and film has applications to a liberal arts approach to crime and justice. Blends literary analysis with the insights of social science research on the work of private and police detectives. May be cross-listed with ENGL330 and/or SOCI336. PREREQ: CRJU201.		See SOCI428 for course description.	
<b>CRJU 340 THE JUVENILE JUSTICE SYSTEM</b>	<b>3</b>	<b>CRJU 435 PUNISHING SPEECH</b>	<b>3</b>
An in-depth view of the juvenile justice system in the United States focusing on crime patterns, police-juvenile relations, juvenile courts and correctional practices.		Examines the use of the criminal law and other regulatory sanctions to punish certain types of speech and the efforts of courts to determine which speech is deserving of constitutional protection and therefore beyond governmental control.	
<b>CRJU 345 SOCIOLOGY OF LAW</b>	<b>3</b>	<b>CRJU 437 SEMINAR ON CORRECTIONS</b>	<b>3</b>
See SOCI345 for course description.		An 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.	
<b>CRJU 346 PSYCHOLOGY AND THE LAW</b>	<b>3</b>	<b>CRJU 446 JUDGING THE JURY</b>	<b>3</b>
Seminar exploring the rapidly expanding field of psychology and the law. Review and discussion of psychological research on such topics as the adversary system, jury selection, eyewitness testimony, the insanity defense, perceptions of crime and the death penalty. May be cross-listed with PSYC346.		Examines and evaluates the institution of the jury. Explores contemporary controversies over the jury by review and analysis of research studies on jury decision making.	
<b>CRJU 350 GENDER AND CRIMINAL JUSTICE</b>	<b>3</b>	<b>CRJU 448 COMMUNITY-BASED TREATMENT</b>	<b>3</b>
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.		See SOCI448 for course description.	
<b>CRJU 355 RACE, CLASS AND CRIME</b>	<b>3</b>	<b>CRJU 450 PRISONERS AND THE LAW</b>	<b>3</b>
Examines contemporary patterns of race, class and crime through historical interconnections of social, political and economic processes. Addresses the impact of race and class on the arrest, conviction and sentencing of offenders. May be cross-listed with BAMS355 and/or SOCI356.		An examination of the legal rights available to prisoners seeking to challenge their convictions or their conditions of confinement. Emphasis on analyzing the capacity of courts to spur prison reform and the impact of court decisions on American penal practices.	
<b>CRJU 357 SEMINAR ON THE POLICE</b>	<b>3</b>	<b>CRJU 456 LAWYERS AND SOCIETY</b>	<b>3</b>
Teaches students to criticize and analyze research and theory in the scholarly literature on policing.		See SOCI456 for course description.	
<b>CRJU 366 INDEPENDENT STUDY</b>	<b>1-6</b>	<b>CRJU 457 CRIMINAL EVIDENCE</b>	<b>3</b>
<b>CRJU 368 INDEPENDENT RESEARCH</b>	<b>1-6</b>	The study of the laws of evidence and how they are used in the criminal courts and their effect on the administration of justice.	
Independent research under the supervision of a faculty member. Requirements include preparation of a research report consistent with the professional literature in the field. Student and faculty member will file a learning contract describing the research and a report with the department chair. RESTRICTIONS: Requires permission of instructor.		<b>CRJU 460 CRIMINAL JUSTICE POLICY</b>	<b>3</b>
<b>CRJU 369 ALCOHOL, DRUGS AND CRIME</b>	<b>3</b>	A critical examination of criminal justice policy in the United States over the past thirty years, with emphasis on the major theoretical positions that have dominated criminal justice policy making during that period.	
Examines the 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. PREREQ: CRJU110 or SOCI201.		<b>CRJU 466 INDEPENDENT STUDY</b>	<b>1-6</b>
<b>CRJU 370 PRISON AND PRISON SUBCULTURES</b>	<b>3</b>	<b>CRJU 475 SOCIAL SCIENCE AND THE LAW</b>	<b>3</b>
Provides an intensive examination of the culture and lifestyles of prisoners. Special emphasis on how gender and race contribute to differential patterns of adjustment to incarceration. Mainly examines how the prisoner subculture contributes to racial conflict, violence and mental health crises among prisoners.		Examines the 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 LEST475.	
		<b>CRJU 480 CIVIL LIABILITY IN CRIMINAL JUSTICE</b>	<b>3</b>
		Examines the circumstances under which the law provides remedies for individuals harmed by agents of the government. May also include discussion of the use of civil remedies, such as asset forfeiture, to complement criminal prosecutions.	
		<b>CRJU 489 CRIME VICTIMS AND VICTIMS' RIGHTS</b>	<b>3</b>
		Examines victim-offender relationships, interactions between victims and the criminal justice system, and the 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 the impact of victimization on the individual.	

- CRJU 490 DRUG ABUSE RESEARCH SEMINAR** 3  
A concentrated examination of contemporary efforts in the areas of drug abuse legislation, enforcement and research, and how these combine to influence prevention, treatment and control strategies.  
PREREQ: SOCI301.
- 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 the field experience to academic work.  
May be cross-listed with SOCI495  
RESTRICTIONS: Requires permission of instructor. Not for major credit.
- 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 the grading of student work or the assignment of grades. May be repeated for up to three credit hours.  
RESTRICTIONS: Requires permission of instructor. Not for major credit.

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## SCIENCE AND CULTURE

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- CSCC 229 THE NATURE OF SCIENCE** 3  
Introduction to the nature of the scientific enterprise. Uses both theoretical discussion and detailed example to illuminate how science helps us to understand the world. Topics include scientific method, the role of theory, controversies in science and the relationship between science and culture.  
May be cross-listed with PHIL229.  
PREREQ: Any two science courses or one science course and PHIL205.
- CSCC 233 WOMEN, BIOLOGY AND MEDICINE** 3  
See WOMS233 for course description.
- CSCC 241 ETHICAL ISSUES IN HEALTHCARE** 3  
Interdisciplinary study of basic ethical thought and its application to contemporary biomedicine in such moral and ethical issues as care for the terminally ill, abortion and experimentation with human subjects.  
May be cross-listed with PHIL241
- CSCC 246 PHILOSOPHICAL PERSPECTIVES OF MEDICINE** 3  
Ethical and epistemological foundations of medicine; medicine as a way of knowing about the world compared with other ways.  
May be cross-listed with PHIL246
- CSCC 250 ENGINEERING ETHICS** 3  
See PHIL250 for course description.
- CSCC 311 SOCIOLOGY OF HEALTHCARE** 3  
See SOCI311 for course description.
- CSCC 330 VARYING AUTHORS, THEMES AND MOVEMENTS** 3  
See FLIT330 for course description.
- CSCC 341 ETHICS OF ENGINEERING PROFESSION** 1  
See PHIL341 for course description
- CSCC 343 SOCIETY, POLITICS AND HEALTHCARE** 3  
See POSC343 for course description
- CSCC 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
- CSCC 365 STUDIES IN LITERARY GENRES, TYPES AND MOVEMENTS** 3  
See ENGL365 for course description
- CSCC 366 INDEPENDENT STUDY** 1-6
- CSCC 368 LITERATURE AND SCIENCE** 3  
See ENGL368 for course description
- CSCC 369 LITERATURE AND MEDICINE** 3  
Critical examination of the relationship between medicine and literature; ways society has viewed the physician as reflected in literature.  
May be cross-listed with ENGL369.

- CSCC 382 HISTORY OF WESTERN MEDICINE** 3  
Social and cultural forces that have influenced the development of modern medicine  
May be cross-listed with HIST382
- CSCC 389 TOPICS IN WOMEN AND HEALTH ISSUES** 3  
See WOMS389 for course description
- CSCC 444 MEDICAL ETHICS** 3  
See PHIL444 for course description
- CSCC 480 ISSUES IN HEALTHCARE FOR CHILDREN AND FAMILIES** 1-3  
Students will come into contact with children, families, physicians, and other health professionals. Students will not only learn about particular cases, but also use these cases to explore issues of health, disease, physician-patient relationships, interactions among members of the healthcare teams, etc  
RESTRICTIONS: BALS and MSP majors only; at least junior standing
- CSCC 481 ISSUES IN PUBLIC HEALTH** 1-3  
Students will come into contact with children, families, physicians, and other health professionals. Students will not only learn about particular cases, but also use these cases to explore issues of health, disease, physician-patient relationships, interactions among members of the healthcare team.  
RESTRICTIONS: BALS and MSP majors only and junior status or above
- CSCC 482 ISSUES IN PUBLIC HEALTH - ECONOMICS** 1-3  
Students will come into contact with children, families, physicians, and other health professionals. Students will not only learn about particular cases, but also use these cases to explore issues of health, disease, physician-patient relationships, interactions among members of the healthcare team.  
RESTRICTIONS: BALS and MSP majors only and junior status or above
- CSCC 498 TOPICS IN BIOLOGY** 3  
See BISC498 for course description.
- CSCC 647 PHILOSOPHY OF TECHNOLOGY** 3  
See PHIL647 for course description

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## EARLY AMERICAN CULTURE

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- EAMC 602 MATERIAL LIFE IN EARLY AMERICA** 3  
American domestic environments and decorative arts within social and economic contexts of 17th and 18th centuries. Critically assesses how objects contribute to the study of everyday life in colonial America.  
RESTRICTIONS: Requires permission of instructor.
- EAMC 604 HISTORY OF NINETEENTH CENTURY AMERICAN INTERIORS** 3  
Introduction to domestic interiors with emphasis on household technology, interior design, decorative arts and furnishings. Touches on some of the social, political, economic and technological forces that shaped the built environment  
RESTRICTIONS: Requires permission of instructor
- EAMC 605 HISTORY OF THEORIES IN MATERIAL CULTURE** 3  
Landmark works and recent theoretical approaches to the understanding and interpretation of the man-made environment. Readings draw from a variety of disciplinary frameworks including art history, anthropology, historical archeology, cultural geography, sociology and history.  
May be cross-listed with ARTH630 and/or HIST605  
RESTRICTIONS: Requires permission of instructor.
- EAMC 606 ISSUES IN AMERICAN MATERIAL CULTURE** 3  
Studies major themes in American material culture of the 17th, 18th or 19th centuries. Topics will vary from year to year.  
May be cross-listed with HIST606 and/or MSST606  
RESTRICTIONS: Requires permission of instructor
- EAMC 671 CONNOISSEURSHIP OF THE DECORATIVE ARTS IN AMERICA I** 1-3  
Furniture with one additional subject within the decorative arts to be presented by a specialist on the Winterthur Museum staff. Emphasis on close analytical examination of objects stressing identification and evaluation.  
RESTRICTIONS: Requires permission of instructor.
- EAMC 672 CONNOISSEURSHIP OF THE DECORATIVE ARTS IN AMERICA II** 1-3  
Three subject areas within the decorative arts, each presented by a specialist on the Winterthur Museum staff. Emphasis on close analytical examination of objects stressing identification and evaluation.  
RESTRICTIONS: Requires permission of instructor

**EAMC 673 CONNOISSEURSHIP OF THE DECORATIVE ARTS IN AMERICA III** 1-3

One or two subject areas within the decorative arts, each presented by a specialist on the Winterthur faculty. Emphasis on close analytical examination of objects stressing identification and evaluation.  
 RESTRICTIONS: Requires permission of instructor.

**EAMC 801 INTRODUCTION TO DECORATIVE ARTS IN AMERICA TO 1860** 3

Development of decorative arts, painting and architecture in America. Principles of connoisseurship and studies of American and imported objects of art. Collections of the Winterthur Museum.  
 May be cross-listed with ARTH801.  
 RESTRICTIONS: Requires permission of instructor.

**EAMC 869 MASTER'S THESIS** 3**ECONOMICS****ECON 100 ECONOMIC ISSUES AND POLICIES** 3

Takes a nontechnical approach to basic economics. Applies economic concepts to contemporary issues, problems and policies. Covers both macro and micro topics.  
 RESTRICTIONS: Not for major credit. May not be substituted for ECON151 or ECON152.

**ECON 141 SWEDISH ECONOMICS: A SURVEY** 2

Introduction to the Swedish economy focusing on its unique features. The role of Sweden in Euroland is examined.  
 RESTRICTIONS: Offered only in Sweden.

**ECON 151 INTRODUCTION TO MICROECONOMICS: PRICES AND MARKETS** 3

Introduces supply and demand concepts with basic economic graphs. Examines models of perfect and imperfect competition and the determination of product price and quantities. Covers current microeconomic issues such as the effect of government regulation and environmental problems.  
 COREQ: MATH114 or MATH115.

**ECON 152 INTRODUCTION TO MACROECONOMICS: THE NATIONAL ECONOMY** 3

Analyzes the determinants of unemployment, inflation, national income, and policy issues relating to how the government alters unemployment and inflation through control of government spending, taxes and the money supply.  
 PREREQ: ECON151.

**ECON 251 MANAGERIAL ECONOMICS** 3

Applies economic theory to business and managerial decision making. Includes analysis of consumer demand, theory of production and supply and the effects of different market structures and pricing strategies.  
 PREREQ: ECON151 and MATH201.  
 RESTRICTIONS: Credit can be earned for only one among ECON251, ECON300 or ECON301.

**ECON 300 INTERMEDIATE MICROECONOMIC THEORY** 3

Price determination and income distribution in a market economy; the behavior of firms and industry under conditions of pure and imperfect competition.  
 PREREQ: ECON151.  
 RESTRICTIONS: Credit can be earned for only one among ECON251, ECON300 and ECON301. BS majors must take ECON301. ECON300 cannot be used to satisfy Economics BS major requirements.

**ECON 301 QUANTITATIVE MICROECONOMIC THEORY** 3

Uses calculus to study price determination and income distribution in a market economy; and the behavior of firms and industry under conditions of pure and imperfect competition.  
 PREREQ: ECON151 and MATH221.  
 RESTRICTIONS: Credit can be earned for only one among ECON251, ECON300 or ECON301.

**ECON 302 BANKING AND MONETARY POLICY** 3

Nature and economic significance of money, credit and the banking system; the origin and management of the money supply; and effects of monetary changes on price levels, output and employment.  
 PREREQ: ECON152.

**ECON 303 INTERMEDIATE MACROECONOMIC THEORY** 3

Determinants of national income and employment and inflation; theoretical problem of short-run fluctuations and secular growth; relative merits of monetary and fiscal policy.  
 PREREQ: ECON302 or permission of instructor.

**ECON 305 COMPARATIVE ECONOMIC SYSTEMS** 3

Theoretical and empirical comparison of economic systems' use of the market mechanism to allocate resources. Emphasis on the consequences of industrial democracy and governmental efforts to improve the decisions of corporations in Western and Eastern Europe, Russia and Japan.  
 PREREQ: ECON151.

**ECON 306 ECONOMIC THEORY OF POLITICS** 3

Uses rational choice principles of maximization and competition to analyze political behavior. Covers candidates' competition for votes, the "public good" problem, paradoxes of voting, the political business cycle, legislative decision making and vote trading and theories of bureaucracy.  
 May be cross-listed with POSC306.  
 PREREQ: ECON151 and POSC150.

**ECON 311 ECONOMICS OF DEVELOPING COUNTRIES** 3

Surveys policy issues related to economic growth and development. Special emphasis on problems facing contemporary developing countries.  
 PREREQ: ECON151 and ECON152.  
 RESTRICTIONS: ECON311 and ECON411 cannot both count for degree credit.

**ECON 315 ECONOMIC HISTORY OF COLONIAL AMERICA** 3

Simple economic models and quantitative evidence used to explain colonial American history. Includes migration, servant and slave markets, government financing and the creation of paper money, causes of the Revolution, colonial growth, foreign trade, education and witchcraft.  
 PREREQ: ECON151 and ECON152.

**ECON 316 ECONOMIC HISTORY OF THE UNITED STATES** 3

Examines the record of economic change in the United States from the colonial period to the present. Emphasis on using economic theory and measurement for interpreting the past.  
 PREREQ: ECON151 and ECON152.

**ECON 332 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 the 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 344 THE MAKING OF THE EUROPEAN ECONOMY** 3

Theory and policy of trade integration, resource mobility, exchange mechanisms, policy coordination, and progress toward monetary union. Visits may be made to business and government agencies where course material is supplemented by presentations of business executives, practicing economists, and financial experts.  
 PREREQ: ECON151 and ECON152.  
 RESTRICTIONS: Credit toward degree may not be earned in both ECON344 and ECON444.

**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 360 GOVERNMENT REGULATION OF BUSINESS** 3

Normative, economic and legal foundations of government intervention in business, particularly antitrust and regulation; and the process and the effects of government policies.  
 PREREQ: ECON151.

**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, the 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 a 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 the United States healthcare system. Analysis of existing policies and proposals. Examines the 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 the 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 405 THE PLANNED ECONOMIES** 3  
Theoretical and empirical comparison of market and centrally planned economic systems. The United States and the Soviet Union are studied.  
PREREQ: ECON300 or ECON301, and MATH230.
- ECON 406 MARKETS: INFORMATION AND UNCERTAINTY** 3  
Investigates impact of costly information on the behavior of individuals and markets. Topics include decision making under risk and uncertainty, insurance, consumer-employer search behavior, product liability, industrial safety, futures markets and problems of contract enforcement.  
PREREQ: ECON300 or ECON301, and MATH221 and MATH202.
- ECON 408 ECONOMICS OF LAW** 3  
Effect of legal rules on resource allocation both in and between the public and private sectors. Considers common law, regulation and constitutional rules.  
May be cross-listed with LEST408.  
PREREQ: ECON300 or ECON301.
- ECON 411 ECONOMIC THEORY OF DEVELOPING COUNTRIES** 3  
Theoretical and empirical analysis of models of growth and development. Emphasizes the use of economic analysis to evaluate public policies in developing countries.  
PREREQ: ECON300 or ECON301, and ECON303.  
RESTRICTIONS: ECON311 and ECON411 cannot both count for degree credit.
- ECON 415 ECONOMIC FORECASTING** 3  
A practically oriented introduction to the art of managerial forecasting. Includes an integration of microeconomic and macroeconomic theory with statistical and econometric techniques to provide meaningful forecasts of the future values of series such as prices, sales, inventory levels and costs.  
PREREQ: ECON151, ECON152 and MATH202.
- ECON 418 ECONOMIC HISTORY OF AMERICAN LABOR MARKETS** 3  
Economic models will be used to explain the evolution of various American labor markets, including: immigrant labor, female labor markets, slavery, labor unions, internal labor migration, southern labor institutions, and the impact of human capital on industrial expansion and productivity.  
PREREQ: ECON300 or 301.
- ECON 419 ECONOMICS OF THE GREAT DEPRESSION** 3  
Analysis of modern theoretical explanations of the economic downturn of 1929-1933, with implications for understanding current economic problems. Theories considered include those based on monetary contractions, consumption and investment instability and international disturbances.  
PREREQ: ECON303.
- ECON 422 ECONOMETRIC METHODS AND MODELS I** 3  
Uses statistical methods, especially multiple regression, to quantify economic models, including situations when the assumptions of classical statistics do not hold.  
PREREQ: MATH221, MATH202 and ECON152.
- ECON 423 ECONOMETRIC METHODS AND MODELS II** 3  
Class discussion and research in advanced economic statistics and applied econometrics.  
PREREQ: ECON422.
- ECON 426 MATHEMATICAL ECONOMIC ANALYSIS** 3  
Uses mathematical tools to formulate and analyze economic propositions. Topics include the use of calculus to analyze comparative statics, optimization and constrained optimization, interest and growth and dynamic models.  
PREREQ: ECON300 or ECON301, and MATH221.
- ECON 430 ADVANCED MACROECONOMIC THEORY** 3  
Continuation of intermediate macroeconomic theory. Recent developments in macroeconomic theory explored in the context of the ongoing debate between the classical equilibrium and Keynesian disequilibrium theorists.  
PREREQ: ECON303.
- ECON 433 ECONOMICS OF THE PUBLIC SECTOR** 3  
Role of government in the economy. Effects of taxation, spending and borrowing on resource allocation and income distribution. Special emphasis on cost-benefit analysis and current issues such as energy, environmental problems, the negative income tax, urban finances and the national debt.  
PREREQ: ECON300 or ECON301.  
RESTRICTIONS: ECON332 and ECON433 cannot both count for degree credit.
- ECON 435 CONTEMPORARY MACROECONOMIC POLICY** 3  
Unfolding events in the economy and the actions of policymakers are studied. Special emphasis on current policy actions of the Federal Reserve. Macroeconomic models studied in earlier courses are used to analyze current events.  
PREREQ: ECON303.
- ECON 441 INTERNATIONAL TRADE** 3  
Focuses on international trade theory and policy, and exchange rates. Topics include trade based on competitive advantage and economies 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.
- 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 the international monetary system.  
PREREQ: ECON300 or ECON301, and ECON303.
- ECON 444 ANALYSIS OF EUROPEAN ECONOMIC PERFORMANCE** 3  
Theory and policy of trade integration, resource mobility, exchange mechanisms, policy coordination, and progress toward monetary union. Visits may be made to business and government agencies where course material is supplemented by presentations of business executives, practicing economists, and financial experts. Project required.  
PREREQ: ECON303 and one of ECON251, ECON300, ECON301.  
RESTRICTIONS: Credit toward degree may not be earned in both ECON344 and ECON444.
- 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: 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 multiproduct natural monopolies. Discusses the positive theory of regulation and industry studies, with emphasis on efficiency and regulatory reform.  
PREREQ: ECON300 or ECON301, and MATH221.  
RESTRICTIONS: ECON360 and ECON463 cannot both count for degree credit.
- ECON 466 INDEPENDENT STUDY** 1-6
- 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: 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 the 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 of the course will focus on microeconomics and one-third on macroeconomics.  
RESTRICTIONS: Can not be taken for credit by economics graduate students.
- ECON 530 OPTIMIZATION AND GAME THEORY** 3  
See MATH530 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 the development and analysis of economic models to understand the different market environments in which firms operate. Special attention is paid to the 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 is given to the 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, the 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 the determination of output, employment, and the price level within classical, neoclassical, and contemporary frameworks; analyzes the effects of fiscal and monetary policy within these alternative frameworks, and examines the determinants of economic growth.
- ECON 805 GAME THEORY FOR ECONOMISTS** 3  
Study of the theory of games with complete and incomplete information in both static and dynamic contexts with applications to economic problems, primarily in the areas of labor economics, economics of information and uncertainty, international trade and macroeconomics.  
PREREQ: ECON801 or equivalent.
- ECON 808 UNITED STATES ECONOMIC HISTORY** 3  
Topics where economic analysis has revolutionized the interpretation of U.S. History will be explored. Topics vary by semester, but may include: the market for immigrant servants; the economics of slavery; the impact of railroads; gender discrimination; the 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. The 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 the 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: ECON551 or ECON801 or equivalent.
- ECON 822 ECONOMETRIC THEORY** 3  
Applies and modifies statistical techniques to economic data; presents the 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.

<b>ECON 824 TOPICS IN ADVANCED ECONOMETRICS</b>	<b>3</b>
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	
<b>ECON 825 TIME-SERIES ECONOMETRICS</b>	<b>3</b>
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	
<b>ECON 827 ADVANCED PRODUCTION ECONOMICS</b>	<b>3</b>
See FREC827 for course description	
<b>ECON 832 PUBLIC FINANCE</b>	<b>3</b>
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	
<b>ECON 841 INTERNATIONAL TRADE AND DEVELOPMENT</b>	<b>3</b>
Covers the basis of exchange, trade policy, international factor movements and integration. Applies to both historical and current economic development. PREREQ: ECON551 or ECON801 or equivalent	
<b>ECON 842 INTERNATIONAL FINANCE AND DEVELOPMENT</b>	<b>3</b>
Continues ECON841. Covers foreign exchange markets, balance of payments, exchange rate systems and international economic policy. PREREQ: ECON552 or ECON802 or equivalent	
<b>ECON 846 TOPICS IN ECONOMIC DEVELOPMENT</b>	<b>3</b>
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)	
<b>ECON 852 MONETARY ECONOMICS</b>	<b>3</b>
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 the pricing of financial securities as well as theories of the term structure of interest rates. PREREQ: ECON552 or ECON802 or equivalent	
<b>ECON 861 INDUSTRIAL ORGANIZATION AND ANTITRUST POLICIES</b>	<b>3</b>
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: ECON551 or ECON801 or equivalent	
<b>ECON 862 ECONOMICS OF REGULATION</b>	<b>3</b>
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	
<b>ECON 868 RESEARCH</b>	<b>1-9</b>
<b>ECON 869 MASTER'S THESIS</b>	<b>1-6</b>
<b>ECON 875 ADVANCED FISHERY ECONOMICS</b>	<b>3</b>
See MAST875 for course description	
<b>ECON 877 ADVANCED BENEFIT-COST ANALYSIS</b>	<b>3</b>
Concentrates on the identification and measurement of the benefits and costs of both market and non-market activities. Applies benefit-cost principles to realistic problems. PREREQ: ECON551 COREQ: ECON801	
<b>ECON 880 LABOR ECONOMICS</b>	<b>3</b>
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 will be stressed throughout. COREQ: ECON801, ECON822 or equivalent	
<b>ECON 890 COLLOQUIUM: ECONOMICS SEMINAR SERIES</b>	<b>0 PF</b>
Regularly-scheduled lectures by faculty and visiting researchers providing exposure to current research in economics	

<b>ECON 894 APPLIED REGIONAL MODELING</b>	<b>3</b>
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	
<b>ECON 964 PRE-CANDIDACY STUDY</b>	<b>3-12 PF</b>
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	
<b>ECON 969 DOCTORAL DISSERTATION</b>	<b>1-12 PF</b>

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## EDUCATION LIBRARY MEDIA

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<b>EDLM 621 REFERENCE SERVICES AND RESOURCES</b>	<b>3</b>
Explores and evaluates the role of information in our society and the range of reference materials supporting the school library media program. Includes the use of print and electronic systems, reference procedures, and instructional role of information in the school curriculum.	
<b>EDLM 622 INTRODUCTION TO CATALOGING AND CLASSIFICATION</b>	<b>3</b>
Explores and evaluates standardized cataloging and classification systems with special emphasis on the organization of the school library media center. Topics include: Anglo-American Cataloging Rules; Library of Congress Subject Headings; and Dewey Decimal Classification.	
<b>EDLM 623 ADVANCED CATALOGING AND CLASSIFICATION</b>	<b>3</b>
Continues study of concepts introduced in EDLM622 but focuses on organizing non-book materials and cataloging in the on-line environment. Special emphasis is given to the organization of the school library media center. Topics include: Library Automation; USMARC Format; Electronic Bibliographic Databases.	
<b>EDLM 624 LIBRARY COLLECTION DEVELOPMENT</b>	<b>3</b>
Explores and evaluates the theory and practice of building and managing library collections with a special emphasis on collections in school library media centers. Topics include: Intellectual Freedom; Selection Criteria; Collection Analysis; Budgets; and Producing Teacher Resources.	
<b>EDLM 625 SCHOOL LIBRARY MEDIA PROGRAM ADMINISTRATION</b>	<b>3</b>
Explores and evaluates the administration and management of the school library media center. Topics include: Planning and Evaluation; Policy Making; Personnel; Budget; Facilities; Standards; Trends in research in this area.	
<b>EDLM 626 DEVELOPMENT OF LIBRARIES IN SOCIETY</b>	<b>3</b>
Explores and evaluates the foundations, concepts, research and issues of librarianship pertaining to the goals and functions of American and world cultures with particular emphasis on the relationship between school library media centers and society.	
<b>EDLM 628 SCHOOL LIBRARY MEDIA PROGRAM CURRICULUM</b>	<b>3</b>
Explores the role of the 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.	

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## EDUCATION

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<b>EDUC 011 COLLEGE INTENSIVE LITERACY</b>	<b>3 RP</b>
A 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	
<b>EDUC 166 SPECIAL PROBLEM</b>	<b>1-3</b>
<b>EDUC 202 HUMAN DEVELOPMENT I: GRADES K-4</b>	<b>3</b>
Introduce students to the major theories of human development as well as to issues in the area of language development. Students will also tutor in the schools to gain clinical experience.	
<b>EDUC 203 HUMAN DEVELOPMENT II: GRADES 5-8</b>	<b>3</b>
The development of adolescents will be covered, including topics of language development and physical, cognitive and social-emotional changes in the middle school years. A field experience consisting of interviewing students in area middle schools is required.	



**EDUC 210 LITERATURE AND LITERACY FOR YOUNG CHILDREN 3**

Introduces current theoretical perspectives of emergent literacy acquisition and development in home, community and school settings, and emphasizes the integration of reading, writing, oral language and literature. Takes a social constructivist orientation and highlights the influence of culture on literacy learning. Includes field experience.

**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 a cross section of special education classes required. Emphasis on the school-age child.

**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 the history of American education as it has developed from the colonial era into current time, with particular attention to issues of equity, discipline, intellectual freedom and professionalism. Includes all levels of schooling in a social, multicultural context.

**EDUC 258 CULTURAL DIVERSITY, SCHOOLING AND THE TEACHER 3**

Examines roles and responsibilities of the classroom teacher vis-à-vis the demographic changes occurring in United States society and the public school student population. Topics include race, ethnicity, gender, sexual orientation, social class, poverty and language.

**EDUC 266 SPECIAL PROBLEM 1-6****EDUC 286 EDUCATIONAL TECHNOLOGY: PROFESSIONAL TOOLS 1**

Topics include educational resources and communication on the internet, word processing, authoring for the 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 a range of children's texts in different modes including books, films, oral performance, computer programs and television. The nature of children's responses to these texts and the implications for educational practice are addressed.

**EDUC 306 EMERGING LITERACY: YOUNG CHILDREN 3**

The 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, IFST222 and IFST224.

**EDUC 308 CURRICULUM DEVELOPMENT IN THE PRIMARY AND MIDDLE GRADES 2 PF**

Theories and practices of designing and implementing thematic, interdisciplinary, intradisciplinary and integrated curriculum in grades K-8 are explored. Stresses the need to address local and state curriculum guidelines and consider the attributes of the age group for whom the curriculum is provided.

COREQ: EDUC400 and EDUC433

**EDUC 310 READING AND WRITING IN THE PRIMARY GRADES 3**

Focuses on language arts development (reading, writing, listening, and speaking) of kindergarten through fourth grade children. Explores developmentally appropriate practices. Includes a field experience in kindergarten through fourth grade classrooms.

PREREQ: EDUC210

COREQ: EDUC386

**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 a practicum in a fourth through eighth grade classroom.

PREREQ: EDUC310

COREQ: EDUC335, EDUC341, EDUC346, EDUC436 and EDUC486 (for Elementary Education majors)

**EDUC 335 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 the appraisal of pupil achievement. Practicum included.

PREREQ: MATH253

COREQ: EDUC320, EDUC341, EDUC346, EDUC436 and EDUC486 (for Elementary Education majors) EDUC310, EDUC341 and EDUC346 (for Early Childhood Development majors)

**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 the elementary school. Includes the study of current elementary school programs, instructional materials, teaching strategies, lesson planning and implementation and the appraisal of pupil achievement. Practicum included.

COREQ: EDUC320, EDUC335, EDUC346, EDUC436 and EDUC486 (for Elementary Education majors) EDUC310, EDUC335 and EDUC346 (for Early Childhood Development majors)

**EDUC 346 ELEMENTARY CURRICULUM: SOCIAL STUDIES 3**

Introduction to teaching social studies in the elementary school. Includes the study of current elementary school programs, instructional materials, teaching strategies, lesson planning and implementation and the appraisal of pupil achievement. Practicum included.

COREQ: EDUC320, EDUC335, EDUC341, EDUC436 and EDUC486 (for Elementary Education majors) EDUC310, EDUC335 and EDUC341 (for Early Childhood Development majors)

**EDUC 358 LINGUISTICS AND LANGUAGE ARTS 3**

Explores linguistic and cultural assumptions that motivate and guide current language arts curricula and pedagogy. Encourages future teachers to reflect on their role in the 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

**EDUC 360 LEARNING IN COMMUNITY CONTEXTS 3**

Study of the educational process in institutions and organizations with a focus on non-profit groups oriented toward community service. Emphasis upon the relation of these groups' educational practices to their overall public service mission.

May be cross-listed with IFST360

**EDUC 366 INDEPENDENT STUDY 1-6****EDUC 376 EDUCATION PRACTICUM 1-3 PF**

Field-based internship in a school working as an assistant with a professional teacher, including tutoring, small group instruction, grading of instructional materials and limited whole group instruction.

**EDUC 386 EDUCATIONAL TECHNOLOGY III: LITERACY AND LANGUAGE ARTS LABORATORY 1**

Introduces prospective teachers to technology available for use in the literacy and language arts curriculum. Enables students to evaluate this technology by applying the approaches studied in their literacy and language arts methods courses.

Concludes with a teaching project incorporating the use of technology.

PREREQ: EDUC286

COREQ: EDUC310

**EDUC 390 INSTRUCTIONAL STRATEGIES AND REFLECTIVE PRACTICE 3**

Strategies for elementary school teaching, including classroom management and models of teaching. Emphasis on provisions for students with special needs.

COREQ: EDUC310 and EDUC386

**EDUC 391 HONORS COLLOQUIUM 3**

See ARSC390 for course description.

**EDUC 400 STUDENT TEACHING 3-12 PF**

Full-time extended student teaching experience in pre-kindergarten through 12th grade schools. Students are under the guidance and supervision of a cooperating teacher in the classroom and a University of Delaware supervisor.

PREREQ: Students must show evidence of passing Praxis I. See your student teaching program coordinator/course instructor for portfolio requirements.

**EDUC 403 LITERATURE FOR ADOLESCENTS 3**

Evaluation of classic and contemporary reading materials and their application to the junior-senior high school curriculum. Study of criteria, methods and tools for selection of books. Techniques for developing and promoting reading.

**EDUC 410 ASSISTIVE TECHNOLOGY 1**

Students identify, evaluate, and use technology to support the 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



- EDUC 413 EDUCATIONAL PSYCHOLOGY - SOCIAL ASPECTS** 3  
Focuses on adolescent social and moral development. Specific topics include motivation and affect; teacher beliefs; biases and expectations; student attitudes toward school and teachers; adolescent values; interpersonal relations and self-concept; learning styles; psychological processes underlying classroom management; and student variability and exceptional students.  
RESTRICTIONS: School practicum of 18 hours is required.
- EDUC 414 EDUCATIONAL PSYCHOLOGY - COGNITIVE ASPECTS** 3  
Focuses on adolescent cognitive development and learning and the relationship between these cognitive processes and sound instructional models, strategies and practices for diverse and exceptional learners. Assessment and measurement of instruction outcomes are stressed.
- EDUC 419 DIVERSITY IN THE CLASSROOM** 3  
Examines type and implications of student diversity in classrooms (cultural, gender, class, language, and handicapping conditional, cross-cultural processes and foundations of special education). Explores best practices in multicultural education, classroom management and inclusion of secondary students with special learning needs.  
RESTRICTIONS: Field experience of 18 hours is required.
- EDUC 420 READING IN THE CONTENT AREAS** 1  
Overview of reading comprehension issues at the middle and high school levels based primarily upon task analyses of content-area materials (math, social studies and science). Students will apply current theories of reading comprehension to texts in their areas of interest.
- EDUC 429 METHODS OF TEACHING LANGUAGES IN ELEMENTARY SCHOOL** 3  
See FLT429 for course description.
- EDUC 430 CLASSROOM MANAGEMENT IN SECONDARY SCHOOLS** 1 PF  
Examines various aspects of discipline in high school classrooms: the causes of misbehavior, procedures and rules to establish and maintain order, responding to misbehavior and legal issues.  
COREQ: EDUC400
- EDUC 431 APPLIED BEHAVIOR ANALYSIS** 3  
Covers the principles of behavior analysis and a 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. Students participate in a behavior analytic field experience in a public elementary school.  
PREREQ: EDUC230  
COREQ: EDUC410, EDUC432 and EDUC435.
- EDUC 432 CURRICULUM FOR SCHOOL-AGE EXCEPTIONAL CHILDREN** 3  
Focuses on understanding the special instructional needs of students with mild to moderate educational disabilities and on planning and monitoring instruction. Emphasis is placed on diagnostic assessment of learning problems, design and implementation of instructional interventions, and monitoring of progress. Methods for preventing early reading problems are included.  
PREREQ: EDUC230  
COREQ: EDUC410, EDUC431 and EDUC435.  
RESTRICTIONS: Requires field placement.
- EDUC 433 NON-SCHOOL FACTORS AFFECTING LEARNING IN THE CLASSROOM** 2  
Emphasis on research findings describing extent to which academic success is affected by non-curricular factors including the role of families as partners and collaborators, peer relations, child abuse and classroom social climate. Counseling and mentoring skills will be taught and the role of other school and community based referrals will be examined.  
COREQ: EDUC308 and EDUC400
- EDUC 435 EDUCATIONAL EVALUATION FOR EXCEPTIONAL CHILDREN** 3  
An 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.
- EDUC 436 LITERACY PROBLEMS: ASSESSMENT AND INSTRUCTION** 3  
Introduces general and special education teachers to the needs of students whose literacy attainments are below expectations. Prepares teachers to use diagnostic assessment as a basis for planning preventive and remedial instruction.  
COREQ: EDUC320, EDUC335, EDUC341, EDUC346 and EDUC486
- EDUC 437 DIAGNOSIS AND INSTRUCTION: LITERACY PROBLEMS** 3  
Prepares special education teachers to meet the needs of students with significant problems in reading and writing. Emphasis is placed on understanding and analysis of learning problems and the design and implementation of instructional interventions in reading and language arts. A field experience is required.  
PREREQ: EDUC431, EDUC432, EDUC435, EDUC310  
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.  
PREREQ: EDUC341
- 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  
The factors which distinguish human language from animal communication, as well as the 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 the on-going language acquisition projects.  
May be cross-listed with LING462 and/or PSYC462.
- EDUC 466 INDEPENDENT STUDY** 1-6
- EDUC 469 RESEARCH INTERNSHIP EXPERIENCE** 3  
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 a 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 the curriculum and reflects on the effects of multimedia on current teaching practice. Provides a multimedia toolbox and shows how to use it to create and publish multimedia applications on the 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 LAB** 1  
Introduces prospective teachers to technology available for use in mathematics, science, and social studies curricula. Enables students to evaluate this technology by applying the approaches studied in their mathematics, science, and social studies methods courses. Concludes with a teaching project incorporating the use of technology.  
PREREQ: EDUC386  
COREQ: EDUC320, EDUC335, EDUC341, EDUC346 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 a specific topic. Topics and format will vary depending on the needs of the participants.  
RESTRICTIONS: Not intended for students enrolled in a degree program
- EDUC 524 INTENSIVE LITERACY INSTRUCTION** 3  
Training in the methods of teaching reading, writing and spelling developed in the Reading Study Center, School of Education. The program is called Intensive Literacy and is 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 600 TEACHER AS RESEARCHER** 3  
Helps develop strategies to be used by teachers and administrators to bridge the 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 the development of language processes and the assessment of language performance. Explores language processes that provide a foundation for reading, speaking and listening
- EDUC 602 CHILDHOOD LITERATURE** 3  
Survey of literature of children and its application to the curriculum. A study of literary genre, elements and devices found in children's books, aids for selection, criteria for evaluation and techniques for promoting reading
- EDUC 603 LITERATURE FOR ADOLESCENTS** 3  
Evaluation of classic and contemporary reading materials and their application to the junior-senior 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 the development of appropriate instructional programs for elementary and middle school children. Provides information on the writing process, the beginnings of writing, exemplary programs, evaluation of children's writing and functions/forms of writing.
- EDUC 605 MEASUREMENT APPLICATIONS IN EDUCATION** 3  
Focuses on educational measurement strategies and processes that teachers use to assess student learning. Emphasis is 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  
An introduction to quantitative methods and procedures in education through the study of the logic and procedures of educational and social research. Provides information about the various stages of the research process with attention on measurement, sampling, design, data analysis and application
- EDUC 608 TEACHING READING IN THE ELEMENTARY AND MIDDLE GRADES** 3  
Students explore the relationships between reading theory, research, and practice. Focuses on the teaching of reading in the elementary and middle school.
- EDUC 609 ASSESSMENT AND INSTRUCTION FOR READING IN THE PRIMARY GRADES** 3  
First in a three-course sequence on assessment and instruction of reading and writing for students with learning problems. Focuses on preventing and remediating reading and writing problems in the primary grades  
PREREQ: EDUC608 or EDUC620
- 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 611 INTERNSHIP IN SCHOOL COUNSELING** 3-6  
On-site experiences in school counseling and guidance.  
RESTRICTIONS: Requires completion of all coursework for School Counseling Master's Program. Requires contractual arrangement with university and on-site supervisor.
- EDUC 612 ETHNIC STUDIES AND MULTICULTURAL EDUCATION** 3  
Content, strategies, concepts and resources for teaching comparative ethnic studies and integrating these studies into the regular curriculum. Techniques for evaluating multicultural education outcomes. Surveys the culture and history of major American ethnic groups; emphasizes the major ethnic groups in our geographic area.
- EDUC 613 EDUCATIONAL PSYCHOLOGY - SOCIAL ASPECTS** 3  
Focuses on adolescent social and moral development. Specific topics include: motivation and affect, teacher beliefs, biases and expectations, student attitudes toward school and teachers, adolescent values, interpersonal relations and self-concept, learning styles, psychological processes underlying classroom management, student variability and exceptional students.  
RESTRICTIONS: School practicum of 18 hours is required.
- EDUC 614 EDUCATIONAL PSYCHOLOGY - COGNITIVE ASPECTS** 3  
Focuses on adolescent cognitive development and learning and the relationship between these cognitive processes and sound instructional models, strategies and practices for diverse and exceptional learners. Assessment and measurement of instructional outcomes are stressed  
PREREQ: EDUC413
- 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 a summer early intervention program that is site based in a 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 videotapes and other evidence to show how they are 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  
The Delaware Reading Project (DRP) focuses on research, theory, and practice in literacy instruction for grades K-12. DRP's central purpose is for students to become familiar with and evaluate best practices in literacy instruction in order to develop a workshop for other teachers.  
PREREQ: EDUC608, EDUC622 or equivalent  
RESTRICTIONS: Approval of instructor
- EDUC 618 SPECIAL SERVICES IN THE SCHOOLS** 3  
Explores roles and functions of psychologists, counselors and special educators in the schools. Study of school organization, professional standards, history of special services, legal and ethical issues and current issues pertaining to special education in the state and nation
- EDUC 619 DIVERSITY IN THE CLASSROOM** 3  
Examines type and implications of student diversity in classrooms (cultural, gender, class, language, and handicapping condition), cross-cultural processes, and foundations of special education. Explores best practices in multicultural education, classroom management and inclusion of secondary students with special learning needs.  
RESTRICTIONS: Field placement of 18 hours is required.
- EDUC 620 FOUNDATIONS OF READING INSTRUCTION** 3  
Psychology and pedagogy of reading instruction. Lectures and demonstrations covering the following areas: psychology of the 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 course to prepare students as reading consultants. Teaching experience in the Reading Center is required along with visitations 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 the contributions of literacy research for content learning (e.g., math, science, social studies). Underscores the 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 are studied with an emphasis on applications in the schools. Designed primarily for school psychologists, school counselors and other educators. Examines the social, moral, affective, cognitive and biological bases of behavior within the school setting. May be cross-listed with IFST623.  
PREREQ: EDUC202 or EDUC413
- EDUC 624 INTRODUCTION TO AUTISM AND SEVERE DISABILITIES** 3  
An introduction to issues related to the 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 the 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 the 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 a 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 the 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  
A study of the research on teacher characteristics, teaching style and method, and teaching.
- EDUC 630 ASSESSMENT AND INSTRUCTION FOR READING: MIDDLE AND HIGH SCHOOL** 3  
Third in a three-course sequence on assessment and instruction of reading and writing for students with learning problems. Focuses on assessment of reading and writing problems and appropriate instruction in middle and high school.  
PREREQ: EDUC608 or EDUC620; EDUC659 and EDUC668
- EDUC 631 ORGANIZATION AND SUPERVISION OF LITERACY PROGRAMS** 3  
Contextualizes assessment and instruction for reading in the whole-school context. Designed to introduce the leadership roles currently held by Reading Specialists and Literacy Coaches and includes an 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 the Internet to support, enhance, and deliver curriculum in grades K-12. Participants will use a variety of tools including the 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 will create units of instruction appropriate to their teaching level 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 the field of computer-based instruction, including instructional theory and design, hardware and software systems, artificial intelligence techniques, author languages and the politics and sociology of educational technology. May be cross-listed with CISC633.
- EDUC 634 TOPICS IN ELEMENTARY SCHOOL MATHEMATICS** 3  
Examines in-depth topics usually included in a K-8 mathematics program. Provides not only an overview of the topics, but increased understanding as well.
- EDUC 635 TEACHING MATHEMATICS IN LOWER ELEMENTARY SCHOOL** 3  
Acquaints students with historic and recent information from theory and research on teaching and learning mathematics in grades 1-4, and will engage students in methods and materials for instruction that such information suggests.  
PREREQ: EDUC634 and MATH252  
RESTRICTIONS: Grade of C or better in EDUC634 or MATH252
- EDUC 636 TEACHING MATHEMATICS IN UPPER ELEMENTARY SCHOOL** 3  
Acquaints students with historic and recent information from theory and research on teaching and learning mathematics in grades 4-8, 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 639 EDUCATIONAL TECHNOLOGY TOPICS** 3  
In-depth study of a major problem in educational technology. Problems to be studied will vary with each offering.  
RESTRICTIONS: May be repeated for credit when topics vary.
- EDUC 640 INTRODUCTION TO CURRICULUM** 3  
Focuses on the curriculum that actually makes a difference - the curriculum that finds its way into the classroom. The three main topics are: 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 the operational curriculum.
- EDUC 641 SCIENCE CURRICULUM AND INSTRUCTION** 3  
Examination of the 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 that are consistent with current learning theories.
- EDUC 642 TOPICS IN SCIENCE EDUCATION** 3  
In-depth study of a 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; the development of lessons in environmental education; and practical experiences with curriculum development and teaching procedures.
- EDUC 644 SOCIAL STUDIES CURRICULUM AND INSTRUCTION** 3  
Compares the goals of the 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 the 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 the application of current methods, techniques and procedures in EFL and ESL instructional settings. Although theoretical concerns are included, emphasis is 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 the 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 the specialized skills and knowledge necessary in counseling groups of children and adolescents, integrating developmental considerations, leadership skills and fundamentals of group counseling practice. Students are supervised practicing skills in class and at practicum site.  
PREREQ: EDCE654  
COREQ: EDUC669  
RESTRICTIONS: Requires permission of instructor
- EDUC 651 SCHOOL-BASED FAMILY ISSUES AND INTERVENTION** 3  
Provides an ecological view of children in families and the relationships between families and the school system. Topics for study will be the 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 the design and evaluation of instructional technology applications for elementary and secondary school students with disabilities. Topics include instructional design principles and their application to the 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 the use of computer-based aids and other assistive devices to reduce barriers to the education and rehabilitation of children and adults with mild, moderate, and severe physical and cognitive disabilities. Topics include strategies to facilitate the learning of cause-and-effect, alternate control interfaces to access computers and other aids, human factors, principles in the design and configuration of assistive devices and strategies and devices to improve the interactivity of learning and living environments. Federal policies regarding assistive technology.  
PREREQ: EDUC652
- EDUC 656 SCHOOL COUNSELING SERVICES** 3  
Detailed study of the function of school counselors with emphasis on developing a curriculum to promote social and emotional development of children. A practicum experience is included.
- EDUC 657 CHILDREN, TELEVISION AND EDUCATION** 3  
See COMM657 for course description.
- EDUC 658 DISCIPLINE AND CLASSROOM MANAGEMENT** 3  
A review of discipline procedures, sources of assistance, legal implications, parental roles, 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 can be applied to research studies.
- EDUC 661 SCHOOL BUSINESS MANAGEMENT** 3  
A study of the financial and business aspects of school administration
- EDUC 662 ADULT LEARNER** 3  
A study of values, interests and social roles through the life span. Emphasis on social and psychological development of adult learners; practical implications of aging on the learner studied from the perspective of teachers of adults
- EDUC 663 COUNSELING SKILLS LAB FOR COUNSELORS AND PSYCHOLOGISTS** 3  
Provides students the 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 a 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 a conceptual understanding of some useful statistical techniques along with practical computer and statistical skills which will enable the student to answer realistic research questions. Topics include descriptive statistics, regression, exploratory data analysis and hypothesis testing.
- EDUC 666 SPECIAL PROBLEM** 1-12
- EDUC 668 ASSESSMENT AND INSTRUCTION FOR READING: INTERMEDIATE GRADES** 3  
Second in a 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 the intermediate grades (4-6) and appropriate instruction.  
PREREQ: EDUC608 or EDUC620; EDUC659
- EDUC 669 PRACTICUM IN SCHOOL COUNSELING** 1-3  
Supervised counseling and guidance experiences in a school setting.  
PREREQ: EDUC618, EDUC651, EDUC656, EDUC660, EDUC663 and EDUC677.  
RESTRICTIONS: Requires contractual arrangement with University and on-site supervisor.
- EDUC 670 PROGRAM DESIGN FOR ADULTS** 3  
Program planning, development and evaluation for adult and continuing education programs. Including diagnosis of client needs; effective system of planning, development and evaluation for adult education programs; program scheduling; and budget and resource planning.
- EDUC 671 PRACTICUM IN SCHOOL PSYCHOLOGY** 3-6  
Closely supervised experiences in various school and clinical settings. Students have the opportunity to develop and practice skills that must be mastered prior to starting the 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 a 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 the factors which distinguish human language from animal communication as well as the development of many facets of language (semantics, syntax and phonology). Main emphasis on how children in the 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 the 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 are discussed and administered. Students are trained to be effective participants on a child study team and to administer a diagnostic-prescriptive protocol. Students are expected to interpret results from a placement protocol and to make recommendations for appropriate educational placement.
- EDUC 681 TECHNIQUES FOR BEHAVIOR CHANGE** 3  
Focuses on behavioral principles and procedures for promoting the acquisition of new skills, motivating the performance of previously acquired skills and reducing the occurrence of inappropriate behaviors. Includes strategies for analyzing the effectiveness of these interventions. Participants design and conduct a behavior-change project in an 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 the special education literature to design and interpret action research projects in classroom settings.  
PREREQ: EDUC607 and EDUC681.
- EDUC 683 CURRICULUM AND METHODS FOR TEACHING THE GIFTED CHILD** 3  
Focuses on the development of appropriate activities for gifted children. Acquaints students with theoretical models to guide the 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 the impact it is having on society. Surveys applications across the curriculum and reflects on the effects of multimedia on current teaching practice. Provides a multimedia toolbox and shows how to use it to create and publish multimedia applications on the 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 the identification of gifted and talented children and the development of programs to meet their needs.
- EDUC 687 INTERPRETATION AND TESTING OF THE EXCEPTIONAL CHILD** 3  
Testing procedures including the more esoteric tests that are administered in educational settings. Tests from areas such as the gifted and learning disabilities will be 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 a 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 the elementary schools with emphasis on the role of the elementary school principal.
- EDUC 690 ADMINISTRATION OF SECONDARY SCHOOLS** 3  
A study of administrative practices and procedures in secondary school with emphasis on the 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  
Presents a critical examination of methods to teach social skills to children and youth in both classroom and clinical settings. Presents a model for understanding social competence and a rationale for including social skill training in school curricula.  
May be cross-listed with PSYC692.
- EDUC 693 SUPERVISION: PURPOSES AND EFFECTS** 3  
Investigates research in the purposes and effects of supervision and evaluation in school settings. Particular attention given to the Delaware appraisal process.
- EDUC 694 ORGANIZATIONAL MANAGEMENT** 3  
An introduction to the function and structure of educational organizations. Emphasis on the sociopsychological foundations of management principles dealing with organizational theory and development, decision making, planned change, group process and leadership styles.
- EDUC 695 INTRODUCTION TO LEADERSHIP THEORY** 3  
Studies current applications of leadership research to educational administration. Includes some history of leadership studies. Focuses on instructional leadership, leadership style and the development of leadership skills.
- 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 697 EDUCATION OF EXCEPTIONAL CHILDREN** 3  
Historical and philosophical basis for special education; legislative mandates and litigation that establish the right to a free, appropriate, public education; physical, psychological and educational characteristics of exceptional children; study of past and emerging education practices for exceptional children with emphasis on pedagogical commonalities.
- EDUC 698 INSTRUCTIONAL STRATEGIES FOR ADULTS** 3  
Topics include characteristics of the adult learner; motivation; socioeconomic, cultural and psychological factors complicating the educational process; meeting students' needs through outside-class resources; counseling strategies; integrating adults' interests and needs into the curriculum.
- EDUC 699 FOUNDATIONS OF ADULT AND POSTSECONDARY EDUCATION** 3  
Overview of the historical and philosophical foundations of postsecondary education with particular reference to the United States. Key people, issues, institutions, movements, public policy and programs. Examines the 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 a positive classroom learning and teaching environment within a strong collegial support system. Content varies with participant needs 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 a classroom climate conducive to learning and growth with a focus on developmentally appropriate practice to adolescents.  
RESTRICTIONS: Limited for 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 the 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 the academic achievement of under-represented populations.

RESTRICTIONS: Limited to ARTC candidates.

**EDUC 801 SEMINAR: CHILD DISCOURSE AND EDUCATION 3**

Examination of child discourse from the earliest period of language development through the middle school years. Investigation of the literature on oral language development among children from different sociocultural backgrounds. Focus on the relationship between discourse development and children's abilities to engage in oral language and literacy activities in the classroom.

RESTRICTIONS: Open only to Ph.D. and advanced master's students.

**EDUC 802 SEMINAR: READING 3**

Studies significant research in reading to train students in the 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 a variety of school and community agency settings.

**EDUC 805 PROSEMINAR IN EDUCATION I 4**

Required first-year seminar presents Ph.D. students with the key domains of education research and the 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 Ph.D. students to the key domains of education research examined from the perspective of qualitative analyses.

COREQ: EDUC850.

**EDUC 807 WRITING PROCESSES IN EDUCATIONAL SETTINGS 3**

Focuses on the nature of the writing system, how it is acquired and developed and the 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**

RESTRICTIONS: Requires permission of department. Credit during any semester varies according to the percentage of time spent in internship. May be repeated up to nine credits.

**EDUC 811 TOPICS IN EDUCATIONAL POLICY 3**

In depth examination of select topics that reflect the expertise of the instructor, and build on the themes introduced in EDUC875.

**EDUC 812 REGRESSION MODELS IN EDUCATION 3**

The use of regression models in education. Topics include simple and multiple regression, regression models for limited dependent variables and path analysis models.

PREREQ: EDUC856 or equivalent.

**EDUC 813 CHILDHOOD PSYCHOPATHOLOGY 3**

Survey of various developmental and behavioral disorders in childhood. Seminar will examine the 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**

Intellectual and personality assessment of children. Offers extensive experience in administering, interpreting and integrating psychological tests, training in report writing and the development of treatment prescriptions.

RESTRICTIONS: Requires permission of instructor.

**EDUC 817 INDIVIDUAL INTELLIGENCE TESTING 3**

Administration and interpretation of major individually administered intelligence tests used in school and child clinical psychology. Five tests will be highlighted: the Stanford Binet, EISC-R, WPPSI, WAIS-R and K-ABC. May be cross-listed with PSYC817.

RESTRICTIONS: 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 the 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 the 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 SOCIAL FOUNDATIONS OF LITERACY 3**

Explores social and cultural factors which influence children's acquisition and use of literacy. Issues relating to variations in expectations for literacy behavior in community and school contexts are considered. Relations between discourse patterns and literacy learning will be addressed.

RESTRICTIONS: Open only to Ph.D. and advanced master's students.

**EDUC 823 LEARNING AND DEVELOPMENT 3**

The study of contemporary theory and research in human development, with an emphasis on issues of educational significance, and mechanisms that affect development.

May be cross-listed with PSYC823.

**EDUC 825 PROSEMINAR: SOCIAL AND URBAN POLICY 3**

See UAPP823 for course description.

**EDUC 829 RESEARCH ON TEACHING 3**

A 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 the 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**

The application of brief therapy techniques with children and adolescents from diverse backgrounds. Attention is given to a 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**

Students will work in school, clinic or community settings under supervision to further develop their 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 MATH LEARNING 3**

Examines research and theories of mathematics learning. Traces development of mathematical thinking from grades K to 12. Examines factors that influence the nature of what and how mathematics is learned.

**EDUC 834 RESEARCH/THEORY OF MATH 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 the factors that influence the selection of teaching methods.

PREREQ: EDUC 833 or permission of instructor.

**EDUC 835 RESEARCH/THEORY OF MATH CURRICULUM 3**

Examines research and theories of mathematics curricula, grades K-12. Analyzes features of traditional and reform curricula, and issues of curricula design and implementation.



- EDUC 836 RESEARCH/THEORY OF MATH TEACHER EDUCATION AND SCHOOL IMPROVEMENT** 3  
Examines research and theories of mathematics teacher education and school improvement, grades K-12. Studies factors that influence the effectiveness of mathematics teacher education programs and factors that support teacher learning in schools.  
PREREQ: EDUC835 or permission of instructor
- EDUC 837 SEMINAR: HUMAN DEVELOPMENT** 3  
See PSYC804 for course description
- EDUC 838 RESEARCH ISSUES IN MATH EDUCATION** 1 PF  
Examines current issues in mathematics education from methodological and conceptual perspectives. Design and critique local research projects.  
PREREQ: Admission to doctoral program.
- EDUC 840 RESEARCH COLLOQUIUM IN EDUCATION** 1-3 PF  
A detailed analysis of the research currently under way at the University of Delaware and other institutions, including doctoral dissertations, that has application to human learning in an educational environment.  
RESTRICTIONS: Open to Ph.D. and advanced master's students.
- EDUC 843 PROSEMINAR IN SCIENCE EDUCATION** 3  
Covers critical issues in curriculum, research on learning and teaching.  
RESTRICTIONS: Topics vary. May be repeated for credit.
- EDUC 845 SEMINAR IN SOCIAL STUDIES EDUCATION** 3  
The role of school programs in citizenship education. Selected topics may include analysis of the citizenship mission of American education, examination of how American culture is transmitted and evaluated in school programs and changing conceptions of civic education in an increasingly diverse nation.  
RESTRICTIONS: May be repeated for credit when topics vary.
- EDUC 848 SEMINAR IN LANGUAGE DEVELOPMENT** 3  
Covers aspects of semantic, syntactic and phonological development through an examination of current research and theory in the field. Treats the educational implications of language development.  
May be cross-listed with LING848
- EDUC 850 QUALITATIVE RESEARCH AND EVALUATION DESIGNS IN EDUCATIONAL SETTINGS** 3  
Theory and practice are 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 a two-semester introduction to qualitative research.
- EDUC 851 PRACTICUM: QUALITATIVE RESEARCH** 3  
Provides practical experience in qualitative data collection, analysis and writing. Topics include research design, formal and informal interviewing, community and classroom observations, life history, the case study, analytic induction, ethics and style in qualitative research reporting.  
PREREQ: EDUC850
- EDUC 852 CRITICAL AND INTERPRETIVE METHODS IN EDUCATION RESEARCH** 3  
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 are examined.
- EDUC 856 INTRODUCTION TO STATISTICAL INFERENCE** 3  
Quantitative analysis topics include describing univariate and bivariate data distributions, calculating and interpreting summary statistics, the logic of least squares estimation, the rudiments of probability theory, selected probability models and their interrelationships, the logic of null hypothesis testing, interval estimation and selected inferential techniques.  
PREREQ: EDUC665 or equivalent.  
RESTRICTIONS: Requires admission to doctoral program.
- EDUC 860 CURRICULUM THEORY** 3  
Introduces curriculum theory and the history of curriculum as a field of study. Topics include societal forces influencing curriculum, assumptions underlying curriculum decisions and conflicting views of curriculum.
- EDUC 861 CURRICULUM DEVELOPMENT AND EVALUATION** 3  
Major curriculum theories and their relationships to planning, improvement and evaluation of school programs. Consideration of strategies for affecting curriculum change.
- EDUC 862 QUANTITATIVE ISSUES IN EDUCATION RESEARCH** 3  
Considers general topics relevant to the quantitative analysis of educational data. Topics include the use of major educational databases, sampling issues, experimental, quasi-experimental and non-experimental designs. Issues of the philosophy and epistemology of quantitative methodology as they pertain to educational research.  
PREREQ: EDUC856  
RESTRICTIONS: Requires admission to doctoral program.
- EDUC 863 PRINCIPLES OF EDUCATIONAL EVALUATION** 3  
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 the implementation and practice of process and outcome program evaluation.
- EDUC 865 EDUCATIONAL MEASUREMENT THEORY** 3  
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** 3  
Examines approaches to neuropsychological assessment and application to childhood learning and neurodevelopmental disorders.  
RESTRICTIONS: Requires permission of instructor.
- EDUC 871 TOPICS IN RESEARCH METHODOLOGY** 3  
Concerns the substantive applications of research and evaluation to education problems and is taught in a rotating manner. Possible topics include history and sociology of testing, visual and graphical display of data, models of educational stratification and problems of educational evaluation.
- EDUC 872 ADVANCED EDUCATIONAL MEASUREMENT** 3  
Focuses on theories of measurement with special emphasis on item response theory. The first two classes will be devoted to classical test theory and remaining class sessions will emphasize item response theory.  
PREREQ: EDUC856 and EDUC865.
- EDUC 873 MULTILEVEL MODELS IN EDUCATION** 3  
Introduction to multilevel modeling. Such modeling is useful for studies of organizations such as schools in which units of observations are nested in other units (e.g. students in schools). Also considers the analysis of growth and change as a special case of multilevel modeling.  
PREREQ: EDUC812 and EDUC856, or equivalent.
- EDUC 874 MULTIVARIATE DATA ANALYSIS IN EDUCATION** 3  
Topics covered include regression, factor analysis, discriminant analysis and multivariate analysis of variance. Emphasis on applications and the use of computer packages.  
PREREQ: EDUC812 and EDUC856.
- EDUC 875 INTRODUCTION TO EDUCATIONAL POLICY** 3  
Survey of the origins, nature and impact of the major state and federal educational policies of the past 20 years. What do officials seek when they frame policies; what happens when innovations take hold; how do we explain the frequent discrepancies between intentions and results?
- EDUC 876 STRUCTURAL MODELS IN EDUCATION** 3  
Concerns the statistical modeling of latent variables arising in educational settings. Topics include model specification, identification, estimation and testing. Considers structural models in single and multiple groups, structured means analysis and structural analysis of categorical and other non-normal data.  
PREREQ: EDUC812, EDUC856 and EDUC874.
- EDUC 877 PRACTICUM IN SPECIAL EDUCATION** 3-6  
Demonstration, directed observation and practice teaching with consultation and an accompanying seminar to discuss experiences and problems under faculty supervision.  
PREREQ: EDUC679, EDUC680 and EDUC681
- EDUC 879 INTERNSHIP IN EDUCATION** 3-9  
Supervised, on-the-job experience in one specific area of education (i.e., administration, guidance, etc.), in which such internships are required as a part of graduate degree programs.  
RESTRICTIONS: Credit during any semester varies according to the time spent in internship.



**EDUC 883 ADMINISTRATION OF ADULT AND CONTINUING EDUCATION PROGRAMS 3**

Considers the administration, design and implementation, and evaluation of programs for postsecondary students in formal and informal training, degree or nondegree programs. Will consider factors influencing the administration and design of programs such as institutional demands.

**EDUC 885 EDUCATIONAL TECHNOLOGY TOPICS 3**

In-depth study of a major problem in educational technology.  
RESTRICTIONS: May be repeated for credit when topics vary.

**EDUC 888 PUBLIC EDUCATION FINANCE 3**

Review of approaches to collecting and distributing local, state, and federal funds for public education. Analysis of issues of funding public education and its economic aspects.  
RESTRICTIONS: Open only to students in the Ed.D. program in educational leadership.

**EDUC 890 LEADERSHIP: THEORY AND RESEARCH 3**

Theories and research relating to leadership and management style. Fundamental principles of leadership as viewed from the fields of philosophy, sociology, psychology and applied behavioral science are discussed. Emphasis on analysis of personal style.  
RESTRICTIONS: Open only to students in the Ed.D. program in educational leadership.

**EDUC 891 MANAGEMENT APPLICATIONS RESEARCH I 2**

Focuses on conceptualizing, writing and designing quantitative decision-oriented studies for education administrators and policymakers.  
RESTRICTIONS: Open only to students in the Ed.D. program in educational leadership.

**EDUC 892 MANAGEMENT APPLICATIONS RESEARCH II 1**

Focuses on developing, organizing and analyzing quantitative management-oriented data for education administrators and policymakers.  
PREREQ: EDUC665, EDUC891.  
RESTRICTIONS: Open only to students in the Ed.D. program in educational leadership.

**EDUC 894 ADVANCED ORGANIZATIONAL THEORY 3**

Survey of historical and contemporary macro-organizational theory with a focus on the school as an 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 the need for change in an educational setting, the educational leader as an agent of change and an analysis of numerous approaches that have been successful in improving instructional programs.  
RESTRICTIONS: Open only to students in the Ed.D. program in educational leadership.

**EDUC 897 CURRICULUM INQUIRY 3**

A study of the emerging concepts and radical policy options found in significant writings that have influenced curriculum theory and practice during the 20th century.  
RESTRICTIONS: Open only to students in the Ed.D. program in educational leadership.

**EDUC 899 ECONOMICS OF EDUCATION 3**

Introduces economic analysis as it pertains to educational systems and their impact on economic growth. General economic principles related to specific education issues and problems such as productivity, human capital, effectiveness and funding. Approaches used by economists are presented in evaluating educational activities and their policy impact.

**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 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, ground water, 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, landscaping 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 111 COMPUTER APPLICATIONS IN ENGINEERING TECHNOLOGY 3**

A foundation course in the application of engineering principles and modern technology in agriculture and industry. Emphasis on problem solving and elementary Fortran programming.

**EGTE 112 PERSONAL COMPUTERS AND TECHNOLOGY 3**

Introductory course in personal computers. PC operation systems, programming, and software packages such as spreadsheets and word processing. Statistical and numerical analysis techniques will be applied to production problems in Engineering Technology.

**EGTE 115 INTRODUCTION TO COMPUTER BASED PROBLEM SOLVING 4**

Provides foundation in the application of computers and engineering principles for agriculture, industry and the environmental sciences. Emphasizes fundamentals of computer programming, problem solving and practical applications within the field. Includes a design project and laboratory.  
COREQ: MATH117 or higher.

**EGTE 125 INTRODUCTION TO ENGINEERING TECHNOLOGY 1**

Career exploration in engineering technology, campus resources, engineering methods. Intended for first-year students in the Department of Bioresources Engineering.

**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: EGTE115, MATH221/241 and PHYS201/207.

**EGTE 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 CIEG126.  
RESTRICTIONS: Requires competency in trigonometry.

**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: MATH221/241, PHYS201/207.

**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 the 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: EGTE244.

- EGTE 306 COST ESTIMATING** 3  
Building components, bill of materials and cost estimating using cost of materials plus labor system.  
PREREQ: EGTE112, EGTE209
- EGTE 311 FUNDAMENTALS OF THERMODYNAMICS** 3  
Basic properties and concepts. Zeroth, first and second laws. Closed and open systems. Gas cycles, vapor cycles, mixtures of gases and vapors, psychrometry and transfer of heat energy.  
PREREQ: EGTE215.  
COREQ: MATH222 or MATH242.
- 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: EGTE231.
- 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: EGTE215.
- EGTE 328 WASTEWATER TREATMENT SYSTEMS** 3  
Properties of municipal and food processing wastes. Wastewater treatment, biosolids management and wastewater utilization.  
PREREQ: CHEM102 or 104, and MATH221, and one semester of general biology.
- EGTE 331 MECHANICAL POWER UNITS** 4  
Theory and operation of internal combustion engines. Analysis of engine and power transmission components. Design of power units and components. Design and selection of mechanical and hydraulic power transmission systems using computer techniques.  
PREREQ: EGTE111, EGTE215 and EGTE311.
- EGTE 344 ELECTRONICS AND MICROPROCESSORS** 3  
Survey course with emphasis on fundamental electronic concepts and devices. A logical progression is made from semiconductors through microprocessors. Topics include diodes, transistors, SCR's, triacs, digital logic, number systems, flip flops, shift registers, counters, microprocessors, assembly language programming, A/D conversion and data communications.  
PREREQ: EGTE244.
- EGTE 354 RURAL AND LIGHT INDUSTRIAL BUILDINGS** 4  
Analysis, design, materials and construction of rural and light industrial buildings.  
PREREQ: EGTE111 or EGTE115; EGTE112; EGTE209.
- EGTE 365 JUNIOR SEMINAR** 1  
Invited speakers, faculty presentations, and oral and written reports required on selected topics in agricultural engineering.
- 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: MATH221 or equivalent, EGTE115.
- EGTE 417 PROJECT MANAGEMENT** 3  
Basic procedures for finding the limiting sequence of events, constructing a flow network describing the 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: EGTE112 or EGTE115.
- 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 a 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 421 BIORESOURCES MANAGEMENT SYSTEMS** 4  
Water movement in soil-plant-atmosphere continuum, heat flow in soils, radiant energy in plant environment, ground-water, soil erosion and design of irrigation, drainage and soil erosion control systems.  
PREREQ: EGTE321, PLSC204, BISC103.

- EGTE 431 MECHANICAL ASPECTS OF BIOLOGICAL AND NATURAL RESOURCES** 4  
Mechanical properties of biological materials; mechanics of cutting and processing. Mechanics of soil cutting and traction. Design of off-highway equipment for biological and natural resources including machines for plant and soil systems, watershed management, resource conservation and the land application of waste materials.  
PREREQ: MATH243, PHYS207, and CISC106.
- EGTE 435 MACHINE DESIGN** 3  
Various aspects of machine design including static and fatigue failure, and the design of machine elements including fasteners, welded joints, bearings, shafts, and power transmission components. Projects include a semester-long design problem with a customer, a design-draw-build exercise in a machine shop, and the programming of a 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 processing 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. EGTE344 suggested.
- EGTE 444 PROGRAMMABLE LOGIC CONTROL APPLICATIONS** 3  
Designed to teach 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 will be programmed and tested on actual PLCs.  
PREREQ: EGTE115, EGTE244 or equivalent.
- EGTE 445 FOOD ENGINEERING TECHNOLOGY** 4  
See FOSC445 for course description.
- EGTE 449 APPLIED CONTROLS** 3  
The selection, operating principles and application of electrical, mechanical and mechatronic systems for industrial, agricultural and environmental applications. Includes a laboratory and design project.  
PREREQ: EGTE115, EGTE245, CPEG202 and MATH222/242  
RESTRICTIONS: Requires junior or senior status in the major or approval of the department.
- EGTE 450 TECHNICAL PRACTICUM IN INDUSTRY** 1-3  
Structured experience in industry. A minimum of 40 hours of technical activities per credit hour. Upon completion, students present results to the department faculty and industrial sponsor through written reports and oral presentations. May be repeated twice for credit. Proposals approved in advance by the department faculty, and a designated faculty advisor is required.  
RESTRICTIONS: Junior standing.
- 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 bioresources engineering technology.
- EGTE 454 WOOD AND STEEL STRUCTURES** 3  
Analysis and design of structures using wood and steel for building materials. Design aspects of building construction.  
PREREQ: EGTE231, PHYS201/207.
- EGTE 455 CONCRETE AND MASONRY STRUCTURES** 3  
The use of concrete and masonry in building structures. Includes analysis and design with concrete and masonry.  
PREREQ: EGTE231, PHYS201/PHYS207.
- 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, EGTE112, EGTE215 and EGTE311.
- EGTE 466 INDEPENDENT STUDY** 1-3

## ELECTRICAL ENGINEERING

**ELEG 205 ANALOG CIRCUITS I 4**

Laws of the 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, ELEG205

**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

**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 the introductory level. Introduces Z, Laplace and Fourier transforms and uses these to solve difference and differential equations arising from circuit theory and signal processing. Presents theory of linear and causal systems.

PREREQ: ELEG212

**ELEG 306 SIGNAL PROCESSING II 3**

Continues topics introduced in ELEG305 at a more advanced level. Introduces filter design, transmission line analysis, the discrete Fourier transform, the 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 informational handling.

PREREQ: PHYS208 and MATH302

RESTRICTIONS: Not for major credit

**ELEG 320 FIELD THEORY I 3**

Study of theory and problems in electrostatic and magnetostatic fields. Maxwell's equations.

PREREQ: PHYS208, MATH342 and ELEG205

**ELEG 340 SOLID STATE ELECTRONICS 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: ELEG309, ELEG240, MATH243

**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; based band data transmission, modulation, noise in analog systems and digital carrier modulation.

PREREQ: ELEG306

**ELEG 410 SIGNALS AND COMMUNICATIONS DESIGN 4**

Design of signal processing, control and communications systems. A major design project is required. Students study, design, build and test their projects. Periodic oral and written reports are required.

May be cross-listed with CPEG410.

PREREQ: ELEG306 or ELEG403 or ELEG413

**ELEG 413 FIELD THEORY II 4**

Electrodynamics based on Maxwell's equations. Energy storage and flow in electromagnetic fields. Transmission lines, waves and radiating systems.

PREREQ: ELEG320

**ELEG 418 DIGITAL CONTROL SYSTEMS 3**

Study of closed-loop digital control systems. Emphasis is on simulation methods and pole placement techniques for controller development. Both root-locus and input/output pole placement using the Diphantine equation are used to generate designs. MATLAB is used for computer aided design.

**ELEG 419 MULTIMEDIA COMMUNICATIONS 3**

The 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 the principles of solid state physics for electronics and photonics. Topics including material structure, the states and statistics of charge carriers, and the properties of conductors, insulators, and semiconductors. Provides a foundation for understanding nanotechnology applications and nanophase materials.

PREREQ: Senior standing

**ELEG 422 SEMICONDUCTOR MATERIALS PROCESSING 3**

The basic goals, principles and techniques of semiconductor materials processing are discussed. The emphasis is 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: ELEG320 and ELEG340

**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. It begins with a working knowledge of their basic operation physics and then introduces mathematical and computational methods for their design. Various fabrication methods will be discussed such as lithographic and self-assembly methods.

**ELEG 428 SYSTEMS ANALYSIS AND CONTROL 3**

Involves the study of closed-loop analog control systems. Emphasis on stability analysis and the translation of performance specifications into a control system design using the root locus method. Implementation issues are covered. Computer aided design techniques involving the use of MATLAB are stressed.

**ELEG 430 MICROWAVE CIRCUIT DESIGN PRINCIPLES 4**

Provides a comprehensive introduction to time and frequency domain integrated circuit design in the microwave/GHz regime. Major design project to complete course.

PREREQ: ELEG312 and ELEG320

**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, ELEG306 and ELEG320

- ELEG 440 OPTO-ELECTRONICS** 3  
Provides an introduction to the operating principles of opto-electronic devices used in various digital transmission and information processing systems. Emphasis is on the 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  
The 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 transport, nano-scale manipulation, nanomaterials and nano-sensors for medical applications.
- ELEG 444 MICRO-ELECTRO-MECHANICAL SYSTEMS** 3  
Explores the 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 445 OPTICAL COMMUNICATION SYSTEMS** 3  
Studies the components and system design issues of fiber optic based communications systems. Topics include the propagation of lightwaves in fibers, the coupling of light into fibers, a review of sources and detectors used in fiber-based systems, link analysis, and overall architecture issues.  
PREREQ: ELEG440 or permission of instructor.
- ELEG 446 NANO-ELECTRONIC DEVICE PRINCIPLES** 3  
Introduction to the operating principles of nanoscale optical and electronic devices, with emphasis on how nanotechnology and quantum mechanics affect devices with reduced sizes and dimensions. Develops the performance and limitations of devices based on quantum wells, wires, dots, and nanophase materials.
- ELEG 447 OPTICAL PROPERTIES OF SOLIDS** 3  
Techniques for the design of optical filters and optoelectronic devices with thin films and the fundamental electromagnetic and solid state physics that determine the optical properties of solids.  
PREREQ: ELEG240.
- ELEG 449 NANOMATERIALS AND APPLICATIONS** 3  
A 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: PHYS207, PHYS208.
- ELEG 450 SEMICONDUCTOR DEVICE DESIGN AND FABRICATION** 4  
Instruction in design and fabrication of simple bi-polar 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.
- ELEG 460 HIGH TECHNOLOGY ENTREPRENEURSHIP** 3  
Focuses on the critical financial, legal, scientific and engineering issues that must be confronted during the initial planning stages of a start-up enterprise. Students work in teams to develop a business plan for a real world/business product offering.
- ELEG 466 INDEPENDENT STUDY** 1-6
- ELEG 471 INTRODUCTION TO BIOMEDICAL ENGINEERING** 3  
Introduction to human physiology at all hierarchical levels including molecular, biochemical, cellular, tissue, organ, and integrated systems.  
RESTRICTIONS: Seniors only.
- ELEG 472 CELL AND MOLECULAR BIOLOGY FOR ENGINEERS** 3  
Overview of cell biology and molecular mechanisms. Covers some intercellular interactions, but main focus is on intracellular structure, organization, and function.
- ELEG 473 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 or instructor's permission.
- ELEG 474 NONLINEAR DYNAMICS IN NEURAL SYSTEMS** 3  
Introduction to the mathematical tools, theory, and experimental observations that concern nonlinear dynamics of biological nervous systems. Classical methods employed to develop a unified approach to the study and understanding of nonlinear dynamics, chaos, synchronicity, bifurcation, and self-organization.  
PREREQ: MATH243.
- ELEG 475 IMAGE PROCESSING WITH BIOMEDICAL APPLICATIONS** 3  
Fundamentals of digital image processing, including image formation, acquisition, transforms, enhancement, restoration, coding, and reconstruction from projections. Attention will be given to biomedical imaging modalities, including X-ray, computed tomography (CT), magnetic resonance (MR) imaging, and ultrasound.  
PREREQ: ELEG305.
- ELEG 477 BIOSIGNAL PROCESSING** 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 490 CAREER SKILLS FOR ENGINEERS** 1  
See CPEG490 for course description.  
RESTRICTIONS: Open to engineering seniors, or by permission of instructor.
- ELEG 611 LINEAR SYSTEMS THEORY** 3  
Reviews the fundamentals of matrix and linear algebra, introduces the ideas around state-space representations of linear systems and demonstrates application areas in signal processing including estimation and control of dynamic systems.
- ELEG 616 KINETIC THEORY AND THERMODYNAMICS** 3  
See PHYS616 for course description.
- ELEG 619 MULTIMEDIA COMMUNICATIONS** 3  
The theory and principles of multimedia communications, including data compression, CD-ROMs, multimedia networking and standards (JPEG, MPEG, H261, H263, RTP, etc.).
- ELEG 620 SOLAR ELECTRIC SYSTEMS** 3  
Examines the issues critical to the deployment of photovoltaic systems. Focuses on systems that have an electricity generating capacity of three kilowatts and larger.
- ELEG 621 SOLID STATE NANOTECHNOLOGY** 3  
Introduces the principles of solid state physics for electronics and photonics. Topics include material structure, the states and statistics of charge carriers, and the properties of conductors, insulators, and semiconductors. Provides a foundation for understanding nanotechnology applications and nanophase materials.
- ELEG 622 ELECTRONIC MATERIALS PROCESSING** 3  
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.
- ELEG 624 FUNDAMENTAL DEVICE PRINCIPLES** 3  
Introduces fundamental principles of semiconductor devices. Topics covered 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 MIS structure, microwave and optoelectronic devices.
- ELEG 625 OPTICAL FIBER COMMUNICATIONS** 3  
Introduces the fundamental aspect of optical fiber communications as well as some 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.
- ELEG 626 PHOTONIC CRYSTAL DEVICES** 3  
Introduces design and fabrication tools required for photonic crystal structures. It begins with a working knowledge of their basic operation physics and then introduces mathematical and computational methods for their design. Various fabrication methods will be discussed such as lithographic and self-assembly methods.  
PREREQ: ELEG648.

- ELEG 631 DIGITAL SIGNAL PROCESSING** 3  
Theory of discrete-time signals and systems with emphasis on the 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 633 IMAGE PROCESSING** 3  
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** 3  
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 the Cayley-Hamilton theorem are studied.  
PREREQ: ELEG305 and MATH342 or MATH349 or equivalents
- ELEG 635 DIGITAL COMMUNICATION** 3  
The 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** 3  
Introduction to random vectors and random processes and second-order moment and spectral characterizations. Linear transformations of stationary processes. Parameter estimation. Orthogonality principle and optimal linear filtering. Levinson recursion and lattice prediction filters. AR and ARMA models and their Yule-Walker characterizations. Classical and modern spectrum estimation.  
PREREQ: Undergraduate courses in probability and signals and linear systems
- ELEG 638 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, ELEG306 and ELEG320
- ELEG 640 OPTO-ELECTRONICS** 3  
Provides an introduction to the operating principles of optoelectronic devices used in various digital transmission and information processing systems. Emphasis is on the generation (via lasers) and detection of optical signals.
- ELEG 641 ANTENNA THEORY AND DESIGN** 3  
The 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 NANOTECHNOLOGY** 3  
Applications of nanotechnology in biomedical engineering. Topics include nanomedicine in medical diagnostics, molecular manufacturing and transport, nano-scale manipulation, nanomaterials and nano-sensors for medical applications.
- ELEG 643 COMPUTATIONAL METHODS FOR ELECTROMAGNETICS** 3  
Develop and apply numerical techniques for solving Maxwell's equations as they apply to radiation, propagation and scattering problems. Techniques such as the finite-difference time and frequency-domain methods, finite element method, method of moments and the boundary element method will be introduced.
- ELEG 644 MICRO-ELECTRO-MECHANICAL SYSTEMS** 3  
Explores the 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 COMMUNICATION SYSTEMS** 3  
Studies the components and system design issues of fiber optic based communications systems. Topics include the propagation of lightwaves in fibers, the coupling of light into fibers, a review of sources and detectors used in fiber-based systems, link analysis, and overall architecture issues.  
PREREQ: ELEG640 or permission of instructor
- ELEG 646 NANO-ELECTRONIC DEVICE PRINCIPLES** 3  
Introduction to the operating principles of nanoscale optical and electronic devices, with emphasis on how nanotechnology and quantum mechanics affect devices with reduced sizes and dimensions. Develops the performance and limitations of devices based on quantum wells, wires, dots, and nanophase materials.
- ELEG 647 OPTICAL PROPERTIES OF SOLIDS** 3  
Techniques for the design of optical filters and optoelectronic devices with thin films and the fundamental electromagnetic and solid state physics that determine the optical properties of solids  
PREREQ: ELEG240 or equivalent
- ELEG 648 ADVANCED ENGINEERING ELECTROMAGNETICS** 3  
Development and application of Maxwell's equations as they apply to the 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** 3  
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** 3  
Instruction in design and fabrication of simple bi-polar 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.  
PREREQ: ELEG340
- ELEG 651 COMPUTER NETWORKING COMMUNICATIONS** 3  
Presents basic concepts in computer network analysis and design. Emphasizes generic principles developed over the last two decades in the 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  
Provides an introduction to the principles of parallel computer architecture. Begins at a level that 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: ELEG651 or CISC650 or permission from the instructor
- ELEG 660 HIGH TECHNOLOGY ENTREPRENEURSHIP** 3  
Focuses on the critical financial, legal, scientific and engineering issues that must be confronted during the initial planning stages of a start-up enterprise. Students work in teams to develop a business plan for a real world/business product offering.
- ELEG 661 MATERIALS AND DEVICES SEMINAR** 1 PF  
Lectures and discussions by faculty and students on specialized topics in materials and devices.
- ELEG 662 DIGITAL SYSTEMS SEMINAR** 1 PF  
Lectures and discussions by faculty and students on specialized topics in digital systems
- ELEG 663 SIGNAL PROCESSING SEMINAR** 1 PF  
Lectures and discussions by faculty and students on specialized topics in signal processing and communications.
- 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 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 the mathematical tools, theory, and experimental observations that concern nonlinear dynamics of biological nervous systems. Classical methods will be employed to develop a unified approach to the 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 will be given to biomedical imaging modalities, including X-ray, computed tomography (CT), magnetic resonance (MR) imaging, and ultrasound.  
PREREQ: ELEG305 or equivalent
- ELEG 677 BIOSIGNAL PROCESSING** 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 681 REMOTE SENSING OF ENVIRONMENT** 3  
See MAST681 for course description
- ELEG 809 ELECTROMAGNETIC THEORY** 3  
See PHYS809 for course description
- ELEG 810 ELECTROMAGNETIC THEORY** 3  
See PHYS810 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, modem 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 PHYS813 for course description
- 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: ELEG631 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 the 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 the finite-difference time-domain (FDTD) method. Various properties for electromagnetic modeling such as the incorporation of symmetry aspects to reduce computational costs are introduced. Also, several applications including electromagnetic scattering, antenna design, micro-optical modeling are explored.  
PREREQ: ELEG648
- ELEG 841 ADVANCED COMPUTATIONAL ELECTROMAGNETICS II** 3  
Introduces the major modern computational methods for the analysis of frequency domain electromagnetics problems. The finite element method and the method of moments are covered. Students will 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 the radio frequency (RF) and microwave range. The basic concepts and technologies required to design RF and microwave devices and circuits will be explained. Examples of applications to wireless and lightwave systems will be discussed.  
RESTRICTIONS: Undergraduates require permission of the instructor

- ELEG 843 FOURIER OPTICS** 3  
Provides an understanding of the basic principles underlying the field of optical information processing. Emphasis will be 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 the 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 the operating principles of heterojunction devices and describes their performance using microwave techniques
- ELEG 853 INTEGRATED OPTICS** 3  
Discusses basic goals, principles and techniques of integrated optics. Topics include optical wave guides, scattering and absorption, couplers, electro-optic modulators, acousto-optic modulators, semiconductor lasers and optical detectors. Includes applications of optical integrated circuits.  
PREREQ: ELEG320 and ELEG340
- ELEG 855 MICROWAVE DEVICES AND CIRCUITS** 3  
Describes principles of device operation and circuit characteristics for the microwave FET, IMPATT, TRAPPATT, Gunn diode, varactor diode, p-i-n diode, tunnel diode and bipolar transistor. Covers both wave guide circuits and microwave integrated circuits.  
PREREQ: ELEG320 and ELEG340
- ELEG 868 RESEARCH** 1-6
- ELEG 869 MASTER'S THESIS** 1-6  
Laboratory study conducted for the purpose of contributing new data and theory in some fields of electrical engineering in which information is lacking. Although supervised, the work will be independent in character to encourage the 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 engage in a project that will allow them to acquire hands-on-experience in applying biological information to real biocomputational problems.  
PREREQ: ELEG676, CISC 889, or permission of instructor
- ELEG 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
- ELEG 969 DOCTORAL DISSERTATION** 1-12 PF

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**ENGLISH**


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- ENGL 011 ENGLISH ESSENTIALS** 3 RP  
Required of students whose admissions credentials indicate a need for additional training in the 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 110 CRITICAL READING AND WRITING** 3  
Expository and argumentative composition through analysis of selected readings.  
RESTRICTIONS: Required of all freshmen
- ENGL 166 SPECIAL PROBLEM** 1-3
- ENGL 183 GRAMMAR FOR ENGLISH TEACHERS** 2 PF  
Prepares English education majors for student teaching by providing them with a 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 an 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 CMLT202, 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 I** 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 II** 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 the classical era to the 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 SHORT STORY** 3  
Study of the short story as a 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 the 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 the ways they do.  
May be cross-listed with CMLT217.  
PREREQ: ENGL110.
- ENGL 260 HUMANITIES COLLOQUIUM** 3  
See ARSC260 for description.  
PREREQ: ENGL110.
- ENGL 266 SPECIAL PROBLEM** 1-3
- ENGL 300 TEXTS AND CONTEXTS** 3  
Examines cultural, historical, and theoretical contexts of a broad range of literary, critical and nontraditional texts.  
PREREQ: ENGL202, ENGL205 and ENGL206.  
RESTRICTIONS: Any two of the three prerequisites acceptable.
- ENGL 301 EXPOSITORY WRITING** 3  
Expository writing, with related studies in grammar, diction and rhetoric.  
PREREQ: ENGL110.  
RESTRICTIONS: Does not count toward English major.
- ENGL 302 ADVANCED COMPOSITION** 3  
Expository writing in a variety of forms, with emphasis on literary analysis.  
PREREQ: ENGL110.
- ENGL 303 SCRIPT WRITING** 3  
Instruction in script writing and preparation of a script.  
PREREQ: ENGL110.  
RESTRICTIONS: Final enrollment set after first class and submission of a script.
- ENGL 304 POETRY WRITING** 3  
Practice in writing a variety of verse forms.  
PREREQ: ENGL110.  
RESTRICTIONS: Final enrollment set after first class and submission of five poems.
- ENGL 305 FICTION WRITING** 3  
Practice in writing the short story.  
PREREQ: ENGL110.  
RESTRICTIONS: Final enrollment set after first class and submission of a short story.
- ENGL 306 TOPICS IN WRITING** 3  
Special topics in writing (for example, autobiography) Variable content.  
PREREQ: ENGL110.  
RESTRICTIONS: Final enrollment set after first class and submission of appropriate written sample.
- ENGL 307 NEWS WRITING AND EDITING** 3  
News judgment, news gathering, feature writing, libel problems, and ethics.  
Assignments include writing for the campus newspaper.  
PREREQ: ENGL110.  
RESTRICTIONS: Minimum grade of B required in ENGL110. Counts toward English major only as part of journalism concentration.
- ENGL 308 REPORTER'S PRACTICUM** 3  
Builds on ENGL307 with extensive reporting and writing for the campus newspaper. Attention to libel and privacy issues.  
PREREQ: ENGL307.  
RESTRICTIONS: Counts toward English major only as part of journalism concentration.
- ENGL 309 FEATURE AND MAGAZINE WRITING** 3  
All aspects of the newspaper and feature article. Developing ideas, researching, interviewing, writing, and marketing.  
PREREQ: ENGL307.  
RESTRICTIONS: Counts toward English major only as part of journalism concentration.
- ENGL 310 COPY EDITING AND LAYOUT** 3  
Newspaper copy editing, headline writing and layout, with emphasis on practical experience. Explores improvement or updating of news stories by rewriting.  
PREREQ: ENGL307.  
RESTRICTIONS: Counts toward English major only as part of journalism concentration.
- ENGL 312 WRITTEN COMMUNICATIONS IN BUSINESS** 3  
Examines the role of written communication in corporate decision making. Students write memos, letters, proposals and reports that simulate on-the-job communication tasks, and are encouraged to use materials from their fields of specialization.  
PREREQ: ENGL110.  
RESTRICTIONS: Counts toward English major only as part of the concentration in business and technical writing.
- ENGL 314 INTRODUCTION TO FOLKLORE AND FOLKLORE** 3  
Traditional forms of folklore with emphasis on modern folklore as it functions in contemporary societies.  
May be cross-listed with CMLT314.  
PREREQ: ENGL110.
- ENGL 315 BALLAD AND FOLKSONG** 3  
English-language ballad and folksong tradition in America. Consideration of oral, literary, historical and sociocultural aspects of the Anglo-Scots-Irish and African-American heritages.  
PREREQ: ENGL110.
- ENGL 316 PEER TUTORING/ADVANCED COMPOSITION** 3  
See ARSC316 for course description.
- ENGL 317 FILM HISTORY** 3  
History of American or various foreign national cinemas.  
May be cross-listed with CMLT317.  
PREREQ: ENGL110.  
RESTRICTIONS: May be repeated for credit when topics vary.
- ENGL 318 STUDIES IN FILM** 3  
Special topics such as film genres, major directors and Soviet cinema.  
May be cross-listed with CMLT318, JWST318, and/or WOMS318.  
PREREQ: ENGL110.  
RESTRICTIONS: May be repeated for credit when topics vary.
- ENGL 320 THE BIBLE AS LITERATURE** 3  
Studies the cultural contexts, narrative strategies, poetic forms, and literary archetypes of the Hebrew and Christian scriptures.  
PREREQ: ENGL110.



- ENGL 321 MEDIEVAL LITERATURE AND CULTURE** 3  
Study of selected topics in medieval literature (romance, Chaucer's contemporaries, drama). Texts usually read in English translations. Emphasis on medieval culture as a European phenomenon. Variable content. May be cross-listed with CMLT321.  
PREREQ: ENGL110.
- ENGL 322 CHAUCER** 3  
The Canterbury Tales (in part), Troilus and Criseyde, and some of the shorter poems.  
PREREQ: ENGL110.
- ENGL 324 SHAKESPEARE** 3  
Representative histories, comedies and tragedies  
PREREQ: ENGL110.
- ENGL 325 RENAISSANCE LITERATURE** 3  
Survey of varied literature written in England during the sixteenth and seventeenth centuries, from the age of the Reformation through the English Civil Wars. For example, selected works of Wyatt, Sidney, Spenser, Marlowe, Shakespeare, Jonson, Webster, Herbert, Vaughan, Marvell and Milton  
PREREQ: ENGL110.
- ENGL 328 MILTON** 3  
Milton's major poetry and selected prose.  
PREREQ: ENGL110.
- ENGL 330 THE DETECTIVE IN FILM AND FICTION** 3  
See CRJU336  
PREREQ: CRJU201.
- ENGL 331 THE AGE OF SATIRE** 3  
Dryden, Pope, Swift and their contemporaries  
PREREQ: ENGL110.
- ENGL 332 STUDIES IN RESTORATION AND EIGHTEENTH CENTURY LITERATURE** 3  
Studies of selected topics in Restoration and eighteenth century literature and culture, e.g., the epistolary novel, Restoration and eighteenth century drama and women in eighteenth century literature.  
PREREQ: ENGL110.  
RESTRICTIONS: May be repeated for credit when topics vary.
- ENGL 334 THE EARLY ROMANTICS** 3  
Poetry and prose of Blake, Coleridge, Wordsworth, and their associates.  
PREREQ: ENGL110.
- ENGL 335 THE LATER ROMANTICS** 3  
Poetry and prose of Byron, Shelley, Keats and their associates.  
PREREQ: ENGL110.
- ENGL 336 VICTORIAN POETRY** 3  
Tennyson, the Brownings, Arnold, the Brontes and their contemporaries.  
PREREQ: ENGL110.
- ENGL 337 VICTORIAN PROSE** 3  
Carlyle, Ruskin, Arnold and their contemporaries  
PREREQ: ENGL110.
- ENGL 338 VICTORIAN FICTION** 3  
Authors may include Dickens, the Brontes, Eliot, Hardy and their contemporaries. May be cross-listed with WOMS337.  
PREREQ: ENGL110.
- ENGL 340 AMERICAN LITERATURE TO THE CIVIL WAR** 3  
PREREQ: ENGL110.
- ENGL 341 AMERICAN LITERATURE: CIVIL WAR TO WORLD WAR II** 3  
PREREQ: ENGL110.
- ENGL 342 AMERICAN LITERATURE SINCE WORLD WAR II** 3  
PREREQ: ENGL110.
- ENGL 344 AFRICAN AMERICAN LITERATURE I** 3  
Literature by African American writers from the eighteenth century to the Harlem Renaissance  
May be cross-listed with BAMS313  
PREREQ: ENGL110.
- ENGL 345 AFRICAN AMERICAN LITERATURE II** 3  
Literature by African American writers from the Harlem Renaissance to the present.  
May be cross-listed with BAMS345.  
PREREQ: ENGL110.
- ENGL 347 STUDIES IN AMERICAN LITERATURE** 3  
Special topics, ranging from the beginnings to contemporary American literature; may include studies in a single author or authors (e.g., the detective stories of Poe) or period and genre studies (e.g., the Harlem Renaissance or the humor of the old southwest). Variable content. May be cross-listed with BAMS347.  
RESTRICTIONS: May be repeated once for credit when topics vary.
- ENGL 348 CONTEMPORARY JEWISH-AMERICAN LITERATURE** 3  
Lectures and discussions of outstanding contemporary Jewish American novelists, short story writers, and others.  
May be cross-listed with JWST348.  
PREREQ: ENGL110.
- ENGL 349 INTRODUCTION TO JEWISH SOURCES: TEXT AND INTERPRETATION** 3  
Examines the central texts which form the basis of Jewish thought, religion and culture—the Torah, or Hebrew Bible (in translation) and the interpretive traditions which have evolved to understand it (e.g., Midrash, Rashi, contemporary theology) as sources of uniquely Jewish meanings.  
May be cross-listed with JWST349.
- ENGL 351 INTRODUCTION TO IRISH LITERATURE** 3  
Survey emphasizing modern and contemporary writers of various genres such as Yeats, Synge, Joyce, Beckett, Heaney and Bolomod. Critical reading set in mythic, historic and cultural contexts  
PREREQ: ENGL110.
- ENGL 352 STUDIES IN NINETEENTH CENTURY LITERATURE** 3  
Special topics in an author or authors, a genre, literary movement, or an idea. May be cross-listed with WOMS352.  
PREREQ: ENGL110.  
RESTRICTIONS: May be repeated once for credit when topics vary.
- ENGL 353 TWENTIETH CENTURY BRITISH LITERATURE** 3  
Broadly focused study of literature in several genres, including a variety of eras and movements such as turn-of-the-century realism, war poetry, modernism, and post-colonial writing.  
May be cross-listed with WOMS353.  
PREREQ: ENGL110.
- ENGL 355 KING ARTHUR IN LITERATURE** 3  
Study of the historical background and literary treatments of Arthurian characters and themes in English literature.  
PREREQ: ENGL110.
- ENGL 356 STUDIES IN MODERN/CONTEMPORARY LITERATURE** 3  
Study of selected topics in 20th century British, American and world literature, e.g., the contemporary epic novel, post-colonial writing and politics. May be cross-listed with BAMS356.  
PREREQ: ENGL110.  
RESTRICTIONS: May be repeated once for credit when topics vary.
- ENGL 357 LITERATURE OF LONDON** 3  
The interaction between London and a variety of literary works.  
RESTRICTIONS: Offered only through the Semester in London Program.
- ENGL 358 LINGUISTICS AND LANGUAGE ARTS** 3  
See EDUC358 for course description.
- ENGL 361 LITERARY CRITICISM AND THEORY** 3  
Study of problems in textual interpretation and aesthetics from the ancient world through the present, with attention to both the principal movements in critical theory and the social and philosophical contexts of interpretation. May be cross-listed with CMLT361.  
PREREQ: ENGL110.
- ENGL 365 STUDIES IN LITERARY GENRES, TYPES AND MOVEMENTS** 3  
Particular areas or writers to be announced.  
May be cross-listed with CMLT365, CCCC365, and/or JWST365.  
PREREQ: ENGL110.
- ENGL 366 INDEPENDENT STUDY** 1-6
- ENGL 368 LITERATURE AND SCIENCE** 3  
Comparative examination of literature and science in several important philosophical, methodological, cultural and social aspects, including the study of elementary philosophy, history of science and theory, history of literature and the analysis of individual scientific and literary texts  
May be cross-listed with CCCC368  
PREREQ: ENGL110.
- ENGL 369 LITERATURE AND MEDICINE** 3  
See CCCC369 for course description.

- 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 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 concentration 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 women'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 for credit when topics vary.
- ENGL 390 ENGLISH LINGUISTICS** 3  
General introduction to the study of the English language, with emphasis on modern linguistic approaches.  
May be cross-listed with LING390.  
PREREQ: ENGL110.
- ENGL 391 HONORS COLLOQUIUM** 3  
See ARSC390 for description.  
May be cross-listed with JWST390 and/or MUSC390.  
PREREQ: ENGL110.
- 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.  
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 the 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 the 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 the 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 the communications skills of students aiming toward careers in any of the professions.  
PREREQ: ENGL110.
- ENGL 417 FILM THEORY AND CRITICISM** 3  
Survey of major theories of film.  
PREREQ: ENGL217.
- ENGL 464 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. The 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 465 STUDIES IN LITERATURE GENRES, TYPES AND MOVEMENTS** 3  
Particular areas or writers to be announced.  
May be cross-listed with CMLT465 and/or WOMS465.  
PREREQ: ENGL110.
- ENGL 466 INDEPENDENT STUDY** 1-9
- ENGL 472 STUDIES IN THE 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 477 THE STRUCTURE OF ENGLISH** 3  
See LING477 for course description.  
PREREQ: LING101.
- ENGL 479 LITERACY AND LITERATURE** 3  
Explores the concept of literacy using a variety of perspectives: scientific, historical, cultural, sociological, political, and literary. Designed for teacher education students and incorporates field work and addresses the state standards that teachers are asked to have their students meet.  
RESTRICTIONS: Offered for students in the Milford ETE program.

- ENGL 480 SEMINAR** 3  
Intensive capstone program in creative writing or study of some aspect of literature, be it a critical problem (e.g., reader response criticism), a movement (e.g., experimental American literature), a single author (e.g., John Keats), a group of authors (e.g., Fitzgerald, Hemingway, Steinbeck), or a genre (e.g., autobiography). Stresses critical writing and literary research. May be cross-listed with JWST480 and/or WOMS480.
- ENGL 481 TEACHING ENGLISH IN SECONDARY SCHOOL** 3 PF  
Accompanies student teaching in secondary school English. Deals with classroom management and other professional issues.  
PREREQ: ENGL110  
COREQ: EDUC400  
RESTRICTIONS: Open only to student teachers in English
- ENGL 482 SEMINAR IN TEACHING ENGLISH I** 3  
Prepares English education seniors and graduate students to teach oral and written composition at the secondary school level  
COREQ: ENGL483  
RESTRICTIONS: Enrollment limited to English education seniors
- ENGL 483 SEMINAR IN TEACHING ENGLISH II** 3  
Prepares English education seniors and graduate students to teach adolescent literature, classic literature and non-print literary expression at the secondary school level.  
COREQ: ENGL482/682  
RESTRICTIONS: Enrollment limited to English education seniors
- ENGL 494 HISTORY OF THE ENGLISH LANGUAGE** 3  
The development of Modern English with emphasis on changes in sounds, inflections, spelling, and vocabulary. Attention also to usage, dialects, attitudes toward language, and cultural history.  
PREREQ: ENGL110
- ENGL 600 METHODS OF RESEARCH** 3  
Research methods and problem-solving strategies in literary and cultural studies
- ENGL 604 POETRY WRITING WORKSHOP** 3  
Intensive practice in verse composition. Group discussions and individual conferences. Wide reference to professional poems as models. Emphasis on student competence in traditional prosody as well as in freer forms.  
RESTRICTIONS: May be repeated once for credit when topics vary
- ENGL 621 MEDIEVAL LITERATURE AND CULTURE** 3  
Survey of medieval culture and ideas as expressed in literature (e.g., Beowulf, The Canterbury Tales, The Divine Comedy) and/or in history, philosophy, etc. (e.g., Boethius, Augustine, Thomas Aquinas), and topics (e.g., orality and literacy, epic and romance, genres)
- ENGL 625 STUDIES IN THE RENAISSANCE** 3  
Survey of a wide selection of authors (e.g., More, Wyatt, Sidney, Spenser, Marlowe, Donne, Herbert, Marvell, Jonson, Webster, Middleton, the Cavalier poets, Marvell, Milton); some of Shakespeare's works may also be included.  
RESTRICTIONS: May be repeated once for credit when topics vary
- ENGL 627 SEVENTEENTH CENTURY LITERATURE** 3  
Survey of representative examples of prose, poetry, and drama from Jacobean comedies, tragedies, and masques to the satire, burlesque, and mannered literature of the Restoration. Points of focus are the counsels and propositions of Francis Bacon and his followers; developments in lyrical, narrative, descriptive, and meditative poetry of Donne, Herbert, Vaughan, Marvell and Milton; classicism from Jonson to Cowley and Dryden; romance and prose fiction
- ENGL 631 EIGHTEENTH CENTURY LITERATURE** 3  
Topics may include (but are not restricted to) general survey (i.e., selected poetry, drama, fiction), genre survey, gender studies (e.g., women writers), or thematic issues (e.g., literature and politics).  
RESTRICTIONS: May be repeated once for credit when topics vary
- ENGL 634 STUDIES IN NINETEENTH CENTURY LITERATURE** 3  
Survey of Romantic and/or Victorian Literature.  
RESTRICTIONS: May be repeated once for credit when topics vary
- ENGL 636 TWENTIETH CENTURY LITERATURE** 3  
Broadly focused to include multiple genres and/or movements (e.g., turn-of-the-century realism, war poets, modernism, postmodern drama) from before and after World War II. May include American, European and post-colonial, in addition to British literature.
- ENGL 639 STUDIES IN MODERN/CONTEMPORARY LITERATURE** 3  
Study of selected poetry, prose, and drama of the twentieth century, with an emphasis on the major texts of English and American literature during the period. Some attention given to other literary traditions and writings.  
RESTRICTIONS: May be repeated for credit when topics vary
- ENGL 641 AMERICAN LITERATURE: PERIOD STUDIES** 3  
Historical survey of American literature of the Colonial, Romantic, or Realistic period, emphasizing "canonical" works of major writers along with selected "non-canonical" writings.  
RESTRICTIONS: May be repeated for credit when topics vary
- ENGL 651 IRISH LITERATURE: PERIOD STUDIES** 3  
Study of a set of Irish writers related by genre or period, set in historical and political contexts.  
RESTRICTIONS: May be repeated for credit when topics vary
- ENGL 671 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.  
RESTRICTIONS: May be repeated for credit when topics vary
- ENGL 672 STUDIES IN THE DRAMA** 3  
Special topics on an author or authors, a type or types of drama, a period or theme.  
RESTRICTIONS: May be repeated for credit when topics vary
- ENGL 673 STUDIES IN POETRY** 3  
Special topics on a poet or poets, a type or movement, a period or theme.  
RESTRICTIONS: May be repeated for credit when topics vary
- ENGL 677 THE STRUCTURE OF ENGLISH** 3  
See LING677 for course description
- ENGL 680 SEMINAR** 3
- ENGL 682 SEMINAR IN TEACHING ENGLISH I** 3  
Prepares English education seniors and graduate students to teach oral and written composition at the secondary school level  
COREQ: ENGL683  
RESTRICTIONS: Enrollment limited to English education seniors and graduate students
- ENGL 683 SEMINAR IN TEACHING ENGLISH II** 3  
Prepares English education Seniors and graduate students to teach adolescent literature, classic literature and non-print literary expression at the secondary school level.  
COREQ: ENGL682  
RESTRICTIONS: Enrollment limited to English education seniors and graduate students
- ENGL 684 LITERARY THEORY AND CRITICISM** 3  
Introduction to some of the leading problems in contemporary literary theory, with some attention to their historical precedents.  
RESTRICTIONS: May be repeated once for credit when topics vary
- ENGL 685 CULTURAL THEORY AND CRITICISM** 3  
A topical introduction to cultural theory, emphasizing such varied topics as semiotics, deconstructionism, feminism, post-colonial and third-world studies, and problems of representation and signification in literary and non-literary texts.  
May be cross-listed with ARTH685.  
RESTRICTIONS: May be repeated once for credit when topics vary
- ENGL 688 TEACHING COMPOSITION** 3  
Study of current composition theory, with emphasis on the relationship between theory and classroom practices.
- ENGL 694 HISTORY OF THE ENGLISH LANGUAGE** 3  
Development of Modern English, with emphasis on changes in sounds, inflections, spelling, and vocabulary. Attention also given to usage, dialects, attitudes toward language, and cultural history.
- ENGL 802 STUDIES IN OLD AND MIDDLE ENGLISH** 3  
A study of the English language either from before 1100 or between 1100 and 1400 with selected readings in Old or Middle English poetry and prose.  
May be cross-listed with LING802.  
RESTRICTIONS: May be repeated once for credit when topics vary
- ENGL 804 STUDIES IN MEDIEVAL LITERATURE AND CULTURE** 3  
Intensive study of literature and language in Old English or Middle English, with attention to history and culture. Recent course titles: Chaucer, Beowulf, The Gawain-Poet, The Age of Langland, The Romance.  
RESTRICTIONS: May be repeated once for credit when topics vary
- ENGL 806 STUDIES IN RENAISSANCE LITERATURE** 3  
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).

**ENGL 815 STUDIES IN SEVENTEENTH CENTURY LITERATURE 3**

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)

RESTRICTIONS: May be repeated once for credit when topics vary

**ENGL 820 STUDIES IN EIGHTEENTH CENTURY LITERATURE 3**

Variable content. Possible topics include: Restoration Theatre; English Neoclassicism; The Rise of the Novel; individual writers or groups of writers; applications of theory

**ENGL 830 STUDIES IN NINETEENTH CENTURY LITERATURE 3**

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

**ENGL 840 STUDIES IN TWENTIETH CENTURY LITERATURE 3**

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)

**ENGL 844 SEMINAR: SPECIAL TOPICS IN AMERICAN LITERATURE 3**

RESTRICTIONS: May be repeated for credit when topics vary

**ENGL 846 SEMINAR: SPECIAL TOPICS IN ENGLISH LITERATURE 3**

RESTRICTIONS: May be repeated for credit when topics vary

**ENGL 848 SPECIAL TOPICS IN COMPARATIVE LITERATURE 3**

Variable content. Possible topics include: The Avant-Garde, Literature and Aesthetics, The Novel in a Global Context

RESTRICTIONS: May be repeated once for credit when topics vary

**ENGL 850 STUDIES IN COLONIAL AMERICAN LITERATURE 3**

Topics may include New England Puritanism, Southern Colonial Literature, and Major Early American Authors

RESTRICTIONS: May be repeated for credit when topics vary

**ENGL 852 SEMINAR: AMERICAN REALISM AND NATURALISM 3**

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)

RESTRICTIONS: May be repeated for credit when topics vary

**ENGL 853 MODERN/POSTMODERN AMERICAN LITERATURE 3**

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

RESTRICTIONS: May be repeated for credit when topics vary

**ENGL 868 RESEARCH 3**

**ENGL 869 MASTER'S THESIS 1-6**

**ENGL 884 STUDIES IN LITERARY AND CULTURAL THEORY 3**

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

RESTRICTIONS: May be repeated for credit when topics vary

**ENGL 890 STUDIES IN LINGUISTICS 3**

See LING890 for course description

**ENGL 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

**ENGL 969 DOCTORAL DISSERTATION 1-12 PF**

**ENVIRONMENTAL SCIENCE**

**ENSC 366 INDEPENDENT STUDY 1-6**

**ENSC 425 ENVIRONMENTAL FIELD METHODS 3**

Introduction to the instrumentation and measurement techniques involved in the observation and monitoring of environmental systems. Issues concerning experimental design, instrument performance, instrument calibration and data quality control are discussed in the context of field experiments

RESTRICTIONS: Environmental science majors are given preference in enrolling

**ENSC 427 APPLIED ENVIRONMENTAL SCIENCE 3**

Introduction to the diverse field of environmental consulting: an application of science to the solution of environmental problems. Topics include project planning, data collection and analysis, health and safety, work products, business management, accounting and contracts, marketing, professional responsibility and ethics

RESTRICTIONS: Open to junior and seniors or by permission of instructor

**ENSC 450 PROSEMINAR IN ENVIRONMENTAL SCIENCE 3**

Discussion of the history and state of environmental science as well as its relation to current environmental problems. Survey of research topics and methodologies in the current scientific literature

RESTRICTIONS: Open to environmental science majors only, or requires permission of instructor

**ENSC 464 INTERNSHIP IN ENVIRONMENTAL SCIENCE 1-6**

On the job experience in governmental or private planning, consulting, environmental or engineering agencies

**ENSC 466 INDEPENDENT STUDY 1-6**

**ENSC 475 STATISTICS FOR ENVIRONMENTAL SCIENCE 3**

See STAT475 for course description

PREREQ: MATH243 and GEOG250

RESTRICTIONS: Degree credit can only be given for one of the following: STAT/ENSC475, MATH300, STAT370, STAT371 or MATH450

**ENTOMOLOGY AND WILDLIFE CONSERVATION**

**ENWC 105 INSECTS IN OUR WORLD 3**

The 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 sociological problems and solutions in the 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 and function, behavior, ecology, evolution, pest control and impact on human society, history and culture

**ENWC 214 APIOLOGY AND APICULTURE 2**

Scientific study of the 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 224 APIOLOGY AND APICULTURE LABORATORY 1**

Laboratory and field course 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 305 ENTOMOLOGY LABORATORY 2**

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 310 ANIMAL AND PLANT GENETICS LABORATORY 1**

See ANSC310 for course description

**ENWC 314 COMPARATIVE TERRESTRIAL 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 the insect component of biodiversity. Rationale for insect and biodiversity conservation; island biogeography; and endangered species and mechanisms of species loss.  
PREREQ: ENWC201 and ENWC305.
- ENWC 318 TAXONOMY OF BIRDS** 2  
Classification of birds. Identification by sight and sound. Emphasis on orders of the world, North American families and species of the region. Indoor labs with one hour of lecture. Field trips.
- 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  
COREQ: BISC302  
RESTRICTIONS: Requires junior status.
- 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 the Insecta. Emphasis on structures and their functions as adaptive responses to selective pressures. Laboratory dissections emphasizing anatomical variation within external and internal systems.  
PREREQ: ENWC305.
- ENWC 406 INSECT IDENTIFICATION - TAXONOMY** 3  
Lecture and laboratory course in the collection, preservation and classification of common insect families.  
PREREQ: ENWC205.
- ENWC 408 INSECT FIELD TAXONOMY** 3  
The collection, classification, preservation and curation of insects. An insect collection is required.  
COREQ: ENWC406.
- ENWC 410 ECOLOGY OF ARTHROPOD VECTORS AND PARASITES** 3  
Introduction to the ecological relationships among arthropod disease vectors, global diseases shared by humans and other animals. Regionally-transmitted diseases, parasitism, and biting/stinging insects. Lab emphasizes field assessment techniques for, and lab identification of, environmental mechanisms that foster vector/disease relationships and pathogens.  
PREREQ: BISC208.
- ENWC 411 INSECT PEST MANAGEMENT** 3  
Principles of managing insect populations in an environmentally compatible manner to reduce losses caused by insects attacking our food, fiber, buildings, domestic animals and human populations in an environmentally compatible manner. 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 to juniors and seniors only. 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 418 AVIAN BIOLOGY** 3  
Birds as adaptive complexes. Anatomy, physiology and behavior associated with feeding, thermoregulation, flight, migration, communication and reproduction.  
PREREQ: BISC208  
RESTRICTIONS: Requires junior status.
- ENWC 424 HERPETOLOGY** 3  
Introduction to the 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 MAMMALOLOGY** 3  
Mammal biology: evolution, feeding, homeostasis, communication and reproduction. Natural history and identification of taxa. Occasional field trips.  
PREREQ: BISC208  
RESTRICTIONS: Requires junior status.
- ENWC 426 AQUATIC INSECTS** 3  
Biology and systematics of aquatic insects with emphasis on the fauna of North America. Collection of immature aquatic insects required.  
PREREQ: ENWC305  
RESTRICTIONS: Requires junior status.
- ENWC 430 CLOSE-UP NATURE PHOTOGRAPHY** 3  
Introduction to the 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 440 INTEGRATED PEST AND DISEASE MANAGEMENT** 3  
Introduction to the 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 an economically and environmentally sound manner.  
May be cross-listed with PLSC440.  
PREREQ: ENWC205 and PLSC303.
- ENWC 444 CONSERVATION OF TROPICAL BIODIVERSITY** 3  
A 3-week intensive, field-based experience in the mechanics of conserving tropical biodiversity. Focuses on group projects quantifying and comparing the 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 a 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 455 CONSERVATION GENETICS** 3  
Principles of genetics applied to the conservation of animal and plant populations. Fundamentals of basic and population genetics. Examination of case studies of species from a variety of taxonomic groups.  
PREREQ: BISC208.
- ENWC 464 FIELD EXPERIENCE** 1-3 PF  
Faculty-supervised employment (usually part-time) or volunteer service at an entomology, ecology, or wildlife conservation-related site such as a research laboratory, pest control firm, museum, government agency or nature center. A signed agreement with faculty sponsor prior to placement and a journal or written report are 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 SEMINAR** 1  
Preparation and presentation of oral and written critical reviews of a research topic in entomology, wildlife conservation, or applied ecology to peers and professionals in the manner of scientific communication. Emphasis on familiarization with scientific literature.  
RESTRICTIONS: Must be taken as senior in last fall term.

<b>ENWC 466</b>	<b>INDEPENDENT STUDY</b>	<b>1-6</b>	
<b>ENWC 468</b>	<b>RESEARCH</b>	<b>1-6</b>	
<b>ENWC 501</b>	<b>NATURAL HISTORY FOR TEACHERS</b>	<b>3</b>	
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.			
<b>ENWC 601</b>	<b>INSECT PHYSIOLOGY</b>	<b>4</b>	
Physiology and biochemistry of major organs and tissues of insects. Laboratory demonstrates basic tools of insect physiology through original and classical experiments. PREREQ: ENWC305			
<b>ENWC 602</b>	<b>LARVAL TAXONOMY</b>	<b>3</b>	
Lecture-laboratory treating the collection, preservation and immature stages of insects. Emphasis on holometabolous orders, with special orders, with special attention to aquatic immatures. PREREQ: ENWC305 and ENWC406			
<b>ENWC 605</b>	<b>INSECT STRUCTURE AND FUNCTION</b>	<b>4</b>	
Comparative functional anatomy and evolution of arthropods, especially Insecta. Emphasis on structures and their functions as adaptive responses to selective pressures. Laboratory dissections emphasizing anatomical variation within external and internal systems. PREREQ: ENWC305			
<b>ENWC 606</b>	<b>INSECT IDENTIFICATION - TAXONOMY</b>	<b>3</b>	
Lecture and laboratory course in the collection, preservation and common insect families. PREREQ: ENWC205			
<b>ENWC 608</b>	<b>INSECT FIELD TAXONOMY</b>	<b>3</b>	
The collection, classification, preservation and curation of insects. An insect collection is required. PREREQ: ENWC606			
<b>ENWC 610</b>	<b>MEDICAL AND VETERINARY ENTOMOLOGY</b>	<b>3</b>	
Transmission dynamics, ecology, and control of vector-borne diseases, especially global diseases shared by humans and other animals. Regionally-transmitted diseases, parasitism, and biting/stinging insects. Lab emphasizes field assessment techniques for, and lab identification of, vectors and pathogens. PREREQ: BISC208			
<b>ENWC 611</b>	<b>INSECT PEST MANAGEMENT</b>	<b>3</b>	
Principles of managing insect populations in an 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			
<b>ENWC 614</b>	<b>ADVANCED ECOLOGY</b>	<b>3</b>	
The interaction of insects with their environment as it influences their distribution, abundance, life history and evolution. Emphasis on primary research literature. PREREQ: BISC302 or equivalent.			
<b>ENWC 615</b>	<b>WILDLIFE RESEARCH TECHNIQUES</b>	<b>3</b>	
Research design, field sampling techniques, data analysis and interpretation and preparation of publication quality manuscripts. Class and individually designed field projects will 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.			
<b>ENWC 617</b>	<b>FIELD NATURAL HISTORY</b>	<b>1-3</b>	
An 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.			
<b>ENWC 618</b>	<b>AVIAN BIOLOGY</b>	<b>3</b>	
Birds as adaptive complexes. Anatomy, physiology and behavior associated with feeding, thermoregulation, flight, migration, communication and reproduction. PREREQ: BISC208			
<b>ENWC 619</b>	<b>PRINCIPLES OF BIOLOGICAL CONTROL OF INSECTS</b>	<b>3</b>	
Historical, ecological and biological bases of biological control of pest insects and weeds. Procedures and techniques (e.g., foreign exploration) and related aspects (e.g., insect pathology and insect resistance in crop plants). PREREQ: ENWC305			
<b>ENWC 620</b>	<b>BEHAVIORAL ECOLOGY</b>	<b>3</b>	
Theoretical treatment of the factors that have dominated the evolution of animal behavior; hypothesis testing emphasized. PREREQ: BISC302, and ENWC406/606			
<b>ENWC 622</b>	<b>TOXICOLOGY OF INSECTICIDES</b>	<b>3</b>	
Principles of insecticide toxicology. Classification, biochemical and physiological bases of toxic action, animal and plant metabolism, and environmental dynamics of insecticides. PREREQ: CHEM213			
<b>ENWC 624</b>	<b>HERPETOLOGY</b>	<b>3</b>	
Introduction to the 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			
<b>ENWC 625</b>	<b>MAMMALOLOGY</b>	<b>3</b>	
Mammal biology: evolution, feeding, homeostasis, communication and reproduction. Natural history and identification of taxa. Occasional field trips. PREREQ: BISC208 RESTRICTIONS: Open to graduate students only or by permission of instructor			
<b>ENWC 626</b>	<b>AQUATIC INSECTS</b>	<b>3</b>	
Biology and systematics of aquatic insects with emphasis on the fauna of North America. Collection of immature aquatic insects required. PREREQ: ENWC305 RESTRICTIONS: Requires junior status.			
<b>ENWC 630</b>	<b>CLOSE-UP NATURE PHOTOGRAPHY</b>	<b>3</b>	
Introduction to the 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.			
<b>ENWC 640</b>	<b>INTEGRATED PEST AND DISEASE MANAGEMENT</b>	<b>3</b>	
Introduction to the 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 an economically and environmentally sound manner. May be cross-listed with PLSC640. PREREQ: ENWC205 and PLSC303.			
<b>ENWC 655</b>	<b>CONSERVATION GENETICS</b>	<b>3</b>	
Principles of genetics applied to the conservation of animal and plant populations. Fundamentals of basic and population genetics. Examination of case studies of species from a variety of taxonomic groups. Presentation of cases by students. PREREQ: BISC208			
<b>ENWC 803</b>	<b>WRITING RESEARCH PROPOSALS</b>	<b>1</b>	
Conception, design and composition of M.S. and Ph.D. research proposals for professional granting agencies in the biological sciences.			
<b>ENWC 805</b>	<b>INSECT-PLANT CHEMICAL ECOLOGY</b>	<b>2</b>	
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 cross-listed with PLSC805			
<b>ENWC 865</b>	<b>SEMINAR</b>	<b>1</b>	
Written and oral presentation of a student-selected topic in entomology and applied ecology. Emphasis on professional scientific communication. RESTRICTIONS: Required of first-year graduate students.			
<b>ENWC 868</b>	<b>RESEARCH</b>	<b>1-9</b>	
<b>ENWC 869</b>	<b>MASTER'S THESIS</b>	<b>1-6</b>	
<b>ENWC 870</b>	<b>GRADUATE RESEARCH SEMINAR</b>	<b>1 PF</b>	
Students give an oral scientific presentation that describes the theory and development of their individual research projects.			
<b>ENWC 888</b>	<b>TOPICS IN ENTOMOLOGY AND APPLIED ECOLOGY</b>	<b>1 PF</b>	
A seminar with lectures on a variety of topics related to entomology and wildlife biology.			

**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

## FINANCE

**FINC 200 FUNDAMENTALS OF FINANCE** 3

Provides non-business majors with an overview of the role of finance within a business organization. Topics include financial statement analysis, time value of money, capital budgeting, valuation and the cost of capital.  
RESTRICTIONS: Not open to management, marketing, operations management, finance or accounting degree candidates.

**FINC 201 INTRODUCTION TO INVESTMENTS** 3

Provides non-business majors with an overview of the principles and theory of investments and financial markets. Topics include the analysis of investment opportunities and the management of investment portfolios.  
RESTRICTIONS: Not open to management, marketing, operations management, finance or accounting degree candidates.

**FINC 311 PRINCIPLES OF FINANCE** 3

Introduces the fundamental techniques and concepts related to the financial management of business firms. Topics include the time value of money, valuation, capital budgeting, working capital management, cost of capital, capital structure analysis, short and long term financing.  
PREREQ: ACCT208.  
RESTRICTIONS: Requires a grade of C- or better in ACCT208.

**FINC 312 INTERMEDIATE FINANCIAL MANAGEMENT** 3

Focuses on the role of the corporate financial manager in shareholder wealth maximization. Enhances the understanding of material covered in FINC311 through the application of analytical methods, cases and the effective use of information technology in a contemporary financial environment.  
PREREQ: FINC311  
RESTRICTIONS: Requires a grade of C- or better in FINC311.

**FINC 313 FINANCIAL MARKETS** 3

Analyzes domestic and international financial markets, and examines the characteristics of market makers such as investment bankers, brokers, and dealers. Describes the financial instruments used in money and capital markets and their relevant risk, liquidity, and risk-return trade-offs.  
PREREQ: FINC311  
RESTRICTIONS: Requires a grade of C- or better in FINC311.

**FINC 392 SEMINAR ON INTERNATIONAL FINANCIAL MANAGEMENT** 3

Seminar at an overseas location on selected topics in international financial management. Combines lectures and visits to local organizations. Research paper.  
PREREQ: FINC311  
RESTRICTIONS: Used only as a professional elective for finance majors.

**FINC 407 SECURITIES ANALYSIS** 3

Examines the valuation of securities, the functioning of securities markets and the theory and practice of modern portfolio management. Topics include advanced techniques in security valuation, standards and practices in investment management, portfolio evaluation standards and applications using real-time data.  
PREREQ: FINC313.

**FINC 412 FINANCIAL INSTITUTIONS** 3

Examines various types of financial institutions. Topics include structure, performance, asset/liability management, regulation and current issues that impact operational structures.  
PREREQ: FINC313 and ECON302

**FINC 413 ADVANCED CORPORATE FINANCE** 3

Examines such areas as financial theory and practice, financial analysis, financial benchmarking, and small business finance. Topics vary by semester.  
PREREQ: FINC312.

**FINC 414 BANK MANAGEMENT** 3

Examines the management of commercial banks and similar institutions. Topics include funds and capital management, liquidity and credit standards, and lending and trust operations.  
PREREQ: FINC412.

**FINC 415 INTERNATIONAL FINANCE** 3

Examines the international monetary environment and its impact on financial planning for the firm. Topics include exchange rates, currency restrictions, tax regulations, direct investment theory, capital budgeting, financing, risk management, and working capital management.  
PREREQ: ECON302 and FINC313

**FINC 416 ADVANCED INVESTMENTS** 3

Examines such areas as portfolio theory, stock and bond valuation and management of portfolios, market efficiency, and derivative security pricing. Topics vary by semester.  
PREREQ: FINC407

**FINC 417 REAL ESTATE FINANCE** 3

Introduces real estate theory and management. Topics include financing, evaluation and property management, housing policy, and governmental regulation and participation.  
PREREQ: FINC313

**FINC 418 SEMINAR IN CORPORATE GOVERNANCE** 3

Examines current issues in corporate governance. Topics include executive compensation, shareholder resolutions and board of director ownership and accountability.  
PREREQ: FINC311

**FINC 850 FINANCIAL MANAGEMENT** 3

Provides an introduction to the fundamental concepts of the finance function with an emphasis on the 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.  
PREREQ: ACCT800.

**FINC 851 CORPORATE FINANCIAL ANALYSIS** 3

Examines major policy-making areas in corporate finance and the impact of alternative policies on the value of the firm. Emphasis is placed on strengthening financial decision-making skills. Advanced topics include capital investment policy, financing and capital structure policies, dividend policy, and corporate control.  
PREREQ: FINC850

**FINC 852 INVESTMENT ANALYSIS AND PORTFOLIO MANAGEMENT** 3

Examines the role and functioning of securities markets, valuation techniques, and the theory and practice of portfolio management. Topics include portfolio construction and evaluation metrics, relative valuation techniques and an introduction to derivative security pricing.  
PREREQ: FINC850.

**FINC 853 INTERNATIONAL FINANCIAL MANAGEMENT** 3

Examines the financial management of multinational firms and the interrelationships between financial planning and the international economic environment. Topics include direct investment theory, capital budgeting, financing trade and investments, risk management and working capital management.  
PREREQ: FINC850.

**FINC 854 SPECIAL TOPICS IN FINANCE** 1-3

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.  
PREREQ: FINC850.

**FINC 855 FINANCIAL INSTITUTIONS AND MARKETS** 3

Examines the nature, purpose, and management of financial institutions and markets.  
PREREQ: FINC850

**FINC 856 FINANCIAL ENGINEERING AND RISK MANAGEMENT** 3

Introduce the pricing, trading and use of derivative securities (forwards, futures, swaps and options contracts), emphasizing the management of risk arising from the volatility of exchange rates, interest rates and commodity and equity prices.  
PREREQ: FINC850.

**FINC 858 CORPORATE GOVERNANCE** 3

Introduces issues pertaining to corporate governance and oversight, and examines topics of current interest concerning the relationships between corporate boards, company management, and shareholders.  
PREREQ: FINC850.



**FINC 859 SEMINAR IN FINANCE 3**  
Emphasis is on financial research and the application of alternative research methods to a project or current interest. Involves individual inquiry, written communication of results, and presentation of findings by each student.  
PREREQ: Six credit hours of graduate work in finance.  
RESTRICTIONS: Requires 24 M.B.A. credit hours.

**FINC 860 FINANCING NEW VENTURES 1**  
Explores issues associated with financing new ventures, focusing on the 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 the private equity industry.  
PREREQ: FINC850  
RESTRICTIONS: May only be taken as part of the New Venture Creation Concentration

## FOREIGN LANGUAGES AND LITERATURES

**FLLT 100 ESSENTIAL FOREIGN LANGUAGE: LANGUAGE 1 PF**  
Basic, practical vocabulary and idiomatic expressions for beginners in the Foreign Language (e.g. French, Spanish, Chinese, Bulgarian, Hungarian) during Winter or Summer Session abroad.  
RESTRICTIONS: Open only to students who have never studied the language or have had less than two years in high school. Not for major credit. Taught abroad only.

**FLLT 101 ESSENTIAL FOREIGN LANGUAGE: LANGUAGE 2 PF**  
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.  
RESTRICTIONS: Open only to students who have never studied the language or have had less than two years in high school. Not for major credit. Taught abroad only.

**FLLT 105 MODERN LANGUAGE I - ELEMENTARY 4**  
Various modern languages outside normal departmental offerings, e.g., Korean, Modern Greek. An introduction to the language and a development of speaking, listening, reading and writing skills through the use of basic texts.

**FLLT 106 MODERN LANGUAGE II - ELEMENTARY/INTERMEDIATE 4**  
Completion of the basic modern language. Increasing mastery of the basic skills (speaking, listening, reading and writing)  
PREREQ: FLIT105

**FLLT 107 MODERN LANGUAGE III - INTERMEDIATE 4**  
Review of grammar, continued practice in speaking and writing, and reading texts of average difficulty  
PREREQ: FLIT106  
RESTRICTIONS: Satisfies Arts and Science foreign language requirement

**FLLT 202 BIBLICAL AND CLASSICAL LITERATURE 3**  
See ENGL202 for course description

**FLLT 203 LANGUAGES OF THE WORLD 3**  
See LING203 for course description

**FLLT 309 POLITICAL CULTURE BY COUNTRY 3**  
See POSC309 for course description  
RESTRICTIONS: Offered only in conjunction with travel abroad programs. May be repeated for credit when topics vary.

**FLLT 316 CLASSICAL MYTHOLOGY 3**  
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 CMLT316  
RESTRICTIONS: Open to first-year students.

**FLLT 320 VARYING AUTHORS AND GENRES 3**  
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.  
May be cross-listed with CMLT320 and/or WOMS320  
RESTRICTIONS: May be repeated for credit when topics vary.

**FLLT 321 TOPICS: CHINESE LITERATURE IN TRANSLATION 3**  
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  
RESTRICTIONS: May be repeated for credit when topics vary.

**FLLT 322 TOPICS: CLASSICAL LITERATURE IN TRANSLATION 3**  
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 CMLT322 and/or WOMS322  
RESTRICTIONS: May be repeated for credit when topics vary.

**FLLT 324 TOPICS: FRENCH LITERATURE IN TRANSLATION 3**  
Study of the works of one or more outstanding authors or of a special theme. Course taught in English. Topics vary and are announced in registration booklet.  
RESTRICTIONS: May be repeated for credit when topics vary.

**FLLT 325 TOPICS: GERMAN LITERATURE IN TRANSLATION 3**  
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.  
RESTRICTIONS: May be repeated for credit when topics vary.

**FLLT 326 TOPICS: HISPANIC LITERATURE IN TRANSLATION 3**  
Study of the works of one or more outstanding authors or of a special theme. Course taught in English. Topics vary and are announced in registration booklet.  
May be cross-listed with WOMS326  
RESTRICTIONS: May be repeated for credit when topics vary.

**FLLT 327 TOPICS: RUSSIAN LITERATURE IN TRANSLATION 3**  
Study of the works of one or more outstanding authors or of a special theme. Course taught in English. Topics vary and are announced in registration booklet.  
RESTRICTIONS: May be repeated for credit when topics vary.

**FLLT 328 TOPICS: JAPANESE LITERATURE IN TRANSLATION 3**  
Study of the works of one or more outstanding authors or of a special theme. Course taught in English. Topics vary and are announced in registration booklet.  
May be cross-listed with WOMS328  
RESTRICTIONS: May be repeated for credit when topics vary.

**FLLT 329 TOPICS: ITALIAN LITERATURE IN TRANSLATION 3**  
Study of the works of one or more outstanding authors or of a special theme. Course taught in English.  
May be cross-listed with WOMS329  
RESTRICTIONS: May be repeated for credit when topics vary.

**FLLT 330 VARYING AUTHORS, THEMES AND MOVEMENTS 3**  
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 CMLT330, CSCC330, and/or WOMS330  
RESTRICTIONS: May be repeated for credit when topics vary.

**FLLT 331 INTRODUCTION TO CHINESE FILMS 3**  
Inquiry into Chinese films from the prewar period to the present. Both aesthetic and technical elements of film production and reception featured. Discussion intensive.

**FLLT 338 LIGHT AND SHADOW—JAPANESE FILMS 3**  
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.

**FLLT 360 HUMANITIES COLLOQUIUM 3**  
Papers and discussion by faculty members and students participating in Humanities Semester offerings. Interdisciplinary approach.

**FLLT 366 INDEPENDENT STUDY 1-6**

**FLLT 375 TOPICS: RUSSIAN AND SOVIET CULTURE IN TRANSLATION 3**  
Special topics in Russian and Soviet culture. Course taught in English. Topics vary and are announced in registration booklet.  
May be cross-listed with WOMS375  
RESTRICTIONS: May be repeated for credit when topics vary.

**FLLT 380 TOPICS: JAPANESE CULTURE IN TRANSLATION 3**  
Special topics in Japanese culture. Course taught in English. Topics vary and are announced in registration booklet.  
RESTRICTIONS: May be repeated for credit when topics vary.

**FLLT 383 TOPICS: CHINESE CULTURE IN TRANSLATION 3**  
Special topics in Chinese culture. Taught in English. Topics vary and are announced in registration booklet.  
May be cross-listed with WOMS383  
RESTRICTIONS: May be repeated for credit when topics vary.

<b>FLLT 421</b>	<b>METHODS OF TEACHING FOREIGN LANGUAGES</b>	<b>3</b>	<b>FLLT 675</b>	<b>VARYING TOPICS: LITERARY CRITICISM IN A FOREIGN LANGUAGE CONTEXT</b>	<b>3</b>
Description, discussion and analysis of techniques pertinent to the teaching and learning of foreign languages. Emphasis on contributions of contemporary linguistic science. Includes a one and a half hour weekly practicum and 25 hours of observation in high school classrooms for future student teachers. May be cross-listed with LING421.			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.		
<b>FLLT 422</b>	<b>LANGUAGE SYLLABUS DESIGN</b>	<b>3</b>	<b>FLLT 801</b>	<b>PROFESSIONAL ORIENTATION</b>	<b>3</b>
Study of approaches to language syllabus design and materials development including grammatically sequenced, situational, notional-functional and verbal strategy approaches. Simplification, standardization, textbook evaluation and adaptation, and design and implementation of learning units for second language, special purpose and bilingual learners. May be cross-listed with LING422.			Provides students in foreign languages and literature with a general introduction to three topics relevant to their graduate career and subsequent employment: 1) research methods and tools; 2) approaches to the literary text; and 3) professional practices.		
<b>FLLT 424</b>	<b>SECOND LANGUAGE TESTING</b>	<b>3</b>	<b>FLLT 868</b>	<b>RESEARCH</b>	<b>1-12</b>
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 LING424.					
<b>FLLT 429</b>	<b>METHODS OF TEACHING FOREIGN/SECOND LANGUAGES IN ELEMENTARY SCHOOLS</b>	<b>3</b>	<hr/> <b>FOOD SCIENCE</b> <hr/>		
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 EDUC429.			<b>FOSC 102</b>	<b>FOOD FOR THOUGHT</b>	<b>3</b>
<b>FLLT 436</b>	<b>POLITICS AND LITERATURE</b>	<b>3</b>	Overview of the popular aspects of foods and beverages, including food composition, safety, processing and chemistry. The effect of cultural and social influences on food choice, factors directing marketing and development of new food products, and different food professions will be discussed. Some group work is expected.		
See POSC436 for course description.			<b>FOSC 166</b>	<b>SPECIAL PROBLEM</b>	<b>1-3</b>
<b>FLLT 466</b>	<b>INDEPENDENT STUDY</b>	<b>1-6</b>	<b>FOSC 265</b>	<b>SEMINAR ON FOOD SCIENCE</b>	<b>1</b>
<b>FLLT 475</b>	<b>VARYING TOPICS: LITERARY CRITICISM IN A FOREIGN LANGUAGE CONTEXT</b>	<b>3</b>	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 the profession.		
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.			<b>FOSC 266</b>	<b>SPECIAL PROBLEM</b>	<b>1-3</b>
<b>FLLT 621</b>	<b>METHODS OF TEACHING FOREIGN LANGUAGES</b>	<b>3</b>	RESTRICTIONS: Contract must have department chair signature. Independent study to involve library or lab research.		
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 LING621.			<b>FOSC 305</b>	<b>FOOD SCIENCE</b>	<b>3</b>
<b>FLLT 622</b>	<b>LANGUAGE SYLLABUS DESIGN</b>	<b>3</b>	Composition, structure and functional properties of food and the fundamentals of commercial food processing. Discussion and video demonstrations of various food processing and preservation methods and the effects of ingredient manipulation. May be cross-listed with ANSC305. PREREQ: NTD201, NTD211 and CHEM213.		
Study of approaches to language syllabus design and materials development, including grammatically sequenced, situational, notional-functional and verbal strategy approaches. Simplification, standardization, textbook evaluation and adaptation, and design and implementation of learning units for second-language, special purpose and bilingual learners. May be cross-listed with LING622.			<b>FOSC 328</b>	<b>FOOD CHEMISTRY</b>	<b>4</b>
<b>FLLT 623</b>	<b>THEORETICAL AND PRACTICAL ISSUES IN FOREIGN LANGUAGE PEDAGOGY</b>	<b>3</b>	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 the structure and functionality of food. May be cross-listed with ANSC328. PREREQ: CHEM214 or CHEM527.		
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.			<b>FOSC 329</b>	<b>FOOD ANALYSIS</b>	<b>4</b>
<b>FLLT 624</b>	<b>SECOND LANGUAGE TESTING</b>	<b>3</b>	Theory and practice of food analysis. Determine the 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 a scientific poster. May be cross-listed with ANSC329. PREREQ: CHEM214 or CHEM527 and CHEM220.		
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 LING624.			<b>FOSC 359</b>	<b>TOPICS IN FOOD SCIENCE</b>	<b>1</b>
<b>FLLT 629</b>	<b>METHODS OF TEACHING FOREIGN/SECOND LANGUAGES IN ELEMENTARY SCHOOLS</b>	<b>3</b>	Students select a topic in food science, search the literature or other sources for information on the topic, critically examine the information and prepare a presentation to the class. Work is done in groups or individually. Opportunities to discuss careers are provided.		
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 EDUC606.			<b>FOSC 366</b>	<b>INDEPENDENT STUDY</b>	<b>1-6</b>
			RESTRICTIONS: Contract must have department chair signature. Independent study to involve library or lab research.		
			<b>FOSC 399</b>	<b>TEACHING ASSISTANT</b>	<b>1-2 PF</b>
			Practical teaching experience. Students participate and assist in instruction of undergraduate course.		
			<b>FOSC 409</b>	<b>FOOD PROCESSING</b>	<b>4</b>
			Covers the rationale and history of food processing; organizing unit operations; the maintenance of food quality including food palatability and nutritive 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.		

<b>FOSC 411 FOOD SCIENCE CAPSTONE</b>	<b>4</b>
A team-taught capstone course for Seniors to complete food science learning experience by participating in a food product development team that simulates the 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.	
<b>FOSC 439 FOOD MICROBIOLOGY</b>	<b>4</b>
The role and significance of microorganisms in foods with particular reference to food spoilage, preservation, fermentation, sanitation and poisoning. Current methodology used in the microbiological examination of foodstuffs. PREREQ: BISC300.	
<b>FOSC 445 FOOD ENGINEERING TECHNOLOGY</b>	<b>4</b>
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.	
<b>FOSC 449 FOOD BIOTECHNOLOGY</b>	<b>4</b>
Traditional food biotechnology and biotechnology based on genetic engineering are explored through in-depth study of current examples. Technical, economic and social aspects of biotechnology are researched and analyzed through individual and group assignments and lectures. Field trips provide a view of local biotechnology enterprises. PREREQ: BISC300, CHEM214 or CHEM527, or FOSC439.	
<b>FOSC 464 PRACTICUM IN THE FOOD INDUSTRY</b>	<b>1-3</b>
Provides hands-on supervised field experience in research, processing equipment and methodology, product development and testing, and/or other activities in the food industry. RESTRICTIONS: May be repeated once for credit. Separate application form for industry (off campus) or campus courses.	
<b>FOSC 466 INDEPENDENT STUDY</b>	<b>1-6</b>
RESTRICTIONS: Contract must have department chair signature. Independent study to involve library or lab research.	
<b>FOSC 609 FOOD PROCESSING</b>	<b>4</b>
Rationale and history of food processing; organizing unit operations; maintenance of food quality including food palatability and nutritive 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.	
<b>FOSC 611 FOOD SCIENCE CAPSTONE</b>	<b>4</b>
A team-taught capstone course for graduate students to advance food science training by participating in a food product development team that simulates the real-world operation and requires integrated knowledge in the areas of general food science, food chemistry, food analysis, food microbiology and food processing.	
<b>FOSC 628 FOOD CHEMISTRY</b>	<b>4</b>
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.	
<b>FOSC 629 FOOD ANALYSIS</b>	<b>4</b>
Theory and practice of food analysis. Determine the 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 a scientific poster. May be cross-listed with ANSC629.	
<b>FOSC 639 FOOD MICROBIOLOGY</b>	<b>4</b>
The role and significance of microorganisms in foods with particular reference to food spoilage, preservation, fermentation, sanitation and poisoning. Current methodology used in the microbiological examination of foodstuffs. May be cross-listed with ANSC639 PREREQ: BISC300.	
<b>FOSC 645 FOOD ENGINEERING TECHNOLOGY</b>	<b>4</b>
Engineering fundamentals for processing of food materials, including applied thermodynamics and heat transfer principles and operations. PREREQ: MATH222 and PHYS201. RESTRICTIONS: Not open to majors in mechanical or chemical engineering.	

<b>FOSC 649 FOOD BIOTECHNOLOGY</b>	<b>4</b>
Traditional food biotechnology and biotechnology based on genetic engineering are explored through in-depth study of current examples. Technical, economic and social aspects of biotechnology are researched and analyzed through individual and group assignments and lectures. Field trips provide a view of local biotechnology enterprises.	
<b>FOSC 665 SEMINAR</b>	<b>1-3</b>
<b>FOSC 668 RESEARCH</b>	<b>1-6</b>
<b>FOSC 868 RESEARCH</b>	<b>1-6</b>
<b>FOSC 869 MASTER'S THESIS</b>	<b>1-6</b>

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**FOOD AND RESOURCE ECONOMICS**


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<b>FREC 110 INTRODUCTION TO FOOD AND AGRIBUSINESS INDUSTRY</b>	<b>1</b>
Designed to introduce students to the food and agribusiness industry. The economic structure and importance of the industry will be discussed.	
<b>FREC 135 INTRODUCTION TO DATA ANALYSIS</b>	<b>3</b>
Introduction to computer systems, with an emphasis on microcomputer systems, and their use to process and analyze data. Emphasis on application programs used in agricultural sciences including spreadsheets, graphics, database management, electronic communications and word processing.	
<b>FREC 150 ECONOMICS OF AGRICULTURE AND NATURAL RESOURCES</b>	<b>3</b>
Introduction to economic and management principles and their applications to agriculture; including agribusiness, natural resources and the environment. RESTRICTIONS: Not open to juniors and seniors.	
<b>FREC 201 RECORDS AND ACCOUNTS</b>	<b>3</b>
Introductory course. Emphasis on concepts and principles and the uses of accounting for control and decision-making purposes. RESTRICTIONS: Designed for non-business and non-accounting majors.	
<b>FREC 212 FOOD RETAILING AND CONSUMER BEHAVIOR</b>	<b>3</b>
Topics include consumer market environment, demographic characteristics of the population, food retail marketing and financial strategies, product merchandising planning, new product development strategies and site location analysis.	
<b>FREC 240 QUANTITATIVE METHODS IN AGRICULTURAL ECONOMICS</b>	<b>3</b>
Basic quantitative applications of agricultural economics principles and theory. Determination of market equilibria and optimization of static models. PREREQ: MATH115; and FREC150 or ECON151.	
<b>FREC 270 BIOTECH: SCIENCE AND SOCIOECONOMIC ISSUES</b>	<b>3</b>
See ANSC270 for course description.	
<b>FREC 302 MANAGEMENT OF AGRIBUSINESS FIRMS</b>	<b>3</b>
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.	
<b>FREC 305 MANAGEMENT AND LEADERSHIP DEVELOPMENT</b>	<b>3</b>
Exposes students to food and agribusiness human resource management and employee development. Emphasis on the functions of management, leadership principles, effective supervision, training programs, employee and management appraisal systems, role of minorities in management and ethics in management.	
<b>FREC 316 ECONOMICS OF BIOTECHNOLOGY AND NEW TECHNOLOGIES</b>	<b>3</b>
Introduction to the economic explanations for new technologies, innovation and adoption. Biotechnology issues include consumer acceptance, labeling, risk assessment; market structure, trade, patents and the environment. Other current technologies and the future are examined.	
<b>FREC 335 ADVANCED DATA MANAGEMENT</b>	<b>3</b>
Advanced use of microcomputer systems and application software used in agricultural sciences. PREREQ: FREC135.	
<b>FREC 345 STRATEGIC SELLING AND BUYER COMMUNICATION</b>	<b>3</b>
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  
Basis 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 and analysis, pricing, marketing costs, food safety, market power and its sources. Physical distribution, and structure of the 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.
- 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 will be emphasized. Case studies are used to reinforce concepts and integrate major topics presented.  
PREREQ: FREC150 or ECON151
- FREC 412 STRATEGIC MARKETING COMPETITION** 1-3  
Strategic marketing of a new food or fiber product/service. Development of a 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 AGRIBUSINESS FINANCIAL MANAGEMENT** 3  
Study of the principles and tools of finance to identify and solve agribusiness financial management problems through the application of quantitative analytical methods and problem solving techniques.  
PREREQ: FREC201 or ACCT207 and a statistics course.
- FREC 429 COMMUNITY ECONOMIC DEVELOPMENT** 3  
Community economic development in the United States; application of economic principles regarding industrial location, land use; environmental protection, and economic growth and public service provision; and economic development policies.  
PREREQ: FREC150 or ECON151
- FREC 430 ESTABLISHING AND MANAGING A FOOD AND AGRIBUSINESS ENTERPRISE** 3  
Analysis of the necessary factors to consider in initiating a Food and Agribusiness enterprise. Including strategic marketing concepts, competitive, communication, site, and financial strategies, management structure and legal forms of small businesses, etc. Involves case studies and writing a business plan.  
RESTRICTIONS: Requires permission of instructor.
- FREC 444 ECONOMICS OF ENVIRONMENTAL MANAGEMENT** 3  
Review of benefit-cost analysis and welfare theory; techniques for evaluating environmental amenities; the evolution of environmental legislation; and review of case studies of environmental conflicts.  
PREREQ: FREC150 or ECON151
- FREC 450 TOPICS IN ENVIRONMENTAL LAW** 3  
Overview of the legal process and environmental laws in order to understand policy issues and learn action processes in the environmental field.  
May be cross-listed with LEST450.
- FREC 464 AGRIBUSINESS INTERNSHIP** 1-3  
Practical experience acquired by working with corporate and government institutions. Internship sponsor, performance evaluation, and written reports are required.  
RESTRICTIONS: A maximum of three credits may be applied to the B.S. in Agriculture with a major in Food and Agribusiness Management.
- FREC 465 SEMINAR** 1  
Oral and written reports in the subdisciplines of food and resource economics.
- FREC 466 INDEPENDENT STUDY** 1-6
- FREC 471 FUTURES AND OPTION MARKETS** 4  
Analysis of futures and option markets of agricultural and nonagricultural commodities. Hedging and speculative theory and techniques, cash and futures price relationships. Students trade commodities via a satellite information system.  
May be cross-listed with ECON471.  
PREREQ: FREC404 or ECON300 or ECON301
- FREC 480 GEOGRAPHIC INFORMATION SYSTEMS IN NATURAL RESOURCE MANAGEMENT** 4  
Introductory hands-on training in geographic information systems for environmental and natural resource management.
- FREC 608 STATISTICAL RESEARCH METHODS** 3  
Experimental design and plot plans, collection, analysis and presentation of data in agricultural and biological research.  
May be cross-listed with STAT608
- FREC 611 REGIONAL WATERSHED MANAGEMENT** 3  
See UAPP611 for course description.
- FREC 615 ADVANCED PRICES AND STATISTICS** 3  
Statistical tools used in agricultural economics research and operations research. Introduction to econometric specifications, estimation and interpretation.  
May be cross-listed with ORES615
- FREC 674 APPLIED DATA BASE MANAGEMENT** 3  
Provides an in-depth understanding of using computers to manage data using programs such as SAS and Microsoft/Access.  
May be cross-listed with STAT674.  
RESTRICTIONS: Requires permission of instructor.
- FREC 682 SPATIAL ANALYSIS OF NATURAL RESOURCES** 3  
Advanced hands-on training in geographic information systems and spatial statistics for environmental and natural resource management.  
PREREQ: FREC480.
- FREC 801 APPLIED DEMAND AND MARKETING ANALYSIS** 3  
Deals with research techniques and procedures in applied economics with focus on empirical applications of economic theory and econometric tools in consumer demand and marketing analysis.
- FREC 806 RESEARCH TECHNIQUES AND PROCEDURES** 3  
Planning research projects with emphasis on methods of collecting and analyzing data, and the presentation of results. A problems course.  
May be cross-listed with ORES806.  
PREREQ: FREC608
- FREC 810 INTERNATIONAL AGRICULTURAL TRADE SPECIAL TOPICS** 3  
Advanced theory, issues and policies in international agricultural trade emphasizing international finance and agriculture, agricultural trade and development, empirical and methodological issues and international market modeling.  
May be cross-listed with ORES810.
- FREC 826 ISSUES IN DOMESTIC AND FOREIGN RURAL DEVELOPMENT** 3  
Rural economic development in the United States and in developing countries; growth vs. development issues, government policies, analytical techniques - export base, shift share, input-output, growth and development models; empirical analysis and case studies.

**FREC 827 ADVANCED PRODUCTION ECONOMICS** 3  
Specification, identification and estimation of dual models for use in the evaluation, hypothesis testing and control of firm-level technological and production problems.  
May be cross-listed with ECON827 and/or ORES827.  
PREREQ: ECON801 and an econometrics/statistics course  
RESTRICTIONS: Requires permission of instructor.

**FREC 834 SEMINAR IN RESOURCE ECONOMICS** 3  
Quantitative analyses of natural resource markets, resource depletion and the design of optimal management strategies.  
May be cross-listed with ORES834.

**FREC 868 RESEARCH** 1-9

**FREC 869 MASTER'S THESIS** 1-6

## FRENCH

**FREN 101 ELEMENTARY FRENCH I** 3  
Introduction to the French language and development of speaking, listening, reading and writing skills through the use of basic texts.

**FREN 102 ELEMENTARY FRENCH II** 3  
Completion of basic French.  
PREREQ: FREN101 or FREN105.

**FREN 105 FRENCH I - ELEMENTARY** 4  
Introduction to the French language and development of speaking, listening, reading and writing skills through the use of basic texts.

**FREN 106 FRENCH II - ELEMENTARY/INTERMEDIATE** 4  
Completion of basic French. Increasing mastery of the basic skills of speaking, listening, reading and writing.  
PREREQ: FREN105.  
RESTRICTIONS: Two to three years of high school French acceptable in lieu of prerequisite.

**FREN 107 FRENCH III - INTERMEDIATE** 4  
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 INTERMEDIATE FRENCH I** 3  
Review of grammar. Increasing mastery of the basic skills of speaking, listening, reading and writing.  
PREREQ: FREN102 or FREN106.  
RESTRICTIONS: Three years of high school French acceptable in lieu of prerequisite.

**FREN 112 INTERMEDIATE FRENCH II** 3  
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 GRAMMAR AND COMPOSITION** 3  
Intensive grammar review of all major verb tenses and grammatical concepts (such as object pronouns). Emphasis is on grammar improvement through reading and writing.  
PREREQ: FREN107 or FREN112.

**FREN 205 FRENCH CONVERSATION** 3  
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  
RESTRICTIONS: Minimum grade of B required for prerequisites.

**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: FREN107 or FREN112.  
RESTRICTIONS: Taught in France.

**FREN 207 THE CONTEMPORARY CARIBBEAN WORLD** 3  
Introduction to the contemporary Caribbean world, the culture, its people, their way of life, and the issues confronting them. The specific focus of the course will be Martinique.  
RESTRICTIONS: Taught in English during Winter Session abroad. Not for major credit.

**FREN 208 CONTEMPORARY FRANCE I** 3  
An 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: FREN107 or FREN112 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: FREN200 with a minimum grade of C or FREN107 with a minimum grade of A- or FREN112 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 FREN107 or FREN112 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: FREN211 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: FREN211 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: FREN205 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 exposes, discussion of articles and videos, textual analysis and compositions.  
PREREQ: Any two 200-level French courses conducted in French.  
RESTRICTIONS: Course taught abroad only.

**FREN 308 CONTEMPORARY FRANCE II** 3  
Discussion and study of issues related to contemporary cultural, political and social developments in France, including its place in today's European community.  
PREREQ: Any two 200-level French courses taught in the French language.  
RESTRICTIONS: 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.

**FREN 325 FRENCH CIVILIZATION I** 3  
A study of French cultural history from Gaul to the French Revolution.  
PREREQ: Any two 200-level French courses.

**FREN 326 FRENCH CIVILIZATION II** 3  
A 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 FREN250
- FREN 355 SPECIAL TOPICS** 3  
Explores an area of special interest in French literature or culture studies  
RESTRICTIONS: Taught abroad
- FREN 366 INDEPENDENT STUDY** 1-3
- FREN 402 ADVANCED FRENCH COMPOSITION** 3  
PREREQ: Any two 300-level French courses
- 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 FREN314
- 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
- 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  
A study of contemporary French literature, including novels, plays, essays and poetry of such authors as Robbe-Grillet, Sarraute, Perec, Tournier, Duras, Ponge, Bonnefoy, Jacottet 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, Gance, Pagnol, Renoir, Bresson, Resnais, 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 the students' work.  
PREREQ: Any two 300-level French literature courses
- FREN 457 THE FRANCOPHONE WORLD** 3  
Study of the social, cultural, political aspects of the francophone world (Maghreb, West Sub-Saharan Africa, the Caribbean, Quebec, regions of the Indian and Pacific Oceans) as well as the Beur (children of Maghrebi immigrants) phenomenon in the French suburbs, through theoretical texts, films, music.  
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
- FREN 533 FRENCH READINGS FOR PH.D. CANDIDATES** 3 PF  
A 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 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, Rabelais, Montaigne, Moliere, 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

<b>FREN 641 THE EIGHTEENTH CENTURY: THE AGE OF VOLTAIRE</b>	<b>3</b>
Novels, plays, essays and poetry of such authors as Montesquieu, Marivaux, Prevost and Voltaire.	
<b>FREN 642 THE EIGHTEENTH CENTURY: THE AGE OF ROUSSEAU</b>	<b>3</b>
Novels, plays, essays and poetry of such authors as Diderot, Rousseau, Beaumarchais and Chénier.	
<b>FREN 645 NINETEENTH CENTURY FRENCH NOVEL</b>	<b>3</b>
The novel from Romanticism to Naturalism. Chateaubriand, Balzac, Stendhal, Flaubert, Zola and others.	
<b>FREN 646 NINETEENTH CENTURY FRENCH POETRY AND THEATRE</b>	<b>3</b>
Poets and dramatists representative of Romanticism, Realism and the Symbolist movement.	
<b>FREN 651 TWENTIETH CENTURY FRENCH LITERATURE: THE AGE OF ANXIETY AND THE ABSURD</b>	<b>3</b>
Main trends from Gide, Celine and Malraux to Camus and Beckett, including Surrealism, Existentialism and the Theater of the Absurd.	
<b>FREN 652 ASPECTS OF CONTEMPORARY FRENCH LITERATURE</b>	<b>3</b>
A study of contemporary French literature, including novels, plays, essays and poetry of such authors as Robbe-Grillet, Sarraute, Perec, Tournier, Duras, Ponge, Bonnefoy, Jacotet and Barthes.	
<b>FREN 655 SELECTED AUTHORS, WORKS AND THEMES</b>	<b>3</b>
Works of one or more outstanding authors or on a special theme. RESTRICTIONS: May be repeated for credit when topics vary.	
<b>FREN 658 TOPICS IN FRANCOPHONE LITERATURE</b>	<b>3</b>
Varying aspects of Francophone studies, such as women's writing, literature of Quebec, colonial literature, African literature and cinema, literature of immigration.	
<b>FREN 659 NEGRIUDE, ANTILLANITE, CREOLITE</b>	<b>3</b>
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.	
<b>FREN 869 MASTER'S THESIS</b>	<b>1-6</b>
<b>FREN 875 TOPICS: FRENCH LITERATURE</b>	<b>3</b>
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.	

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**GEOGRAPHY**


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<b>GEOG 101 PHYSICAL GEOGRAPHY: CLIMATIC PROCESSES</b>	<b>3</b>
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.	
<b>GEOG 102 HUMAN GEOGRAPHY</b>	<b>3</b>
Examination of the spatial distribution of human activities worldwide. Particular attention is given to those factors and processes that have led to spatial inequality and locational conflict from the international scale to the neighborhood scale.	
<b>GEOG 106 PHYSICAL GEOGRAPHY: LAND SURFACE PROCESSES</b>	<b>3</b>
Introduction to processes responsible for the 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.	
<b>GEOG 111 CLIMATIC PROCESSES LABORATORY</b>	<b>1</b>
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.	
<b>GEOG 120 WORLD REGIONAL GEOGRAPHY</b>	<b>3</b>
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.	

<b>GEOG 152 CLIMATE AND LIFE</b>	<b>4</b>
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.	
<b>GEOG 166 SPECIAL PROBLEM</b>	<b>1-3</b>
<b>GEOG 203 INTRODUCTION TO CULTURAL GEOGRAPHY</b>	<b>3</b>
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.	
<b>GEOG 210 ECONOMIC GEOGRAPHY</b>	<b>3</b>
Aerial variation on the earth's surface of human activities related to producing, exchanging and consuming wealth. World distributional patterns of the major economic activities.	
<b>GEOG 220 METEOROLOGY</b>	<b>3</b>
Analysis of the atmosphere, weather elements, air masses, fronts and storms. Principles of weather forecasting, especially as it relates to severe weather.	
<b>GEOG 225 HISTORICAL GEOGRAPHY OF THE UNITED STATES</b>	<b>3</b>
Persistence and change of settlements, economic activities and social/cultural behavior in development of different geographical regions of the United States.	
<b>GEOG 226 GEOGRAPHY OF LATIN AMERICA</b>	<b>3</b>
Physical, historical and cultural geography of Latin America.	
<b>GEOG 230 HUMANS AND THE EARTH ECOSYSTEM</b>	<b>3</b>
An examination of the historical and contemporary role of humans as major agents of biological change in the earth's ecosystem.	
<b>GEOG 235 CONSERVATION OF NATURAL RESOURCES</b>	<b>3</b>
Physical, social and economic problems involved in integrating resource management and maintaining environmental quality.	
<b>GEOG 236 CONSERVATION: GLOBAL ISSUES</b>	<b>3</b>
Introduces the global nature of resources management and discusses the relationships between population growth, the market economy, agricultural production and mineral and energy exploitation, worldwide.	
<b>GEOG 240 ENVIRONMENT AND BEHAVIOR</b>	<b>3</b>
An interdisciplinary introduction to individual and group behavior in relation to developed and natural environments. The implications of such human environment interactions for planning.	
<b>GEOG 250 COMPUTER METHODS IN GEOGRAPHY</b>	<b>4</b>
Introduces and describes methods of practical digital computing for use in geographic research. Main topics include elementary FORTRAN programming and the utilization of library programs, particularly mapping packages.	
<b>GEOG 255 APPLIED CLIMATOLOGY</b>	<b>3</b>
Application of climatic information to practical problems of agriculture, irrigation and crop scheduling, health, clothing, water resources, architecture and industry.	
<b>GEOG 270 MAP COMMUNICATION AND DESIGN</b>	<b>3</b>
History, design and use of maps as tools for effective communication of geographic ideas.	
<b>GEOG 272 MAP AND AIR PHOTO INTERPRETATION</b>	<b>3</b>
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.	
<b>GEOG 310 SOCIAL GEOGRAPHY</b>	<b>3</b>
The environment is defined, arranged and experienced differently by different social groups. Examines the 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.	
<b>GEOG 315 NEWARK, DELAWARE: PEOPLE, POLITICS AND PLACE</b>	<b>3</b>
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 331 PLANETARY MANAGEMENT SEMINAR AND LABORATORY** 3  
Focuses on areas related to climate change: systems theory, modeling, the carbon-cycle, desert ecology, climate cycles and prediction, water management, and environmental health. Topics include the basic science, human impacts, environmental consequences and policy responses. Offered only in partnership with the Biosphere 2 Center in Arizona.  
May be cross-listed with POSC331.
- 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 GEOL105/115 or GEOL107
- 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  
A 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  
Geographic Information Systems (GIS) are a rapidly growing computer-based technology for storage and analysis of spatial information. GIS technology has been used in a variety of municipal, utility and natural resource applications. Course considers the history, uses, technology and implementation issues associated with GIS.
- GEOG 385 GEOMORPHOLOGY** 4  
See GEOL385 for course description.
- GEOG 390 HONORS COLLOQUIUM** 3  
See ARSC390 for description.
- GEOG 411 FLUVIAL GEOMORPHOLOGY** 3  
See GEOL411 for course description.
- GEOG 412 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 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  
The nature of geography, its history, methodology and applications in research and societal problems. A pre-professional course.
- GEOG 449 ENVIRONMENT AND SOCIETY** 3  
Considers the 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** 3  
Introduction to instrumentation and techniques involved in microclimatic monitoring and sampling. Field observation programs carried out in varying environmental situations.  
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  
The 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 stream flow will be 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  
Commercial geographical information systems (GIS) are introduced and used to analyze a wide variety of spatial data bases. Geo-referenced 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 474 INTRODUCTION TO ENVIRONMENTAL REMOTE SENSING** 3  
Introduction to the basic physics, techniques and theory of remote sensing in geography and environmental science. Digital image processing of satellite imagery and its incorporation into geographic information systems is emphasized. A set of computer-based laboratory exercises will be required  
PREREQ: GEOG250 and GEOG272
- 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 additionally are required to attend (and then discuss) the Department's Friday afternoon guest lectures  
RESTRICTIONS: Open to graduate students in geography and climatology only.
- 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.  
COREQ: GEOG250.
- GEOG 611 FLUVIAL GEOMORPHOLOGY** 3  
See GEOL611 for course description.
- GEOG 612 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 614 THE AMERICAN SUBURB** 3  
See UAPP614 for course description.
- GEOG 615 URBAN, REGIONAL AND ENVIRONMENTAL PLANNING** 3  
See UAPP615 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 relationship to economic development and the global environment. The main objective is to engage 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 645 METHOD AND THEORY IN GEOGRAPHY** 3  
The nature of geography, its history, methodology and applications in research and societal problems. A preprofessional course.
- GEOG 649 ENVIRONMENT AND SOCIETY** 3  
Considers the 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** 3  
Introduction to instrumentation and techniques involved in microclimatic monitoring and sampling. Field observation carried out in varying environmental situations.  
PREREQ: GEOG412 or GEOG612
- GEOG 652 SEMINAR IN CLIMATOLOGY** 3  
General theoretical and practical considerations of research in climatology.  
RESTRICTIONS: Requires permission of instructor.
- GEOG 653 SYNOPTIC CLIMATOLOGY** 3  
The physical processes involved with the 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  
The 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 656 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 stream flow will be examined.  
PREREQ: MATH241 and GEOG250 or equivalent.
- GEOG 657 CLIMATE DYNAMICS** 3  
Investigation of the physical processes controlling global climate, starting with the earth-sun relationship and adding additional processes to increase complexity and realism. Extensive use of models to explore the importance of each process.  
PREREQ: GEOG250 and MATH302
- GEOG 670 COMPUTER CARTOGRAPHY** 4  
Introduction to cartographic theory and computational methods necessary for drawing maps with the aid of a digital computer.  
PREREQ: GEOG250.
- GEOG 671 ADVANCED GEOGRAPHIC INFORMATION SYSTEMS** 4  
Commercial geographical information systems (GIS) are introduced and used to analyze a wide variety of spatial data bases. Geo-referenced 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 672 SEMINAR IN GEOGRAPHIC INFORMATION SYSTEMS** 3  
Principles underlying geographic information systems (GIS) are examined, and sample geographic problems are 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 the seminar is offered.  
PREREQ: GEOG470, GEOG670 or GEOG471.
- GEOG 674 SATELLITE CLIMATOLOGY** 3  
Use of satellite observations to study the climate system. Discussions consider the development of satellite climatology, sensors, platforms and methodologies used to estimate climate variables from radiance measurements. Aspects of climate that are emphasized include cloud climatologies, cloud systems, atmospheric moisture, radiation budget, land-surface conditions.  
PREREQ: GEOG250 and GEOG412
- GEOG 681 REMOTE SENSING OF ENVIRONMENT** 3  
See MAST681 for course description.
- GEOG 682 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, non-glacial) landforms and environmental problems in cold regions. May be cross-listed with GEOL682
- GEOG 803 TOPICS IN GEOMORPHOLOGY** 1-3  
See GEOL803 for course description.
- GEOG 855 CLIMATOLOGICAL RESEARCH** 3  
Techniques of research in basic and applied climatology: to include field study, and the analysis of climatological data.  
RESTRICTIONS: Requires permission of instructor.
- GEOG 868 RESEARCH** 1-9 PF
- GEOG 869 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.  
RESTRICTIONS: Not open to students who have been admitted to candidacy.
- GEOG 969 DOCTORAL DISSERTATION** 1-12 PF

## GEOLOGY

- GEOL 105 GEOLOGICAL HAZARDS AND THEIR HUMAN IMPACT** 3  
Geological processes and events that adversely affect humans and civilization. Methods for predicting and dealing with geological hazards. May be taken with a 1 credit lab, GEOL115.
- GEOL 107 GENERAL GEOLOGY** 4  
Principles of physical geology and its application in interpreting earth processes. Laboratory covers identification of earth materials and the interpretation of topographic and geologic maps.
- GEOL 108 VOLCANOES AND EARTHQUAKES** 3  
Violent geologic activity as illustrated by volcanoes and earthquakes. The 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 the planets, satellites, asteroids, and comets. Also explores the 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 the geologic setting of Delaware and neighboring states. Rocks and fossils of the region. Emphasis on formation and evolution of the region through geologic time. Studies Delaware's coastal zone and the effect of coastal processes on recent geologic history of Delaware.
- GEOL 112 EARTH RESOURCES AND PUBLIC POLICY** 3  
Introduction to the geologic occurrence of resources including water, energy, metals and industrial minerals. Discussion of the 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 the 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.  
RESTRICTIONS: Open to education majors and other selected programs. Does not satisfy Group D requirement in Arts and Science.
- GEOL 115 GEOLOGICAL HAZARDS LABORATORY** 1  
Laboratory investigation of environmental geological 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: GEOL105
- 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: GEOL105 and GEOL115, or GEOL107, or GEOL113.
- GEOL 301 SYSTEMATIC AND EVOLUTIONARY PALEONTOLOGY** 3  
Classification of fossils, organic evolution, paleoecology; and application to geologic principles.  
PREREQ: GEOL107
- GEOL 302 THE EARTH'S MATERIALS II: ROCKS** 4  
Identification, description, occurrences, origins and uses of rocks and ores.  
PREREQ: GEOL105 and GEOL115, or GEOL107, or GEOL113; GEOL300.
- GEOL 303 THE EARTH'S SURFACE I: SURFICIAL PROCESSES** 4  
Uplift, weathering, sediment transport, depositional processes and selected depositional environments. Quaternary history and geochronology. Subsurface fluid flow in surficial environments. Environmental and applied aspects of surficial processes.  
PREREQ: GEOL105 and GEOL115, or GEOL107, or GEOL113.
- GEOL 304 THE EARTH'S 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: GEOL105 and GEOL115, GEOL107, or GEOL113; GEOL303
- GEOL 305 THE EARTH'S LITHOSPHERE I: STRUCTURAL GEOLOGY AND PLATE TECTONICS** 4  
The study of geologic structures, geologic stress and the responses of rocks to stress. Examines plate tectonics and the major structural and tectonic relations generated at plate boundaries.  
PREREQ: GEOL105 and GEOL115, or GEOL107 or GEOL113
- GEOL 306 THE EARTH'S LITHOSPHERE II: FIELD GEOLOGY** 4  
Training and experience in geological mapping and field methods. Geologic map construction and interpretation. Includes rock descriptions, stratigraphic analysis and correlation, and structural methods. Emphasis on regional Piedmont and coastal plain geologic settings.  
PREREQ: GEOL105 and GEOL115, or GEOL107, or GEOL113; GEOL305
- GEOL 307 THE EARTH'S HISTORY I: PALEOBIOLOGY** 4  
Recognition, biology and paleobiology of major groups of invertebrates. Use of the fossil record in solving environmental and paleoenvironmental problems. Principles of stratigraphy and correlation and origin and development of the geologic time scale.  
PREREQ: GEOL105 and GEOL115, or GEOL107, or GEOL113
- GEOL 308 THE EARTH'S HISTORY II: EARTH SYSTEM SCIENCE** 4  
Interaction and evolution of the lithosphere, biosphere, hydrosphere and atmosphere. Examination of the geologic record as a test for hypotheses about earth system processes including climate change, paleoceanography and tectonics. Integrative study of the history of the earth and its inhabitants.  
PREREQ: GEOL105 and GEOL115, or GEOL107, or GEOL113; GEOL307
- GEOL 366 INDEPENDENT STUDY** 1-3
- GEOL 385 GEOMORPHOLOGY** 4  
Survey of landforms and processes that shape them. Description and classification of landforms, relation to geological and climatic processes, rates of landform development and change. Laboratory involves map/air photo interpretation and analysis of digital elevation models.  
May be cross-listed with GEOG385  
PREREQ: GEOL105 and GEOL115, or GEOL107, or GEOL113, or GEOG106

- 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 the supervision of the 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 (GEOL 300-302, 303-304, 305-306, or 307-308).
- GEOL 411 FLUVIAL GEOMORPHOLOGY 3**  
Hydrologic and sediment-transport processes in rivers and watersheds. Morphology and evolution of rivers and watersheds. Depositional processes and evolution of floodplains. Structure and interpretation of fluvial deposits in the geologic record.  
May be cross-listed with GEOG411.  
PREREQ: Completion of any of the one-year undergraduate core course sequences (GEOL 300-302, 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 surrounding geographic terrain; paleogeographies of archaeological settings; and use of geology for interpretations of history.  
PREREQ: Completion of any of the one-year undergraduate core course sequences (GEOL 300-302, 303-304, 305-306, or 307-308).
- GEOL 414 QUATERNARY GEOLOGY AND GEOCHRONOLOGY 3**  
Survey of the stratigraphy and chronology of marine and terrestrial records and theories of climatic change. Studies of the 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 (GEOL 300-302, 303-304, 305-306, or 307-308).
- GEOL 416 PALEOECOLOGY 3**  
Paleoenvironmental and stratigraphic interpretation of sediments and fossils. Basic statistics, bioturbation models, well-logging and sequence stratigraphy. Application to geology problems.  
PREREQ: Completion of any of the one-year undergraduate core course sequences (GEOL 300-302, 303-304, 305-306, or 307-308).
- GEOL 421 ENVIRONMENTAL AND APPLIED GEOLOGY 3**  
The 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 the role of geologist and the educated citizen.  
PREREQ: Completion of any of the one-year undergraduate core course sequences (GEOL 300-302, 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**  
Principles of groundwater flow and water chemistry in varied geologic media. Evaluation of groundwater resources and assessment of environmental problems associated with groundwater use.  
PREREQ: Completion of any of the one-year undergraduate core course sequences (GEOL 300-302, 303-304, 305-306, or 307-308).
- GEOL 431 MARINE GEOLOGY 3**  
Geology of the ocean basins and their continental margins; sedimentation within the marine environment and its uses in interpreting geologic history and paleoecology.  
PREREQ: Completion of any of the one-year undergraduate core course sequences (GEOL 300-302, 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 the coastal areas of the world.  
PREREQ: Completion of any of the one-year undergraduate core course sequences (GEOL 300-302, 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-penetration 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 the shape of the earth and theories of isostasy. Geomagnetism, magnetization of rocks and paleomagnetism. Gravity, magnetic, electrical and electromagnetic methods and interpretations.  
PREREQ: GEOL107 or GEOL105/115 or GEOL113; MATH242; PHYS201 and PHYS202.
- GEOL 466 INDEPENDENT STUDY 1-3**
- 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, the 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: the rock record, relative and absolute dating of rocks, the fossil record, correlation of rocks and fossils, the geologic time scale, and the 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 the graduate program in geology at the University of Delaware. 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 the correlation and interpretation of morphostratigraphic relationships and history. Field methods to be 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  
Hydrologic and sediment transport processes in rivers and watersheds. Morphology and evolution of rivers and watersheds. Depositional processes and evolution of floodplains. Structure and interpretation of fluvial deposits in the geologic record. May be cross-listed with GEOG611.
- 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 the stratigraphy and chronology of marine and terrestrial records and theories of climatic change. Studies of the 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  
The 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 the role of the geologist and the 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 & analysis, site zone & control, health & safety plans, decontamination, and spill response recovery.
- GEOL 628 HYDROGEOLOGY** 3  
Principles of groundwater flow and water chemistry in varied geologic media. Evaluation of groundwater resources and assessment of environmental problems associated with groundwater use.
- GEOL 631 MARINE GEOLOGY** 3  
The geology of the ocean basins and their continental margins; sedimentation within the 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 the 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. The geochemical history of the earth.
- GEOL 650 CLAY MINERALOGY** 3  
See MAST650 for course description.
- GEOL 653 ELEMENTARY GEOPHYSICS I** 3  
Fundamentals of seismology, wave propagation, refraction and reflection of seismic waves. Seismic and ground-penetration radar (GPR) exploration methods and interpretations, with emphasis on near-surface problems.
- GEOL 654 ELEMENTARY GEOPHYSICS II** 3  
Gravity and the shape of the earth, theories of isostasy. Geomagnetism, magnetization of rocks and paleomagnetism. Gravity and magnetic surveys and interpretations. Electrical and radioactive surveying and well logging.
- GEOL 657 STATISTICS FOR EARTH SCIENCES** 3  
See STAT657 for course description.
- GEOL 682 PHYSICAL GEOGRAPHY OF COLD ENVIRONMENTS** 3  
See GEOG682 for course description.
- GEOL 801 TOPICS IN PLANETOLOGY** 1-3  
Selected topics in planetology. Topics vary according to instructor's preference. RESTRICTIONS: May be taken more than once for graduate credit.
- GEOL 802 TOPICS IN GEOPHYSICS** 1-3  
Selected topics in geophysics. Topics vary according to instructor's preference. RESTRICTIONS: May be taken more than once for graduate credit.

- GEOL 803 TOPICS IN GEOMORPHOLOGY** 1-3  
Selected topics in geomorphology. Topics vary according to instructor preference. May be cross-listed with GEOG803. RESTRICTIONS: May be taken more than once for graduate credit.
- GEOL 804 TOPICS IN GEOCHEMISTRY** 1-3  
Selected topics in geochemistry. Topics vary according to instructor preference. RESTRICTIONS: May be taken more than once for graduate credit.
- GEOL 807 TOPICS IN MINERALOGY AND PETROLOGY** 1-3  
Selected topics in mineralogy and petrology. Topics vary according to instructor's preference. RESTRICTIONS: May be taken more than once for graduate credit.
- GEOL 808 TOPICS IN STRUCTURAL GEOLOGY** 1-3  
Selected topics in structural geology. Topics vary according to instructor's preference. RESTRICTIONS: May be taken more than once for graduate credit.
- GEOL 809 TOPICS IN SEDIMENTOLOGY AND STRATIGRAPHY** 1-3  
Selected topics in sedimentology and stratigraphy. Topics vary according to instructor's preference. RESTRICTIONS: May be taken more than once for graduate credit.
- GEOL 818 TOPICS IN PALEOBIOLOGY** 1-3  
Selected topics in paleobiology. Topics vary according to instructor's preference.
- GEOL 857 PALEOCEANOGRAPHY** 3  
See MAST857 for course description. RESTRICTIONS: Requires permission of instructor.
- GEOL 868 RESEARCH** 1-9  
Enables students to begin planning work and research before admission to dissertation candidacy and GEOL969.
- GEOL 869 MASTER'S THESIS** 1-6
- GEOL 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.
- GEOL 969 DOCTORAL DISSERTATION** 1-12 PF

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**GREEK**


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- 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 PLATO** 3  
Introduction to reading ancient Greek literature in the original language, focusing on the philosophical works of Plato. PREREQ: GREK102.
- GREK 214 HOMER** 3  
Readings from the epics of Homer in the original language with review of grammar and syntax. PREREQ: GREK213. RESTRICTIONS: Satisfies College of Arts and Sciences language requirement.
- GREK 366 INDEPENDENT STUDY** 1-3
- GREK 466 INDEPENDENT STUDY** 1-3

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**GERMAN**


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- 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  
Systematic review of elementary and intermediate German grammar. Emphasis on grammar. Conversational practice.  
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 for students who wish to broaden their knowledge of German culture while improving their oral and aural language skills.  
PREREQ: GRMN107  
RESTRICTIONS: Taught abroad only
- GRMN 208 CONTEMPORARY GERMANY I** 3  
An 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
- 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. Taught in German
- GRMN 311 INTRODUCTION TO MODERN GERMAN LITERATURE** 3  
Masterpieces of poetry, narrative prose and drama from the 18th century to the present.  
PREREQ: Any two 200-level German courses.
- GRMN 325 GERMAN CIVILIZATION AND CULTURE** 3  
A survey of the major cultural, social and political developments in Germany from the mid-18th century to the 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: 12th-17th centuries "Courtly love" and "knighthood" (Minnesang, Das Nibelungenlied); "bourgeoisie" vs "peasantry" during the Reformation (Sachs'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-Hulshoff, 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-Schueler, 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: 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**

A 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: 12th - 17th centuries "courtly love" and "knighthood" (Minnesang, Das Nibelungenlied); "bourgeoisie verses peasantry" during the Reformation (Sachs'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**

A study of major literary trends and figures (Heine, Buechner, Droste-Huelshoff, 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-Schueler 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 reunited Germany's cultural and literary landscape and examines how reunification has effected 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.

**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 the 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 366 INDEPENDENT STUDY 1-3****HEBR 466 INDEPENDENT STUDY 1-6****HUMAN SERVICES, EDUCATION AND PUBLIC POLICY****HEPP 100 INTRODUCTORY SEMINAR 1**

Introduces students to the academic disciplines represented in the College of Human Services, Education and Public Policy. Possible opportunities for service learning and career opportunities are also explored.

**HEPP 160 SPECIAL TOPICS 3**

Freshman level interdisciplinary course on topics drawn from disciplines within the College of Human Services, Education and Public Policy. Content varies each semester. May be repeated for credit as topics change.

**HEPP 260 SPECIAL TOPICS 3**

Sophomore level interdisciplinary course on topics drawn from the disciplines within the College of Human Services, Education and Public Policy. Content varies each semester. May be repeated as topics change.

**HEPP 360 SPECIAL TOPICS 3**

Junior level interdisciplinary course on topics drawn from the disciplines within the College of Human Services, Education and Public Policy. Content varies each semester. May be repeated as topics change.

**HEPP 400 SERVICE LEARNING PRACTICUM 3-6**

Structured experience in a public or private, business, educational or non-profit setting as part of the Human Services, Education and Public Policy major. Course credit requires written documentation of the experience by the student through various means such as a paper, portfolio, report, journal, etc.

**HEPP 433 INTERNET LITERACY 3**

Provides the conceptual background and the online skills needed to become Internet literate. Includes a hands-on tutorial on creating Web pages and using search engines to conduct research. Reflects on the impact of emerging technologies on the future of schooling and communications.

**HEPP 460 SPECIAL TOPICS 3**

Senior level interdisciplinary course on topics drawn from the disciplines within the College of Human Services, Education and Public Policy. Content varies each semester. May be repeated as topics change.

**HEPP 465 SENIOR SEMINAR IN DISABILITIES STUDIES 3**

Culminates the Disabilities Studies minor with an integrative seminar requiring a significant project in the student's area of specialization  
PREREQ: IFST270 and EDUC230.

**HEPP 533 INTERNET LITERACY 3**

Provides the conceptual background and the online skills needed to become Internet literate. Includes a hands-on tutorial on creating Web pages and using search engines to conduct research. Reflects on the impact of emerging technologies on the future of schooling and communications.

**HEALTH AND EXERCISE SCIENCES****HESC 120 PHYSICAL EDUCATION 1 PF**

Introduces knowledge and skills in physical activity. The program is geared toward lifetime sports and allows for selection.

**HESC 121 WATER SAFETY INSTRUCTION 2**

Prepares students with the 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 the professional lifeguard. Topics include the professional lifeguard; rescue skills; breathing and cardiac emergencies; first aid; oxygen administration in the use of Automated External Defibrillation (AED); and spinal injuries.

**HESC 124 AEROBIC INSTRUCTOR TRAINING CERTIFICATION 2**

Provides the potential teacher with pertinent, current knowledge on aerobic dance, to allow the design of safe and effective programs. Emphasis on effective leadership skills.  
RESTRICTIONS: Requires aerobic dance experience and permission of instructor.



<b>HESC 132 SCUBA</b>	<b>2</b>	Prepares students with the skills and knowledge necessary to continue their training for open water scuba certification.
<b>HESC 135 FRESHMAN SEMINAR</b>	<b>2</b>	Covers basic survival skills: effective coping strategies to meet personal, academic, career and social challenges. Enhances student success and develops positive lifelong learning skills. RESTRICTIONS: Open to first semester freshmen
<b>HESC 138 LIFEGUARD TRAINING INSTRUCTOR</b>	<b>2</b>	Trains candidates to teach courses in Basic Water Safety, Emergency Water Safety, Basic Lifeguarding, Lifeguard Training, Basic Lifeguarding to Lifeguard Training Progression, Basic Lifeguarding Review, Lifeguard Training Review, and Safety Training for Swim Coaches. RESTRICTIONS: Current certification in First Aid, CPR and Lifeguard Training
<b>HESC 139 CURRICULUM IN PHYSICAL EDUCATION</b>	<b>3</b>	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 HPE majors.
<b>HESC 140 FUNDAMENTAL SKILLS ANALYSIS</b>	<b>3</b>	Designed to develop cognitive understanding and practical experience for the teaching and refinement of fundamental skills in grades K-12. Emphasis will be 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 HPE majors only.
<b>HESC 141 ADVENTURE CHALLENGE AND OUTDOOR RECREATION</b>	<b>1</b>	Provides the 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 HPE majors only.
<b>HESC 143 SKILLS, TECHNIQUES AND KNOWLEDGE OF STUNTS, TUMBLING AND GYMNASTICS</b>	<b>1</b>	Provides future physical education teachers with the ability to teach a unit in gymnastics, covering skills, techniques and knowledge in gymnastics activities including the balance beam, uneven bars, vaulting horse, tumbling, parallel bars and rings.
<b>HESC 155 PERSONAL HEALTH MANAGEMENT: AN APPROACH FOR A LIFETIME</b>	<b>3</b>	Utilizing group problem solving techniques and on-line resources, students will develop a comprehensive approach to managing their own health. RESTRICTIONS: Not open to students who have taken HESC214
<b>HESC 168 FRESHMAN SPECIAL TOPICS</b>	<b>1-3</b>	Freshman level independent study.
<b>HESC 200 ISSUES IN HEALTH BEHAVIOR MANAGEMENT</b>	<b>3</b>	Issues surrounding health behavior management, with emphasis on the role of the professional in promoting individual and community behavior change. RESTRICTIONS: Open to health behavior management majors only.
<b>HESC 202 FRESHMAN SEMINAR IN SPORT MANAGEMENT</b>	<b>1</b>	Overview of the body of knowledge associated with the field of sport management, including types of employment opportunities, as well as the skills, educational background and experiences that are essential for a successful career. RESTRICTIONS: Open to HBM majors with a concentration in recreation or sport management.
<b>HESC 205 FRESHMAN SEMINAR IN EXERCISE SCIENCE</b>	<b>1 PF</b>	Introduction to biomechanics, exercise physiology, and motor control, including familiarization with types of laboratory research and career opportunities associated with each discipline.
<b>HESC 206 EDUCATIONAL GAMES/ACTIVITIES</b>	<b>3</b>	Introduction to the development, analysis and modification of games/activities for elementary and middle school. Special emphasis on utilizing critical thinking, principles of transfer and basic movement education. Students learn to adapt games/activities for a varied population.
<b>HESC 207 INTRODUCTION TO RECREATION AND SPORT MANAGEMENT</b>	<b>3</b>	Survey of the field of recreation and sport management with an emphasis on the professional opportunities in the public, private and commercial sectors. RESTRICTIONS: Open to health behavior management majors with a concentration in recreation and park administration or sport management.
<b>HESC 210 SAFETY, FIRST AID AND EMERGENCY CARE</b>	<b>3</b>	Practical approach to first aid, safety, family health and prevention. Topics include basic concepts, needs, purposes, individual skills and legal implications. RESTRICTIONS: Open to majors only.
<b>HESC 214 WELLNESS: A WAY OF LIFE</b>	<b>3</b>	Principles of personal and public health including present and future problems of environmental control. Includes health services, health education and healthy school environment. RESTRICTIONS: Open to majors only in Fall. Not open to students who have taken HESC155.
<b>HESC 215 OBSERVATION AND ASSISTING IN SCHOOLS</b>	<b>2 PF</b>	Observation of classes in both the elementary and secondary schools. Primary emphasis on opportunity to assist the regular teacher in classroom and gymnasium activities. RESTRICTIONS: Requires permission of department.
<b>HESC 216 PRACTICUM IN TEACHING</b>	<b>1 PF</b>	Practical teaching experience. Student is assigned to lifetime sports activity courses and assists in conducting the course. RESTRICTIONS: Requires permission of department.
<b>HESC 220 ANATOMY AND PHYSIOLOGY</b>	<b>3</b>	Structure and function of the human body: skeletal, muscular, circulatory, respiratory, nervous, endocrine, digestive and urinary systems. A foundation course for all areas of physical education and athletics. RESTRICTIONS: Open to majors only.
<b>HESC 225 OFFICIATING RECREATIONAL SPORTS</b>	<b>1</b>	Theory and practice of officiating recreational sports. Introduced as a lifetime activity, emphasis is placed on practical experience with the intramural program. Minimal classroom time. Offers excellent leadership training. RESTRICTIONS: Meets one half of a semester. Spring sports: basketball, softball
<b>HESC 230 GROUP FACILITATION SKILLS IN HEALTH AND PHYSICAL EDUCATION</b>	<b>3</b>	Effective group facilitation, management and communication proficiency modeled and practiced. Students participate in a variety of group models to enhance delivery of diverse classroom topics. Students develop preliminary health education planning skills including communication of sensitive issues. RESTRICTIONS: Open to health and physical education majors only.
<b>HESC 233 ADVANCED SCUBA DIVING</b>	<b>2</b>	In-depth study and review of material from entry and mid-level scuba diving courses. Opportunity to use advanced diving skills and knowledge under controlled conditions. RESTRICTIONS: Requires basic scuba certification.
<b>HESC 235 PROFESSIONAL TRANSITIONS</b>	<b>3</b>	Focuses on requirements for successful transition from college student to workplace professional. Examines career planning, managing transition from college to career or graduate school, personal life changes and workplace issues. Through self-assessment, exploration, and classroom activities, students select, clarify and prepare for professional career choices. RESTRICTIONS: Open to PES concentration majors
<b>HESC 240 INTRODUCTION TO ATHLETIC TRAINING</b>	<b>3</b>	Orientation to athletic training as a career in the health care industry and introduction to the prevention and care of injuries in the physically active population. PREREQ: HESC220 RESTRICTIONS: Restricted to athletic training interest students only. Not open to students who have taken HESC305.
<b>HESC 250 MOTOR DEVELOPMENT</b>	<b>3</b>	Pattern of motor development from infancy through adolescence. Motor performance, perceptual-motor development in children, assessment for motor problems, remedial activities, principles of motor learning and conditions that improve motor learning. RESTRICTIONS: Open to HPE majors only.
<b>HESC 251 SKILLS, TECHNIQUES AND KNOWLEDGE OF RHYTHMS AND DANCE</b>	<b>1</b>	Preparation of physical education teachers. Provides the opportunity to develop skills, learn methods and techniques and acquire knowledge of the above activities. Emphasis on developing readiness for presenting such activities in public school settings.
<b>HESC 252 LIFETIME LEISURE ACTIVITIES</b>	<b>1</b>	Provides the 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 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 majors only
- HESC 256 TAPING TECHNIQUES** 1  
Learn accepted and approved taping/wrapping and splinting techniques which are NATA certified and accepted as standard measured by First Aid and CPR requirements.
- HESC 257 ATHLETIC TRAINING PRACTICUM I** 3  
Supervised clinical experience in athletic training. Focuses on development of competencies related to pathology of injuries and illnesses, acute care of injury and illness, and nutritional aspects of injury and illness.  
PREREQ: HESC305  
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 LEISURE SERVICE PROGRAMMING AND LEADERSHIP** 3  
Fundamental principles related to leisure service programming and leadership. Emphasis on the development of programming principles, objectives, program evaluation and applicable leadership theories and principles. Development and execution of a comprehensive program of campus-wide or broader scope is required.  
PREREQ: HESC207  
RESTRICTIONS: Open to health behavior management majors with a concentration in recreation and park administration or sport management
- HESC 263 LEADERSHIP PRACTICUM** 1 PF  
Students work under the auspices of an 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, wall/net and fielding/run-scoring activities. Students analyze 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 PERSONAL COMPUTERS IN HEALTH, PHYSICAL EDUCATION AND RECREATION** 2  
Focuses on the fundamental characteristics of microcomputer systems and their increasing importance in the physical education and recreation areas. Basic concepts of programming as well as an overview of existing software packages.  
RESTRICTIONS: Open to HPE majors only
- HESC 300 ISSUES IN PHYSICAL ACTIVITY STUDIES AND SPORTS** 3  
Compares professional issues and social forces to various philosophic systems. Examines personal beliefs, values and assumptions for the purpose of developing and/or refining a professional philosophy and a professional plan of action.  
RESTRICTIONS: Open to junior and senior HPE majors only
- HESC 302 PRACTICUM IN SPORT MANAGEMENT/RECREATION II** 1 PF  
A pre-internship professional experience in a sport management/recreation agency. Students work under the auspices of a faculty supervisor and professional mentor to gain practical experience.  
PREREQ: HESC202 and HESC207  
RESTRICTIONS: Open to HBM majors with concentrations in recreation and park administration or sport management
- HESC 303 PRACTICUM IN SPORT MANAGEMENT/RECREATION III** 1 PF  
A pre-internship professional experience in a sport management agency. Students work under the auspices of a faculty supervisor and professional mentor to gain practical experience.  
PREREQ: HESC202, HESC207 and HESC302  
RESTRICTIONS: Open to junior and senior HBM majors with a concentration in sport management
- HESC 305 FUNDAMENTALS OF ATHLETIC TRAINING** 3  
The organization and administration of an athletic training program and the prevention, diagnosis and treatment of athletic injuries, including physical therapy, taping and training room. First aid, safety measures and prevention of injuries.  
PREREQ: HESC220
- HESC 306 ADVANCED SEMINAR IN SPORTS ORTHOPAEDICS I** 1 PF  
Provides student with an understanding of diagnostic and decision making processes for common orthopaedic sports injuries. Rationale for the use of diagnostic tests and principles of consultation and referral will be emphasized.  
PREREQ: HESC220 and HESC305  
RESTRICTIONS: Open to athletic training majors only or with permission of instructor
- HESC 307 ADVANCED SEMINAR IN SPORTS ORTHOPAEDICS II** 1 PF  
Provides student with an understanding of special tests used in the diagnosis of common orthopaedic sports injuries and their anatomic and pathomechanical basis.  
PREREQ: HESC220, HESC305  
RESTRICTIONS: Open to athletic training majors only or with permission of instructor
- HESC 310 PRE-CLINICAL ANATOMY AND PHYSIOLOGY** 3  
Structure and function of the 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. Not open to students who have taken HESC220.
- HESC 315 INSTRUCTIONAL STRATEGIES FOR DRUG EDUCATION** 3  
Presents methods and materials to be used in school drug education programs. Emphasis on basic information related to the drug problem. Outside resource people including former drug users will be involved in class presentations.  
PREREQ: HESC214 and HESC230
- HESC 318 INCLUSIVE RECREATION** 3  
Emphasis on the delivery and value of special recreation participation opportunities for members of special population groups and particularly by persons with disabilities.
- 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 a nationally approved program.  
PREREQ: NTD200  
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  
RESTRICTIONS: Open to HESC majors only
- 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 present teaching methodologies relative to all facets of human sexuality. Emphasis will be on the process of integrating information into effective age specific educational strategies.  
PREREQ: HESC315  
RESTRICTIONS: HPE majors or permission of instructor
- 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 an understanding and application of health behavior theory to program development and evaluation. Emphasis is also placed on skills and competencies necessary for programming and evaluation including needs assessments, research, communication and team process.

RESTRICTIONS: Open to students in HPE or fitness management concentration.

**HESC 335 HEALTH AND AGING 3**

The aging process is addressed from a biopsychosocial perspective. Particular emphasis is placed on developing an understanding of the complex interrelations among aging, health and social structure.

RESTRICTIONS: Open to health behavior management majors only.

**HESC 340 MANAGEMENT OF SPORT INFORMATION 3**

An analysis of the information management process in the sport industry. The relationship between sport organizations and their publics and the media will be explored.

PREREQ: HESC200 and HESC207

RESTRICTIONS: Open to HBM majors with a concentration in sport management

**HESC 341 PRINCIPLES OF OUTDOOR RECREATION 3**

Presents an orientation to the field of outdoor recreation. Attention given to heritage, trends, resources, economics, management approaches, ecological and educational goals and ethics toward an outdoor natural environment. Laboratory section involves participation and skill development in a variety of outdoor recreation activities.

**HESC 342 SURVEY IN ADAPTIVE PHYSICAL EDUCATION AND RECREATION 3**

Study of prevalent abnormalities found in a general population including causes, prevention, care and treatment. Methods of screening students for determination of these disabilities are presented as a laboratory experience.

RESTRICTIONS: Open to majors only.

**HESC 344 FINANCIAL ASPECTS OF SPORT MANAGEMENT 3**

Analysis of economic and societal variables impacting the financial viability of professional, intercollegiate and Olympic sport organizations.

PREREQ: HESC200, HESC207, ECON100 and FINC200

RESTRICTIONS: Open to HBM majors with sport management concentration

**HESC 347 LEGAL ASPECTS OF SPORTS MANAGEMENT 3**

An introduction to the 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 junior and senior health behavior management majors with a concentration in sport management.

**HESC 350 BASIC CONCEPTS IN KINESIOLOGY 3**

A review of musculoskeletal anatomy and lever systems will provide the foundation for analyzing human movement. Practical kinesiological evaluation will focus on common fitness and health related exercises. Movement analysis and proper techniques will be discussed for cardiovascular machines, abdominal work, stretching, etc.

PREREQ: HESC220

RESTRICTIONS: Open to majors only

**HESC 353 SEMINAR IN EXERCISE PHYSIOLOGY 1 PF**

Prepares students in the exercise physiology concentration with the 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: Must be in exercise physiology concentration. Requires junior status.

**HESC 354 SEMINAR 1 PF**

Explores internship opportunities in (1) recreation and leisure services field for the recreation major or (2) the fitness management field for the fitness management major. Completion of necessary paperwork for placement in an agency that will assist students in meeting career objectives is required.

RESTRICTIONS: Requires junior status. Recreation/leisure service is limited to recreation majors; fitness management is limited to fitness management majors

**HESC 355 FIGURE SKATING PRACTICUM I 3 PF**

Survey in figure skating science covering the basics of coaching and teaching including an in-depth review of the instructional and competitive programs of the Ice Skating International Association and U.S.F.S.A. Extensive study and work in the basic badge programs of the I.S.I.A. and U.S.F.S.A.

RESTRICTIONS: Open to figure skating science majors only

**HESC 356 FIGURE SKATING PRACTICUM II 3 PF**

Concentration in the areas of pairs and ice dance with emphasis on teaching and coaching techniques related to the basic through intermediate levels with an analysis of progression and sequencing

RESTRICTIONS: Open to figure skating science majors only

**HESC 357 ATHLETIC TRAINING PRACTICUM II 3**

Supervised clinical experience in athletic training. Focuses on development of competencies related to assessment and evaluation, therapeutic modalities and health care administration.

PREREQ: HESC257

RESTRICTIONS: Open to athletic training majors only.

**HESC 358 ATHLETIC TRAINING PRACTICUM III 3**

Supervised clinical experience in athletic training. Focuses on development of competencies related to assessment and evaluation, pharmacology, risk management and injury prevention and general medical conditions and disabilities.

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. Includes classroom management, instructional materials and teaching strategies, lesson planning, implementation and performance-based assessment of pupil achievement and self-assessment of teaching effectiveness.

PREREQ: HESC139, HESC140, HESC210, HESC250, HESC275, HESC276 and HESC319. Satisfactory completion of Praxis I.

COREQ: HESC380.

RESTRICTIONS: Junior status, upper division clearance, minimum gpa of 2.50, major index of 2.75 and completion of all skills requirements.

**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 the neuromuscular and sensory systems and elementary mechanics are employed to explain the mechanical characteristics and control mechanisms underlying basic groups of human motor activities.

PREREQ: HESC220 or HESC310

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. Includes classroom management, instructional materials and teaching strategies, lesson planning, implementation and performance-based assessment of pupil achievement and self-assessment of teaching effectiveness.

PREREQ: HESC139, HESC140, HESC210, HESC220, HESC250, HESC275, HESC276 and HESC319. Satisfactory completion of Praxis I

COREQ: HESC370.

RESTRICTIONS: Junior status, upper division clearance, minimum gpa of 2.50, major index of 2.75 and completion of all skill courses

**HESC 381 ADVENTURE CHALLENGE EDUCATION 3**

An 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" are emphasized. Activities create the atmosphere for individual and group development.

**HESC 390 PRINCIPLES OF COACHING 3**

Introduces students to the 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 athletic training majors with an understanding of the origin, chemistry, effects and uses of medications commonly used in sports medicine. Major topics include pharmacokinetics, indications, contraindications, adverse reactions, management of overdose, phonophoresis, iontophoresis, drugs affecting skeletal muscle, pain and inflammation.

RESTRICTIONS: Open to athletic training majors only

**HESC 400 RESEARCH METHODS 3**

Introduction to 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: Restricted to majors in the Department of Health, Nutrition and Exercise Sciences.

**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 a 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 a 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 the nature and extent of injury.  
PREREQ: HESC480 and HESC481 or HESC420

**HESC 409 THERAPEUTIC MODALITIES 4**

Provides both theory and clinical experience in the use of the most common types of therapeutic modalities utilized in sports medicine.

RESTRICTIONS: Open to athletic training majors only.

**HESC 414 METHODS AND MATERIALS IN HEALTH EDUCATION 3**

Emphasis on health education in the school curriculum; curriculum content and organization of materials for instructional purposes.

PREREQ: HESC210, HESC214, 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 the consideration of muscular, skeletal and nervous systems. Laboratory experience emphasizes the meaning and significance of musculoskeletal movements and utilizes prosected human specimens, models, x-rays, dry biological materials and other aids.

PREREQ: HESC220

**HESC 422 ORGANIZATION AND ADMINISTRATION OF LEISURE SERVICES 3**

Study of the operation and management of sport, recreation and fitness facilities. Emphasis will be placed on developing the skills necessary to conduct the day-to-day operations and manage these types of facilities.

RESTRICTIONS: Open to junior health behavior management majors.

**HESC 425 BIOMECHANICS OF HUMAN MOTION 4**

Study of the fundamental mechanical principles governing the human body in motion and at rest, including application of statics and dynamics in the quantitative analysis of sport and exercise.

RESTRICTIONS: Open only to students in athletic training, health and physical education, figure skating science concentration, and strength and conditioning minor.

**HESC 426 BIOMECHANICS I 4**

Application of mechanical principles in the study of the human musculoskeletal system, including analysis of joint forces, as well as the mechanical properties of bone, muscle, and connective tissues.

PREREQ: PHYS201 or PHYS207

RESTRICTIONS: Open to majors only.

**HESC 427 BIOMECHANICS II 3**

Provides information on the measurement of human motion in three dimensions and on the calculation of inverse dynamics in two dimensions as applied to the analysis of human motion.

PREREQ: HESC426 and MATH242

**HESC 430 PHYSIOLOGY OF ACTIVITY 3**

Study of integration of the body systems in performance of exercise, work and sports activities. Performance of exercise activities by the human body under environment, stress situations

PREREQ: HESC220

COREQ: HESC431

**HESC 431 PHYSIOLOGY OF ACTIVITY LABORATORY 1**

Laboratory experiences include the measurement of physiological parameters under exercise conditions.

COREQ: HESC430

**HESC 432 BASIC EXERCISE PRESCRIPTION 3**

Studies the principles and guidelines (as established by the American College of Sports Medicine) for the development of exercise programs for apparently healthy populations. Emphasis on individualization of fitness programs for optimum client participation.

PREREQ: HESC430

RESTRICTIONS: Open to EXSS/EXSC majors only.

**HESC 434 EXERCISE TEST TECHNOLOGY 3**

Emphasizes American College of Sports Medicine objectives for cardiac rehabilitation exercise technologist certificate. Basic electrocardiography, exercise physiology, stress test administration, medications, report preparations, program considerations and facilities development.

RESTRICTIONS: Open to EXSS/EXSC majors only.

**HESC 437 SPORT MARKETING 3**

A 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: BUAD100

RESTRICTIONS: Open to junior and senior health behavior management majors with a concentration in sport management.

**HESC 440 STRATEGIES FOR ATHLETIC PEAK PERFORMANCE 3**

Presentation of methods and techniques for the mental preparation necessary to attain athletic peak performance. Provides experiential activities in the areas of relaxation, visual imagery, visual motor behavior rehearsal, hypnosis stress reduction and concentration techniques.

**HESC 445 CONCEPTS OF PHYSICAL FITNESS TESTING 3**

Combines both practical and theoretical aspects of physical fitness training. Special reference made to aging, youth fitness, diabetics, asthmatics and obese individuals.

PREREQ: HESC430, HESC431 and HESC432

**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-

RESTRICTIONS: Restricted to majors in the Department of Health, Nutrition and Exercise Sciences.

**HESC 448 ORGANIZATION AND ADMINISTRATION 3**

Information for prospective certified athletic trainers on organization and administration of athletic training programs as identified by the NATA.

Topics include record keeping, purchasing and maintenance of equipment and facilities and policies and procedures for the operation of an athletic training program.

RESTRICTIONS: Open to athletic training majors only

**HESC 449 ADVANCED TOPICS IN SPORTS MEDICINE 3**

Exposure to a 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 the 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 EXERCISE TESTING/PRESCRIPTION 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, a variety of testing protocols, basic exercise physiology and exercise prescription.

**HESC 453 AQUATIC MANAGEMENT 3**

Equips individuals with the knowledge, techniques and skills required to operate an aquatic facility as manager or director

**HESC 455 FIGURE SKATING PRACTICUM III 3 PF**

Concentration on advanced teaching/coaching techniques related to the skill required in I.S.I.A. and U.S.F.S.A. Levels with an analysis of progression and sequencing. Seminar sessions to include professional responsibilities, business practices, skating pedagogy, special programs and precision skating.  
RESTRICTIONS: Open only to majors in the figure skating science degree program.

- HESC 456 FIGURE SKATING PRACTICUM IV** 3 PF  
Direct involvement in the teaching/coaching of beginner elite national and world competitors under the supervision of Ice Skating Development Center professional staff.  
RESTRICTIONS: Open only to majors in the figure skating science degree program.
- HESC 457 ATHLETIC TRAINING PRACTICUM IV** 3  
Supervised clinical experience in athletic training. Focuses on development of competencies related to therapeutic exercise, psychosocial intervention and referral and professional development and responsibilities.  
PREREQ: HESC358.  
RESTRICTIONS: Open to athletic training majors only.
- HESC 460 COACHING/PERFORMANCE PRACTICUM** 1-3 PF  
Practical coaching/performance experience in a scholastic/clinical setting with the season chosen corresponding to each student's interest. The student must keep a daily log of methods and experiences and choose an appropriate project. Observations will be made by the minor coordinator and the cooperating supervisor.  
PREREQ: HESC210, HESC220, HESC320 and HESC390.  
RESTRICTIONS: Junior status or higher.
- HESC 462 PRACTICUM IN STRENGTH AND CONDITIONING** 3 PF  
Directed practical experience in a strength and conditioning environment.  
PREREQ: Admission to the strength and conditioning minor and completion of HESC320, HESC432 and HESC447 with at least a C-.
- HESC 463 PRACTICUM IN EXERCISE SCIENCE** 1-6 PF  
Directed practical experiences in clinical aspects of exercise science.  
PREREQ: Admission to the exercise physiology or biomechanics concentration.  
RESTRICTIONS: Junior status or higher.
- HESC 464 INTERNSHIP** 9 PF
- HESC 465 TEACHING SEMINAR IN HEALTH AND PHYSICAL EDUCATION** 3  
Examines the role of the health and physical education teacher in the elementary and secondary schools. Provides a forum for analyzing and discussing topics of interest to preprofessionals and includes participation of professionals from the 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 a reflection of society and how it pervades American culture. Examines baseball as a game, sport, business and social institution as portrayed in literature, memorabilia, film, ballparks and scandals.
- HESC 475 TEACHING HEALTH IN THE ELEMENTARY SCHOOL** 3  
Examines the importance of teaching health in the elementary school. Presents content and teaching strategies proven effective for teaching health at the elementary level. Also discusses how to incorporate health into other subjects.  
RESTRICTIONS: Open to elementary education majors only.
- HESC 480 UPPER EXTREMITY AND SPINE EVALUATION** 3  
Evaluation of the 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 will be discussed.  
PREREQ: HESC220 and HESC240.  
RESTRICTIONS: Open to athletic training majors only.
- HESC 481 LOWER EXTREMITY AND SPINE EVALUATION** 3  
Evaluation of the lower extremity, lumbar spine and sacroiliac joint. SOAP format evaluation, on-field evaluation, mechanics and pathomechanics of joint movement, detailed anatomy, etiology of specific injuries and special and stress tests will be discussed.  
PREREQ: HESC220 and HESC240.  
RESTRICTIONS: Open to athletic training majors only.
- HESC 484 WOMEN IN SPORTS** 3  
Contemporary view of women in the world of sports. Emphasis on biological, physiological, sociological, psychological, historical and legal aspects.  
May be cross-listed with WOMS484.
- HESC 485 RESEARCH IN EXERCISE SCIENCE** 1-3  
Undergraduate laboratory research experience in biomechanics, exercise physiology, or motor control.  
RESTRICTIONS: Restricted to exercise science majors. Consent of instructor required.

- HESC 486 TENSION CONTROL AND RELAXATION** 3  
Focuses on the phenomenon of stress and includes application of various techniques in a laboratory setting with emphasis on individual measurement, awareness and improvement of relaxation. Students learn tension reduction, relaxation techniques or the refinement of relaxation techniques.
- HESC 490 DEVELOPMENT OF HEALTH PROMOTION PROGRAMS** 3  
Prepares students to plan, create and implement health promotion programs in the workplace, focusing on program selection, promotion, evaluation and expansion.  
PREREQ: HESC432 and a statistics course.
- HESC 601 RESEARCH METHODS** 3  
Emphasis on procedures for designing experimental research studies including choice of subjects, group design, choice of proper instrumentation, statistical design, formulation of experimental group programs and technical writing for proposals and publication.
- HESC 602 ELEMENTARY COMPUTER STATISTICS** 3  
Overview of elementary statistics and their use in research. Emphasis on the use and interpretation of packaged computer routines (SPSS). Discusses experimental designs utilizing analysis of variance and other research procedures.
- HESC 603 SEMINAR IN EXERCISE SCIENCE** 0 PF  
Guest and student presentations on research or other topics related to exercise science.
- HESC 605 PATHOETIOLOGY OF MUSCULOSKELETAL INJURIES** 3  
Physiological, mechanical, and neuromuscular mechanisms of common musculoskeletal injuries with implications for both clinical and research environments.  
PREREQ: HESC220 or equivalent.  
RESTRICTIONS: Restricted to graduate students.
- HESC 608 CURRICULUM IN PHYSICAL EDUCATION** 3  
Curriculum design content, foundations and related research topics as well as principles of supervision appropriate for the student teacher, cooperating teacher and/or the chairperson of a physical education department.
- HESC 615 USING ASSESSMENT IN PHYSICAL EDUCATION** 3  
Authentic assessment strategies for K-12 programs using national and state content standards in physical education. Topics include current practices, educational reform, teacher and student accountability and technological resources.
- HESC 635 SEMINAR IN TEACHING PHYSICAL EDUCATION** 3  
Major goal is educational instructional improvement in elementary and secondary settings. Students critique pedagogical research and study methods of systematic observation of instruction and analysis of effective teaching behavior. Examines pedagogical trends, current issues and coaching methods.
- HESC 644 OUTDOOR EXPERIENTIAL EDUCATION FOR TEACHERS AND RECREATORS** 3  
Focuses on development of a broad spectrum of curriculum materials and instructional aids to be utilized in outdoor education programs. Includes techniques in social studies, science, art, language arts, physical education, music and math. Examines the meaning, scope and value of outdoor education and the involvement of the outdoor education movement in schools in America. Investigates activities both in and around schools and in natural areas.
- HESC 645 ADVENTURE BASED COUNSELING IN EDUCATION** 3  
Presents a model for teachers to challenge students and alter learning capabilities through cooperative behaviors. Participants will have an opportunity to develop new skills utilizing physically challenging activities to expand their curriculum in the area of adventure education.
- HESC 650 LIFE SPAN MOTOR DEVELOPMENT** 3  
Theoretical and empirical inquiry into developmental changes in movement patterns across the life span. Focus will be placed on changes in behavioral aspects of human motor behavior and the underlying mechanisms to which these changes relate. Students will design and complete research project.
- HESC 651 NEUROPHYSIOLOGICAL BASIS OF HUMAN MOVEMENT** 3  
Neural control of human movement, including gradation of muscular force, motor unit control principles, neuromuscular aspects of strength, segmental motor control, the organization of ballistic movements, adaptations in the control of movement, and aging. Students will learn related research techniques through hands-on demonstrations.  
PREREQ: HESC220 or equivalent.
- HESC 657 SEMINAR IN MOTOR BEHAVIOR** 3  
Introduction to contemporary and classical research literature on the motor behavior of human movement emphasizing motor control, learning and development. Lecture/discussion format.

<b>HESC 665</b>	<b>CARDIOVASCULAR ASSESSMENT I</b>	<b>3</b>	Designed to teach the fundamentals for administering the 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.	<b>HESC 808</b>	<b>SEMINAR IN MOTOR CONTROL</b>	<b>3</b>	Introduction to research literature on contemporary theories and models of motor control. Topics include problems of controlled variables and reference systems, movement variability, motor redundancy, interactions of the locomotor apparatus and the central nervous system, and movement optimization criteria. PREREQ: Undergraduate biomechanics and motor control/behavior at the 200-level or higher.
<b>HESC 675</b>	<b>CARDIOVASCULAR ASSESSMENT II</b>	<b>3</b>	Prepares the student to direct exercise programs in the rehabilitative setting. Addresses theoretical and practical aspects of exercise testing and prescription in addition to administrative issues of programs. Students design an exercise program for phase I, II or III cardiac rehabilitation.	<b>HESC 840</b>	<b>ADVANCED HUMAN ANATOMY</b>	<b>3</b>	Laboratory course requiring detailed gross dissection of the extremities and their girdles. Specific emphasis is placed upon neuromuscular, skeletal, cardiovascular and mechanical factors dictating functional capabilities of the human body. Understanding the relationship between structure and function must be demonstrated frequently.
<b>HESC 677</b>	<b>SEMINAR IN EXERCISE PHYSIOLOGY</b>	<b>3</b>	Introduction to contemporary and classical research literature in exercise physiology with an emphasis on the acute and chronic effects of exercise on performance and health. Lecture/discussion format.	<b>HESC 869</b>	<b>MASTER'S THESIS</b>	<b>1-6</b>	
<b>HESC 685</b>	<b>ADVANCED EXERCISE PRESCRIPTION</b>	<b>3</b>	Instructs students in exercise recommendations for populations with special needs. Exercise prescription for cardiac patients, diabetics, pulmonary diseases and others with special needs will be discussed. PREREQ: CV I and CV II.	<b>HESC 964</b>	<b>PRE-CANDIDACY STUDY</b>	<b>3-12 PF</b>	
<b>HESC 687</b>	<b>SEMINAR IN BIOMECHANICS</b>	<b>3</b>	Introduction to contemporary and classical research literature on the biomechanics of human movement with an emphasis on exercise, clinical and sport applications. Lecture/discussion format.	<hr/> <b>HISTORY</b> <hr/>			
<b>HESC 688</b>	<b>ELECTROMYOGRAPHIC KINESIOLOGY</b>	<b>3</b>	Introduction to the theoretical basis and practical application of electromyography. Topics include the electrophysiological basis of muscle actions, mechanical properties of muscle, EMG recording and processing methods and applications of EMG to the study of human motion.	<b>HIST 101</b>	<b>WESTERN CIVILIZATION TO 1648</b>	<b>3</b>	The principal political, social, economic and cultural developments in Western civilization from late antiquity (3rd century A.D.) to the middle of the 17th century.
<b>HESC 690</b>	<b>BIOMECHANICAL METHODS</b>	<b>3</b>	Introduces students to fundamental methods of two- and three-dimensional analysis in sports biomechanics. Topics will include creation of local coordinate systems, coordinate system transformations, joint center predictions, vector manipulation, linear and angular kinematics, joint forces and moments. PREREQ: Calculus. RESTRICTIONS: Requires permission of instructor.	<b>HIST 102</b>	<b>WESTERN CIVILIZATION: 1648 TO THE PRESENT</b>	<b>3</b>	The principal political, social, economic and cultural developments in Western civilization since the middle of the 17th century.
<b>HESC 691</b>	<b>GAIT LABORATORY INTERNSHIP</b>	<b>3</b>	Provides hands-on experience in all patient-related phases of a full service gait analysis laboratory. Designed to enable students to apply skills learned in HESC690 and HESC803. PREREQ: HESC690 and HESC803. RESTRICTIONS: Requires permission of instructor.	<b>HIST 103</b>	<b>WORLD HISTORY I</b>	<b>3</b>	Principal political, economic, cultural and social developments in world history through the sixteenth century, relating the past to the present. Equal weight given to the history of Asia, Africa, the Americas and Europe.
<b>HESC 800</b>	<b>ADVANCED PHYSIOLOGY OF EXERCISE</b>	<b>3</b>	Consists of three basic parts: a survey of completed research on the effects of exercise upon the human body as it specifically relates to physical education and athletics; instruction in the use of stress testing equipment; and completion of an independent research project.	<b>HIST 104</b>	<b>WORLD HISTORY II</b>	<b>3</b>	Principal political, economic, cultural and social developments in world history from the sixteenth century to the present, relating the past to the present. Equal weight given to the history of Asia, Africa, the Americas and Europe.
<b>HESC 802</b>	<b>HUMAN CARDIOVASCULAR CONTROL</b>	<b>3</b>	Focuses on human cardiovascular control as it pertains to orthostasis, exercise and heat stress. The role of mechanical, neural and humoral factors is emphasized, as well as factors that control oxygen transfer from lungs to cells. PREREQ: Undergraduate human or exercise physiology at the 200-level or higher.	<b>HIST 130</b>	<b>ISLAMIC NEAR EAST: 600-1500</b>	<b>3</b>	Introduces the student to the origins of Islam, its development as a religion and a culture, and the broad trends in Middle Eastern history until 1500.
<b>HESC 803</b>	<b>INTRODUCTION TO LABORATORY INSTRUMENTS</b>	<b>3</b>	Introduction to the principles of operation of laboratory equipment common to the areas of exercise physiology and biomechanics. Includes theory of operation, environmental considerations and area of application of instruments. Laboratory involves hands-on use of equipment to collect data for faculty and student research projects.	<b>HIST 131</b>	<b>ISLAMIC NEAR EAST: 1500-PRESENT</b>	<b>3</b>	Considers the traditional make-up of the Middle East and charts the emergence of the region in its present form through the nineteenth and twentieth centuries.
<b>HESC 804</b>	<b>CLINICAL MEASURES IN EXERCISE PHYSIOLOGY</b>	<b>3</b>	Assessment techniques and research protocols used in exercise physiology. Resting energy expenditure, body composition, bone mineral density, cardiopulmonary evaluation and selected histochemical analyses will be addressed. PREREQ: Undergraduate background in exercise physiology. RESTRICTIONS: Class size limited to 15.	<b>HIST 134</b>	<b>HISTORY OF AFRICA</b>	<b>3</b>	Introductory course on African history south of the Sahara, from the 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.
<b>HESC 807</b>	<b>MOTOR LEARNING AND CONTROL</b>	<b>3</b>	Exploration of theoretical perspectives of motor learning and control, with a focus on contemporary approaches. Surveys neurological systems involved in perception and motor performance. Application of specific principles of learning and control of movement to the teaching of motor skills in daily living activities, physical education and sport.	<b>HIST 135</b>	<b>INTRODUCTION TO LATIN AMERICAN HISTORY</b>	<b>3</b>	Introduction to Latin American history from the pre-conquest period to the present.
				<b>HIST 136</b>	<b>TOPICS: EAST ASIA IN FILM</b>	<b>1</b>	See ARSC136 for course description. RESTRICTIONS: May be repeated for credit when topics vary.
				<b>HIST 137</b>	<b>EAST ASIAN CIVILIZATION: CHINA</b>	<b>3</b>	A survey of major aspects of Chinese civilization, relating the past to the present.
				<b>HIST 138</b>	<b>EAST ASIAN CIVILIZATION: JAPAN</b>	<b>3</b>	A survey of major aspects of Japanese civilization, relating the past to the present.
				<b>HIST 200</b>	<b>HISTORY AND GOVERNMENT OF DELAWARE</b>	<b>3</b>	A survey of the history of Delaware and its present government, with special attention to the needs of social studies teachers.
				<b>HIST 205</b>	<b>UNITED STATES HISTORY</b>	<b>3</b>	An introductory survey of 17th, 18th, and 19th-century American history. Themes and approach vary with the instructor.
				<b>HIST 206</b>	<b>UNITED STATES HISTORY</b>	<b>3</b>	An introductory survey of American history since 1865. Themes and approach vary with the instructor.



- HIST 210 WAR IN WESTERN CIVILIZATION** 3  
Survey of the history of warfare from the ancient Greeks through World War II, with emphasis upon tactics, weapons, armor, strategy and the 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, large-enrollment course on the history of the American Civil Rights Movement. Deals with the crucial years from 1954 to 1970 and examines the 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 the 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  
A survey of the evolution of Christianity from its origins to 1300.
- HIST 243 ANCIENT RELIGION AND CIVILIZATION** 3  
Outlines religion in Europe and the Near East from the Paleolithic period to the 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  
An intensive examination, based on primary sources, of the deeds and lives of selected kings and queens of the Middle Ages, Byzantine rulers and the popes.
- HIST 250 ROOTS OF CONTEMPORARY CULTURE** 3  
Main developments in literature and the arts from the early 18th century to World War II from a social and historical perspective. Stresses the impact of social and political change on conceptions of the function of the arts.
- HIST 254 JEWISH HOLOCAUST: 1933-1945** 3  
Focuses on the infamous "Final Solution," with particular emphasis on the roots of Anti-Semitism, National socialist policies and plans, ghetto and camp life, the Einsatzgruppen, resistance, the politics of rescue and the art and literature of the Holocaust. May be cross-listed with JWST254.
- HIST 268 SEMINAR** 3  
Introduction to the study and writing of history. Individual instructors take different approaches but all tend to stress the 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 the modern histories of several Asian countries, for example China, Japan and Vietnam, emphasizing their responses to the modern world. Topics include traditional societies, impact of imperialism, nationalist and communist movements, Pacific War, cultural revolution in China, Vietnam Conflict and emergence of the Japanese economic powerhouse.
- HIST 278 HISTORIC CULTURES OF THE MIDDLE ATLANTIC REGION** 3  
See ANTH278 for course description.
- HIST 280 SCIENCE AND CIVILIZATION** 3  
Changing conception of the universe and of humanity's place within it, as seen in ideas and institutions of science from ancient to modern times.
- HIST 291 WOMEN'S HISTORY THROUGH FILM** 1  
See WOMS291 for course description.
- HIST 300 WOMEN IN AMERICAN HISTORY** 3  
The position of women in American life viewed from a 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 301 THE WORKER IN AMERICAN LIFE** 3  
Survey of the major historical transformations affecting the lives of American working people and their social, political, economic and cultural responses to these changes. Special attention given to how workers' world views and the nature of work have evolved over the course of American history.
- HIST 302 THE WORLD IN OUR TIME** 3  
An examination of current events within the context of historical forces.
- HIST 303 AMERICAN INTELLECTUAL HISTORY** 3  
The development of principal patterns of American religious, social and scientific thought before 1865.
- HIST 304 AMERICAN INTELLECTUAL HISTORY** 3  
The development of principal patterns of American religious, social and scientific thought after 1865.
- HIST 305 IMAGES OF RACE AND ETHNICITY IN AMERICAN CULTURE** 3  
Study of how images have shaped attitudes toward race and ethnicity in American culture from the colonial era to the present. Will 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 the United States and the nation's changing relations with the outside world. Covers the period 1900 to the present. Special attention given to presidential personality - how a President's background and personality affect the 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 the presidency of George Washington through James Monroe. Particular attention to national politics under the 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 the eve of the Civil War. Particular attention to the 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  
A history of the United States as a capitalist civilization, particularly since the nineteenth-century rise of the modern corporation. Emphasis on business history, business-government relations and the larger social history of U.S. political economy.
- HIST 310 POSTWAR AMERICA I: 1945-1963** 3  
Social, political and diplomatic history of the United States from 1945 to 1963.
- HIST 311 POSTWAR AMERICA II: 1963-PRESENT** 3  
Social, political and diplomatic history of the United States from 1963 to the present.
- HIST 312 CRIME AND PUNISHMENT IN AMERICAN HISTORY** 3  
See CRJU312 for course description.
- HIST 313 EARLY TWENTIETH CENTURY AMERICA** 3  
The rise of big business and the ways that farmers, labor leaders, socialists and middle-class reformers responded to the new industrialism.
- HIST 314 TWENTIETH CENTURY AMERICA** 3  
Causes and consequences of American intervention in the two world wars, and the social, political and economic history of the U.S. during the years between the wars.
- HIST 316 FIRST ENCOUNTERS: INDIANS AND EUROPEANS IN EARLY AMERICA** 3  
Explores the initial contacts between Native Americans and Europeans during the sixteenth and seventeenth centuries. Focuses on encounters between the Indians and the Spanish in Mexico, the French in Canada and the British along the Atlantic seaboard.
- HIST 318 COLONIAL AMERICA** 3  
The transit of culture from England to America and its modification there during the seventeenth century. The development of mature colonial societies to 1760.
- HIST 319 REVOLUTIONARY AMERICA** 3  
The 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-19th century United States.
- HIST 323 THE OLD SOUTH** 3  
The history of the Southern United States from the beginnings of European colonization to the outbreak of the Civil War. Special attention to slavery and how it shaped Southern life.
- HIST 324 AMERICAN CONSTITUTIONAL HISTORY** 3  
See CRJU324 for course description.



- HIST 325 HISTORY OF BLACK AMERICA TO THE CIVIL WAR** 3  
See BAMS304 for course description.
- HIST 326 HISTORY OF BLACK AMERICA SINCE THE CIVIL WAR** 3  
See BAMS306 for course description.
- HIST 328 AMERICAN INDUSTRIAL SOCIETY FROM 1815 TO THE PRESENT** 3  
Exploration of social forces and social impact of American industrialization: rise of the 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 329 INTERNATIONAL MIGRATION** 3  
See POSC329 for course description.
- HIST 330 PEASANTS AND REVOLUTION IN AFRICA** 3  
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** 3  
Examines major themes in Caribbean history from the pre-Columbian period to the end of slavery in 1838. Discussion of the demographic and ecological consequences of European contact, sugar and slavery, the evolution of Creole cultures and slave resistance.  
May be cross-listed with BAMS331.
- HIST 332 HISTORY OF CARIBBEAN II** 3  
Examines the period from 1838 to the present. Includes a discussion of the social and economic adjustments to emancipation, the making of plural societies with the importation of Asian laborers, American imperialism and political and social movements of the twentieth century.  
May be cross-listed with BAMS332.
- HIST 334 AFRICAN AMERICAN WOMEN'S HISTORY** 3  
Explores the diversity of African American women's lives and development of women, work, and culture from the colonial era through the late 20th century. Examines the social, political, religious and economic factors affecting change and transformation in the lives of African American women. Provides a broad introduction to the interdisciplinary field of African American and Women's Studies.  
May be cross-listed with BAMS334 and/or WOMS334.
- HIST 336 TOPICS IN LATIN AMERICAN HISTORY** 3  
History and culture of Latin American peoples.  
RESTRICTIONS: Only taught abroad in Latin America.
- HIST 338 GREEK-ROMAN SPORT-RECREATION** 3  
Covers period 2000 B.C. to 6th 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 339 TOPICS IN MODERN EUROPEAN HISTORY** 3  
A reflection of developments in modern European history from the First World War to the 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** 3  
Stresses such themes as the way in which the world view of the ancients was different from ours, and the relationship between the individual and society. Readings in ancient historical works and ancient literature. Extensive use of slides.
- HIST 341 ANCIENT ROME** 3  
Students encouraged to form 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** 3  
A survey of political, social, cultural and economic developments in Europe between 300 and 1050.
- HIST 343 MEDIEVAL EUROPE: 1050-1350** 3  
A survey of political, social, cultural and economic developments in Europe between 1050 and 1350.
- HIST 344 RENAISSANCE EUROPE** 3  
Europe from the late 13th to the early 16th century, with stress on the consequences of the Black Death, the reform of the Church and the flowering of cultural and intellectual life in Italy and northern Europe.
- HIST 345 EUROPE IN THE REFORMATION ERA: 1517-1648** 3  
Religion in the realms of thought and action during the rise of "modern" Western civilization: the scientific revolution, the Reformation, the Counter-Reformation and their impact on the behavior and perceptions of men by 1650.
- HIST 346 AGE OF LOUIS XIV** 3  
The culture, society and politics of 17th century France, centered upon the biography of Louis XIV. Emphasis on growth of absolute monarchy in France and the implications for all of Europe.
- HIST 347 THE FRENCH REVOLUTION AND NAPOLEON** 3  
Emphasis on personalities in the Revolution - Louis XIV, Robespierre and Napoleon - and the clash of social forces.
- HIST 348 HISTORY OF SPAIN: 1479-PRESENT** 3  
History of Spain from the unification of the crowns of Aragon and Castile in 1479 to the present. Emphasis on the rise and decline of the Spanish empire, expansion into the New World, and the obstacles for political, social and economic modernization since 1715.
- HIST 349 MODERN HISPANIC SOCIETIES: 1800-PRESENT** 3  
Comparative social history of the Hispanic world. Topics include the social and cultural background of early modern Spain, the formation of Latin American colonial society and the struggle for modernization in contemporary Spain and Latin America.
- HIST 351 EUROPE IN CRISIS: 1919-1945** 3  
Europe from the Paris Peace Conference to the end of World War II, with emphasis on the breakdown of traditional institutions in an age of totalitarianism, economic depression and world conflict.
- HIST 352 CONTEMPORARY EUROPEAN SOCIETY** 3  
A comprehensive survey and analysis of the evolution and structure of postwar society, with particular emphasis on current social and cultural developments.  
RESTRICTIONS: When taught abroad, course focuses on the host country.
- HIST 353 MODERN GERMANY: 1770-1919** 3  
German political, socioeconomic, and cultural history from 1770 to the end of the First World War.
- HIST 354 GERMANY IN THE TWENTIETH CENTURY: 1914 TO PRESENT** 3  
German political, socioeconomic and cultural history from the First World War to the present.
- HIST 355 EARLY MODERN INTELLECTUAL HISTORY** 3  
Examines the major development in thought from around 1600 to 1800. Questions considered are the nature of political order and justice, the character of the good life and moral obligation, the relation between faith and reason, and the development of historical reason and theories of the fine arts. Readings will be from Milton, Locke, Voltaire, Rousseau and others.
- HIST 356 MODERN EUROPEAN INTELLECTUAL HISTORY** 3  
Philosophical and political thought from English Romanticism and German Classicism through Existentialism. Readings from Hegel, Marx, Kierkegaard, Nietzsche and Thomas Mann.
- HIST 357 THE EUROPEAN CITY** 3  
The evolution of cities in European history, emphasizing the development of urban society and culture. Topics vary and may include London and Paris in the Modern Age, London in the Modern Age, Paris in the Modern Age.  
RESTRICTIONS: May be taught abroad. May be repeated for credit when taken on different city topics.
- HIST 358 RUSSIAN HISTORY: 1801-1917** 3  
Political, socioeconomic and cultural developments in Russia in the 19th century.
- HIST 359 SOVIET UNION: 1917-1990** 3  
Political, socioeconomic and cultural developments in the Soviet Union from 1917 to 1990.
- HIST 361 TWENTIETH CENTURY FRANCE** 3  
French political, social, and cultural history from the 1890s to the year 2000.
- HIST 362 EUROPEAN CULTURAL HISTORY, 1748-1889** 3  
Surveys both popular culture and elite culture from the Enlightenment to the centenary of the French Revolution. Subjects include revolutionary culture, Romanticism, realism, railroads, industry, popular pastimes, folklore, moral reform, national identity. Sources include literature, painting, music.

- HIST 363 EUROPEAN CULTURAL HISTORY SINCE 1889** 3  
Surveys both popular and elite culture since the construction of the Eiffel Tower. Subjects include modernism, consumer culture, mass culture, state subsidy, gender, postmodernism. Sources include literature, architecture, painting, music, cinema.
- HIST 366 INDEPENDENT STUDY** 1-6
- HIST 368 MODERN CHINA: 1600-1920's** 3  
The 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 the collapse of the ancient regime, the Republican revolution, warlordism and imperialism, rise of modern nationalism, Chiang Kai-shek and Mao Zedong, post-1949 China and the 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, the dilemma of progress and Japan's place in the modern world.
- HIST 371 POSTWAR JAPAN** 3  
Traces the emergence of contemporary Japan in its cultural and social spheres. Emphasis is on analysis of the historical significance of postwar Japanese culture. Investigations explore every day life as depicted in literature, film, journalism, memoirs and historical writings.
- HIST 372 POPULAR CULTURE IN URBAN JAPAN** 3  
Explores the theory and practice of popular culture as manifested in the history of urban Japan from the seventeenth to the 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, the emergence and victory of Irish nationalism and the historical roots and subsequent development of the 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 the 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 the roots and the historical complexity of the Arab-Israeli conflict. Topics include: the origins of Zionism, the nature of traditional Arab/Ottoman society in the 19th century, the relationship between the early Zionists and indigenous Arab population of Palestine, the creation of a Jewish society, the 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 the history of mutual views of Islam and Christianity/Judaism/the West from the Middle Ages to the present. Topics include medieval polemics, Enlightenment attempts at respect and understanding, the question of Orientalism, and the current specter of a clash of civilizations.
- HIST 382 HISTORY OF WESTERN MEDICINE** 3  
See CSCC382 for course description.
- HIST 389 THE AMERICAN WEST** 3  
Surveys the American West through the eyes of its diverse population as well as those who are 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 the history of Indians in the American Southwest from pre-European contact to the present. Approaches the subject from multiple disciplinary and cultural perspectives and focuses on the 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 the causes, courses and consequences of World War II. Topics include Western imperialism in Asia, Japanese militarism, occupation and resistance, the Allied counterattack, origins of the Cold War and the rise of nationalism and communism in occupied and affected areas.
- HIST 392 BUDDHISM AND POLITICS IN ASIA** 3  
Addresses the modern phenomenon of politically engaged Buddhism by introducing the 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 the Buddhist Peace Movement during the Vietnam War, Tibetan resistance to Chinese rule, the 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 the 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.  
RESTRICTIONS: Not open to freshmen.
- 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 the present to the past for factual historical analysis.
- HIST 395 PAN AFRICANISM** 3  
Traces the rise, development and varied expressions of the drive towards the liberation and unity of black people on the continent (Africa) and in the diaspora. Covers liberation struggles in Africa and the Civil Rights movement in the United States.  
May be cross-listed with BAMS395.
- HIST 397 HISTORY OF SOUTH AFRICA** 3  
Surveys the complex historical development of South African society. Topics include African resistance to white expansion, wars of resistance, the 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 20th Century America, The Nightmare Years: The U.S. 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 20th century Latin American revolutions, concentrating on the 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 the 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 the 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 the major developments, themes and problems in women's history in the Middle East from the advent of Islam to the 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 the process of women's roles in society and to challenge the 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 the United States National Archives and other depositories.  
PREREQ: HIST268.  
RESTRICTIONS: Majors only, or permission of instructor.
- HIST 454 VERNACULAR ARCHITECTURE** 3  
The study of traditional American folk architecture from the 17th century to the 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  
The process of urbanization in America with special emphasis on the 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 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 the 10th Century, Europe in the 11th 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, 20th Century China or Japan in the 20th Century.  
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: The 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 the 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 the 19th 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; Deportment, 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 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 MSST608.
- HIST 611 SEMINAR IN AMERICAN HISTORY** 3  
Topics vary. Recent topics include Jefferson and His Time, Women in 20th Century America, The Nightmare Years: The U.S. 1960-1980, American Religious History, and Conservatism in Recent America.
- HIST 614 THE AMERICAN SUBURB** 3  
See UAPP614 for course description.
- HIST 617 SEMINAR IN GENDER AND WOMEN'S HISTORY** 3  
Reading seminar. Topics vary and may include U.S. Women's History, U.S. Women's History in Comparative Perspective, Gender in History, or European Women's History.

- HIST 620 THE INVASION OF AMERICA** 3  
Reading seminar devoted to exploring the experiences of Native Americans in the present-day United States and Canada from the sixteenth century to the Indian Removal of the 1830s.
- HIST 621 SEMINAR ON AMERICAN SOCIETY AND CULTURE BEFORE THE REVOLUTION** 3  
Reading seminar in American society and culture from the first settlements to the Revolution.
- HIST 623 AGE OF THE AMERICAN REVOLUTION** 3  
Reading seminar on political and constitutional changes from 1760 to 1790 but also the social and cultural history of that period.
- HIST 625 UNITED STATES SOCIAL AND CULTURAL HISTORY: 1790-1860** 3  
Reading seminar on social and cultural change between 1790 and 1860, with emphasis on expansion of population into the West, sectionalism, the rise of urban and industrial revolutions, and reform.
- HIST 627 ANTEBELLUM AMERICA** 3  
Reading seminar on development of the modern political party system, the American presidency in transition, the transportation revolution, slavery, abolition reform and important changes in American society during the antebellum period.
- HIST 629 UNITED STATES SOCIAL AND CULTURAL HISTORY: 1850-1929** 3  
Reading seminar covering interpretive issues in social and cultural history. Topics covered include social class, social structure and social mobility; work and leisure; reform; and historical memory.
- HIST 630 TWENTIETH CENTURY LATIN AMERICAN REVOLUTIONS** 3  
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 is responsible for leading a discussion of several of the required readings.
- HIST 631 UNITED STATES POLITICAL, CULTURAL AND ECONOMIC HISTORY: 1929-PRESENT** 3  
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.
- HIST 632 MAKING THE AMERICAN CITY** 3  
See UAPP632 for course description.
- HIST 633 THE UNITED STATES IN THE TWENTIETH CENTURY** 3  
Reading seminar on 20th century U.S. history.
- HIST 635 THE EVOLUTION OF THE AMERICAN URBAN LANDSCAPE** 3  
See UAPP635 for course description.
- HIST 636 RESEARCH TOPICS IN HISTORIC PRESERVATION** 3  
See UAPP636 for course description.
- HIST 637 LAW AND SOCIETY IN HISTORICAL PERSPECTIVE** 3  
See SOCI637 for course description.
- HIST 640 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 the effect of Colonialism on Africa's economic, social and political development.
- HIST 646 CREATING EUROPEAN MODERNITY** 3  
The origins and spread of rapid, sustained economic growth since 1750.
- HIST 647 NON-WESTERN INDUSTRIALIZATION** 3  
Introduces the issues of political economy and the social and cultural dimension of industrialization from a global perspective. Examines a variety of theoretical and historiographical approaches to issues of development within the context of regional case studies focusing on Japan, Africa, China, Latin America, the Middle East and the Caribbean.
- HIST 650 POLITICAL ECONOMY OF THE MODERN UNITED STATES** 3  
A reading seminar introducing the fields and historiographies of U.S. business history, business-government relations planning and modern political economy, from the late 19th century to the present.
- HIST 652 SEMINAR IN HISTORIC PRESERVATION** 3  
See UAPP629 for course description.
- HIST 654 VERNACULAR ARCHITECTURE** 3  
Study of traditional American folk architecture from the 17th century to the 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 and/or UAPP654.
- HIST 657 HISTORICAL ARCHAEOLOGY AND MUSEUM INTERPRETATION** 3  
Introduction to the methods and practices of historical archaeological research from a museum perspective. Readings, demonstration techniques and field work.
- HIST 660 HUMANITIES COLLOQUIUM** 3
- HIST 663 HISTORICAL ARCHAEOLOGY AND THE PUBLIC** 3  
See ANTH663 for course description.
- HIST 671 STUDIES IN MEDIEVAL HISTORY** 3  
Topics vary. Topics may include: Europe in the 10th Century, Europe in the 11th Century, and Women in Europe to 1600.
- HIST 673 STUDIES IN EARLY MODERN EUROPEAN HISTORY** 3  
Topics vary. May include such topics as Renaissance Humanism; Women in Europe, 1100-1600; or Rome and Religion.
- HIST 674 STUDIES IN ENGLISH HISTORY** 3
- HIST 675 SEMINAR IN MODERN EUROPEAN HISTORY** 3  
Topics vary. May include topics such as The Holocaust, The Cold War or Hitler's Germany.
- HIST 677 STUDIES IN LATIN AMERICAN HISTORY** 3  
Topics may include history of Mexico, history of the Caribbean or slavery in the New World. Topics will vary.
- HIST 679 STUDIES IN ASIAN HISTORY** 3  
Topics vary. May include topics such as History of Southeast Asia, 20th Century China or Japan in the 20th Century.
- HIST 683 STUDIES IN COMPARATIVE HISTORY** 3  
Topics vary, but all compare some aspect of American history with European history or Western history with non-Western history.
- HIST 692 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.
- HIST 693 SEMINAR: PROBLEMS IN TEACHING HISTORY AND SOCIAL SCIENCE** 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 802 RESEARCH AND WRITING SEMINAR: EUROPEAN HISTORY** 3  
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.
- HIST 803 RESEARCH AND WRITING SEMINAR: AMERICA TO 1860** 3  
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.
- HIST 804 MUSEUM INTERNSHIP** 3  
See MSST804 for course description.
- HIST 805 RESEARCH AND WRITING SEMINAR: AMERICA 1860-PRESENT** 3  
Original research and writing on subjects in American history after 1860. Evaluation of sources, interpretation of evidence and presentation of research papers. Emphasis on professional standards of criticism.
- HIST 806 RESEARCH AND WRITING SEMINAR: HAGLEY LIBRARY AND ARCHIVES** 3  
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.
- HIST 868 RESEARCH** 1-9 PF
- HIST 869 MASTER'S THESIS** 1-6

**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 the 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 will be emphasized.

**HLPR 803 ADVANCED HEALTH PROMOTION PROGRAMMING AND EVALUATION 3**

Prepares the student with the skills for planning, developing, implementing and evaluating health promotion programs in a variety of settings and populations. Emphasis is placed on the behavioral, epidemiological and socio-ecological influences that impact programming and the skills required to evaluate a program.

PREREQ: HESC490

RESTRICTIONS: Open to graduate students only.

**HLPR 807 TOPICS AND ISSUES IN HEALTH PROMOTION 3**

Uses a seminar format and multidisciplinary approach to study current issues. Different faculty review issues from the viewpoint of their disciplines. Students participate in the selection of topics and are 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 a framework for the analysis of health-related behaviors across the lifespan. Emphasis is placed on the psychological and social determinants of health-related behaviors of individuals. Examines the roles of health professionals in facilitating behavior change.

RESTRICTIONS: Open to graduate students only.

**HLPR 819 SOCIAL MARKETING 3**

Application of marketing principles to health behavior change. Includes the 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 an overview of current models and theories of stress, a review of multidisciplinary approaches to the study of stress in applied settings, and a reading knowledge of selected research findings in the field of stress.

RESTRICTIONS: Open to graduate students only.

**HLPR 864 INTERNSHIP 3 PF**

Up to a maximum of 450 hours of fieldwork experience in a health promotion setting, completed along with a performance evaluation and term paper.

RESTRICTIONS: Open to graduate students only and successful completion of the qualifying examination.

**HLPR 868 RESEARCH 3 PF**

Affords an opportunity to apply information derived from the graduate program of study to a health promotion setting or specific population. Involves selecting, organizing, conducting and evaluating a project related to the field of health promotion.

RESTRICTIONS: Open to graduate students only and successful completion of the qualifying examination.

**HEALTH STUDIES****HLTH 495 HEALTH STUDIES PRACTICUM 6 PF**

Directed service learning experience in a health services setting.

RESTRICTIONS: Restricted to health studies majors. Open to seniors only.

**HOTEL RESTAURANT AND INSTITUTIONAL MANAGEMENT****HRIM 140 INFORMATION TECHNOLOGY AND SERVICES MANAGEMENT 3**

Overview of the service industry, its history, current status and future trends. Uses an integrated approach to the study of services, stressing the importance of understanding the underlining processes of service delivery and the way new technologies are 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 the supporting telecommunications and cable infrastructure needed to create data highways in today's hotels and retail operations, using workflow analysis to shape the flow of information.

**HRIM 180 INTRODUCTION TO HOSPITALITY 3**

Objectives within the industry, the 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 an overview of the information systems and technology applications used in the hospitality industry to support operations and management decision-making. Also covers hospitality specific software applications.

**HRIM 201 FOOD PRINCIPLES 2**

Examines the chemical and physical properties of food and its preparation. Includes the composition and structure of food, functional properties of ingredients, and methods to obtain desired sensory and nutritional qualities.

COREQ: HRIM211

**HRIM 211 FOOD PRINCIPLES LABORATORY 1**

Principles of food selection and preparation as related to the chemical and physical properties of food. Includes the composition and structure of food, functional properties of ingredients, and methods to obtain desired sensory and nutritional qualities.

COREQ: HRIM201

**HRIM 212 CLUB MANAGEMENT 3**

Provides an overview of elements unique to club management such as the 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 the scope and organization of the tourism industry, motivations for travel, and the management of micro and macro tourism resources. Economic, social, political and environmental impact of tourism are considered along with the issue of sustainable development within the 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 the catering function. Topics include: developing catering management systems; catering menu planning and design; on-premise versus off-premise catering management; and food production. Students 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, an in-depth study of wine, mixology, inventory control, and profitable beverage management.

**HRIM 219 QUALITY MANAGEMENT FOR THE HOSPITALITY INDUSTRY 3**

Examines the quality revolution in the hospitality industry. Control charts, Pareto charts, scatter diagrams, and other tools used in restructuring, re-engineering, and continuous quality improvement are explored. Integrates principles of customer quality focus and organizational behavior as they apply to the hospitality industry.

**HRIM 230 DECISION-MAKING SKILLS AND TECHNIQUES 3**

Examines the decision-making process, tasks and styles as well as factors that can complicate decision-making. Considers decision-making techniques and offers suggestions for building decision-making confidence.

<b>HRIM 238</b>	<b>ASSESSMENT AND EVALUATION IN SERVICE DELIVERY SYSTEMS</b>	<b>3</b>
Introduction to the research process as it applies to the evaluation of service delivery systems, including design, data collection, analysis, interpretation and reporting of findings. Special emphasis is placed on the development and use of service delivery evaluation instruments.		
<b>HRIM 280</b>	<b>PROPERTY MANAGEMENT</b>	<b>3</b>
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.		
<b>HRIM 313</b>	<b>PRINCIPLES OF GAMING MANAGEMENT</b>	<b>3</b>
An overview of gaming management and how it relates to hospitality management. Topics include a history of gaming in the U.S., social and legal aspects, licensing, organization, credit issues, marketing and Title 31 of the Bank Security Act.		
<b>HRIM 314</b>	<b>HOSPITALITY ENTREPRENEURSHIP AND VENTURE CREATION</b>	<b>3</b>
Provides an 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.		
<b>HRIM 316</b>	<b>CROSS CULTURAL ETIQUETTE AND PROTOCOL</b>	<b>3</b>
Introduces students to a 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 the hospitality industry are also discussed.		
<b>HRIM 320</b>	<b>HOTEL, RESTAURANT AND GENERAL FOOD SERVICE PURCHASING</b>	<b>3</b>
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.		
<b>HRIM 321</b>	<b>QUANTITY FOOD SERVICE MANAGEMENT</b>	<b>2</b>
Principles of quantity food service management with an 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		
<b>HRIM 322</b>	<b>RETAIL DESIGN AND CONSUMER BEHAVIOR</b>	<b>3</b>
See CNST322 for course description.		
<b>HRIM 325</b>	<b>LABORATORY IN QUANTITY FOOD SERVICE MANAGEMENT</b>	<b>2</b>
Laboratory experience in quantity food production, service and management. Applications in safety, sanitation, technical operations and quality and cost controls in a quantity food service environment. PREREQ: HRIM201 and HRIM211 COREQ: HRIM321		
<b>HRIM 327</b>	<b>PROPERTY ENGINEERING</b>	<b>3</b>
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.		
<b>HRIM 330</b>	<b>INTERNATIONAL HOSPITALITY OPERATIONS</b>	<b>3-5</b>
Develops an understanding of how hotels, food service operations and tourism attractions function outside of the United States, with a particular emphasis on Europe. Focuses on the cultural, political, environmental, geographic and economic factors critical to successful international hospitality operations.		
<b>HRIM 335</b>	<b>HOSPITALITY FACILITY DESIGN</b>	<b>3</b>
Explores the architectural design process, including both aesthetic and functional design, as it relates to hospitality venues such as restaurants, hotels, commercial kitchens and resorts. Examines the impact of codes, construction costs and environmental parameters that affect hospitality construction.		
<b>HRIM 346</b>	<b>HOSPITALITY INDUSTRY WEB-BASED MARKETING</b>	<b>3</b>
Provides the information necessary to understand the world of online service industry marketing. Through the use of case studies and examples, students learn how to manage the design, implementation and evaluation of web-based marketing programs.		
<b>HRIM 366</b>	<b>INDEPENDENT STUDY</b>	<b>1-6</b>
<b>HRIM 380</b>	<b>MANAGEMENT OF LODGING OPERATIONS</b>	<b>3</b>
Management of front desk, housekeeping, maintenance, security and conference operations.		
<b>HRIM 381</b>	<b>MANAGEMENT OF FOOD AND BEVERAGE OPERATIONS</b>	<b>3</b>
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		
<b>HRIM 382</b>	<b>MANAGERIAL ACCOUNTING AND FINANCE IN THE HOSPITALITY INDUSTRY</b>	<b>3</b>
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.		
<b>HRIM 425</b>	<b>HISTORIC ROADSIDE ARCHITECTURE</b>	<b>3</b>
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 will be discussed as they relate to travel and tourism.		
<b>HRIM 442</b>	<b>HOSPITALITY COMPUTER-BASED EDUCATION</b>	<b>3</b>
Introduction to the use of computer-based education and training in the 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 the concept of just-in-time training.		
<b>HRIM 448</b>	<b>DATA MINING ANALYSIS IN THE HOSPITALITY INDUSTRY</b>	<b>3</b>
Focuses on the collection of data in hospitality systems environments into an accessible warehouse, and mining (or organizing) the data into a management information system. Multi-unit consolidations using traditional polling techniques and innovative web-based consolidations are the key to organization of data into an up-to-date and accurate source of management information for analysis.		
<b>HRIM 450</b>	<b>MANAGING HOSPITALITY INFORMATION SYSTEMS</b>	<b>3</b>
Takes a life cycle approach to understanding hospitality industry information systems and includes a study of issues considered in the analysis, design and implementation of information systems in hospitality operations. PREREQ: HRIM187 or ACCT160.		
<b>HRIM 466</b>	<b>INDEPENDENT STUDY</b>	<b>1-6</b>
<b>HRIM 480</b>	<b>HUMAN RESOURCES MANAGEMENT IN THE HOSPITALITY INDUSTRY</b>	<b>3</b>
Techniques and philosophies of personnel management as applied to various types of hospitality operations. Motivation, attitude formation and job satisfaction. Case studies related to theories of organizational behavior and industrial psychology.		
<b>HRIM 481</b>	<b>MARKETING IN THE HOSPITALITY INDUSTRY</b>	<b>3</b>
Application of marketing principles in hotel, restaurant and institutional management settings. Development of marketing strategies in both profit and non-profit hospitality operations.		
<b>HRIM 482</b>	<b>LAW OF INNKEEPING</b>	<b>3</b>
Introduction to the laws relating to hotel, restaurant and institutional operations.		
<b>HRIM 487</b>	<b>MANAGEMENT SYSTEMS IN THE HOSPITALITY INDUSTRY</b>	<b>3</b>
Principles of systems analysis applied to the hospitality industry. Organization of the operation and subsystems of a property. Case studies and simulations apply economic and management principles.		
<b>HRIM 488</b>	<b>HOTEL, RESTAURANT AND INSTITUTIONAL MANAGEMENT PRACTICUM I</b>	<b>1-4</b>
Structured experience in a hospitality industry environment. At least 40 hours per credit hour in planned activities associated with the management and operation of a subsystem of a hospitality property. RESTRICTIONS: Requires proof of 800 hours paid work experience in the food service and lodging industry.		
<b>HRIM 489</b>	<b>HOTEL, RESTAURANT AND INSTITUTIONAL MANAGEMENT PRACTICUM II</b>	<b>1-6</b>
Structured experience in a hospitality industry environment. At least 40 hours per credit hour in planned activities associated with the management and operation of a hospitality property. PREREQ: HRIM321, HRIM325 and HRIM488		
<b>HRIM 601</b>	<b>ADVANCED HOSPITALITY AND TOURISM PRODUCT MANAGEMENT</b>	<b>3</b>
Reviews different types, styles and quality of hospitality and tourism products. Examines product management including branding, product lifecycles, positioning and packaging. Includes the latest trends in product development and theoretical and practical issues related to multi-unit operations.		

**HRIM 602 INTERNATIONAL HOSPITALITY AND SERVICE MANAGEMENT 3**

Provides an understanding of the service delivery system, its concepts, principles and theories. The mechanics of identifying and setting organizational vision and service standards and the impact of technology on service delivery are covered.  
PREREQ: HRIM601.

**HRIM 603 STRATEGIC HOSPITALITY MANAGEMENT 3**

Provides a comprehensive understanding of strategic management concepts and competitive strategy as applied to the hospitality industries. Examines co-alignment of environmental scanning, strategy and structure of the hospitality service firm.

**HRIM 604 HOSPITALITY FINANCIAL MANAGEMENT ISSUES 3**

Examines both managerial accounting and financial management as they are practiced in the hospitality industry. Applies principles of finance and accounting to decision-making in the 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 the hospitality industry, including systems, networking, databases, telecommunications, the internet and e-commerce.  
PREREQ: HRIM601.

**HRIM 642 HOSPITALITY COMPUTER BASED TRAINING 3**

A project management approach to the development and implementation of computer-based training in the hospitality industry. Focuses on understanding project management concepts and techniques and applying them to the creation of interactive technology-based training.  
PREREQ: HRIM601

**HRIM 648 DATA-MINING ANALYSIS IN THE HOSPITALITY INDUSTRY 3**

Considers the collection of data in hospitality systems environments and ways to mine (or organize) the data into a management information system. Focuses on creating and organizing a data warehouse based on understanding customer relationship management  
PREREQ: HRIM602

**HRIM 664 HOSPITALITY TECHNOLOGY INTERNSHIP 3**

Supervised technology-related work experience with a hospitality business or related organization.

**HRIM 668 INDUSTRY PROJECT 3**

Provides the opportunity to research, design and/or develop the solution to a real-world hospitality technology-related problem or issue

**HRIM 687 MANAGEMENT SYSTEMS IN THE HOSPITALITY INDUSTRY 3**

Examines issues surrounding the implementation of information technology in supporting hospitality operations from a guest service perspective and decision making from the viewpoint of management. Case studies and review of various software utilized to understand the various subsystems in a hospitality property.  
PREREQ: HRIM601.

**HEALTH SERVICES ADMINISTRATION****HSAD 604 ADVANCED PRACTICE ROLES FOR HEALTHCARE PROVIDERS 3**

See NURS604 for course description.  
RESTRICTIONS: Permission required from department

**HSAD 619 FINANCIAL MANAGEMENT IN HEALTH SERVICES ORGANIZATIONS 3**

See NURS619 for course description.  
RESTRICTIONS: Permission of department required.

**HSAD 635 HEALTH ADMINISTRATION THEORIES 3**

See NURS635 for course description  
RESTRICTIONS: NURS604 required as prerequisite or corequisite.

**HSAD 637 HEALTH PLANNING STRATEGIES 3**

See NURS637 for course description.  
RESTRICTIONS: NURS604 required as prerequisite or corequisite.

**HSAD 638 HEALTH SERVICES EVALUATION 3**

See NURS638 for course description.  
RESTRICTIONS: NURS604 required as prerequisite or corequisite

**HSAD 664 HEALTH SERVICES ADMINISTRATION PRACTICUM 1-3**

In conjunction with his/her faculty advisor and based on the student's individualized long range goals, the student selects a preceptor and healthcare setting in which to apply didactic contact in real life settings. Requires 135 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 a problem in clinical settings related to finance, administration, personnel management, public policy or education, resulting in completion of a scholarly project  
PREREQ: Research and statistics and any two of the following: HSAD836, HSAD837, HSAD838  
COREQ: HSAD864.

**HSAD 890 COLLOQUIUM 0 PF**

See NURS890 for course description.

**INDIVIDUAL AND FAMILY STUDIES****IFST 101 HUMAN SERVICES AND CULTURAL COMPETENCE 1**

Provides an overview of human services and approaches to culturally competent practices; critical perspectives regarding diversity, society, race, class, gender and social policy are discussed

**IFST 165 SEMINAR 1 PF****IFST 201 LIFE SPAN DEVELOPMENT 3**

Exploration and understanding of the social, emotional, cognitive and physical development of the individual from infancy through old age in the context of the family.

**IFST 202 FOUNDATIONS OF FAMILY STUDIES 3**

Examination of diverse families in the United States with an emphasis on issues of race, ethnicity, class, and gender. Emphasis on the effects of multiculturalism and social change

**IFST 210 INTRODUCTION TO CARING FOR YOUNG CHILDREN 3**

Introduction of the core competencies needed in early care and education. Topics include a basic orientation to child development; understanding children's behavior; developmental curriculum; family issues; health, safety, and nutrition; and professional issues

**IFST 221 CHILD DEVELOPMENT 3**

The study of social-emotional, cognitive and psycho-biological development in infancy, early and middle childhood. Emphasis on the child's development as it occurs in the family context. Directed observation in the University's Laboratory Preschool

**IFST 222 EARLY CHILDHOOD CURRICULUM I 2**

Principles underlying values in and guidance of young children's play, creative activities and curriculum content. Selection and use of appropriate materials, with emphasis on preschool and kindergarten settings  
PREREQ: IFST221  
COREQ: IFST224

**IFST 224 EARLY CHILDHOOD CURRICULUM I: PRACTICUM 2**

Three-hour weekly practicum experience with a one-hour weekly discussion section. Gives students a realistic exposure to working with young children, with emphasis on preschool and kindergarten settings  
PREREQ: IFST221  
COREQ: IFST222.

**IFST 230 FAMILIES AND THEIR COMMUNITIES 3**

Discusses the community context of family life, and the interface of family with school, community and work settings. Community development, social capital, collaboration, family and community asset building, and opportunity structure analysis approaches are presented.

**IFST 235 SURVEY IN CHILD AND FAMILY SERVICES 3**

Introduces the scope of human service agencies focusing on the needs of children and families  
PREREQ: IFST101.

**IFST 236 INFANTS AND TODDLERS: DEVELOPMENT AND PROGRAMS 3**

Study of the infant and toddler with emphasis on interrelated growth patterns and processes, appropriate curriculum and stimulation, and the effects of prenatal and perinatal conditions on future development.  
PREREQ: IFST221.



- IFST 270 FAMILIES AND DEVELOPMENTAL DISABILITIES 3**  
Focuses on people with developmental disabilities in the context of their family and culture from a multidisciplinary perspective. Covers disabilities and their causes; changing needs across the lifespan, gender, cross-cultural and legal issues; and information about prevention/intervention, employment, inclusion, and empowerment.  
May be cross-listed with PSYC270 and/or SOC1270.
- IFST 275 HUMAN DEVELOPMENT THROUGH THE ARTS 3**  
Introduction to issues in Individual and Family Studies as viewed through literature, film and other media. Specific genre will vary. Content matched with current and/or classic readings from social sciences. Life span perspective.
- IFST 293 HONORS SHORT COURSE 1**  
See ARSC293 for course description.
- IFST 310 PARENTING THROUGH THE LIFESPAN 3**  
Applied focus on parenting styles, roles, issues and goals through the lifespan. Parent diversity, interfaces with schools and community, resources, theoretical perspectives and developmental needs of children and parents are examined.  
PREREQ: IFST201 or PSYC350.
- IFST 328 INTRODUCTION TO THE RESEARCH PROCESS 3**  
Exposure to the research process through attending and critiquing research presentations, reading and reviewing scholarly papers, and development of a variety of research skills, such as instrument design, coding and data entry. Students' work will contribute to the development of a professional portfolio.  
PREREQ: IFST201 and IFST202.
- IFST 329 ADOLESCENT DEVELOPMENT 3**  
Physical, intellectual and social-emotional development of adolescents and youth in the context of the family, peer groups and the community. Emphasis on theories, current research and the transition from adolescence to young adulthood.  
PREREQ: EDUC202 or IFST201.
- IFST 330 HELPING RELATIONSHIPS 1 PF**  
Introduction to the core dimensions of counseling and helping relationships: empathy, respect, genuineness and concreteness. Practice in communicating those levels of the core dimensions that are facilitative to interpersonal functioning.
- 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 the psychology of the individual, relationship skills, conflict management and intimacy.
- IFST 334 EXPERIENTIAL EDUCATION 3**  
Field experience combined with a seminar emphasizing professional issues in human services, including portfolio development and career planning.  
PREREQ: IFST101.  
RESTRICTIONS: FCS majors only.
- IFST 338 SEXUALITY IN CONTEMPORARY SOCIETY 3**  
A multidisciplinary approach to controversial human sexuality issues which examines and addresses societal solutions to these controversies.
- IFST 339 ADULT DEVELOPMENT AND AGING 3**  
Examines developmental processes, lifespan changes, transitions and stage-related issues of early, middle and late adult life. Explores concepts, theories, historical trends and empirical studies during these life periods; integrates theories with practical applications.  
PREREQ: EDUC202 or IFST201.
- IFST 340 EARLY CHILDHOOD CURRICULUM II 3**  
History, research and practical issues in the organization and operation of early childhood programs with emphasis on preschool and kindergarten settings; integrating and adapting the curriculum, facilities, equipment and instructional strategies to the needs of young children. Includes field experience.  
PREREQ: IFST222 and IFST224.
- IFST 346 DELIVERY OF HUMAN SERVICES 3**  
Presents approaches to interviewing and working with individuals and families in a 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 the development, delivery and evaluation of a wide range of human service programs including preventive interventions for families and individuals.  
PREREQ: IFST235 and IFST334 or permission of instructor.
- IFST 350 TECHNOLOGY IN EARLY CHILDHOOD 3**  
Developmentally appropriate uses of technology in early childhood and early childhood special education. Operation of computers and adaptive devices, evaluation of software and curriculum development. Includes a practicum using technology in appropriate environments.  
PREREQ: IFST222 and IFST224.
- IFST 355 PROFESSIONAL ISSUES IN EARLY CHILDHOOD DEVELOPMENT AND EDUCATION 3**  
Overview and analysis of issues for professionals serving children birth to age eight 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: IFST340.
- 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 the Individual and Family Studies content; often multidisciplinary.  
May be cross-listed with WOMS390.
- IFST 401 FOUNDATIONS OF HUMAN SEXUALITY 3**  
A multidisciplinary study of human sexuality focusing on the implications for individuals and society of the 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 an historical overview of family and child policy in the United States, including policies toward children and families in poverty. The role of the economy, politics, race, class, gender, legal and advocacy issues are discussed.  
PREREQ: IFST235 and IFST202.
- IFST 403 CONCEPTS IN GERONTOLOGY 3**  
Theories and practices of gerontology with emphasis on their relationships to the elderly and their needs for the 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. A major focus is on kinship and caregiving by family and decision making in selecting respite and institutional care when elders develop cognitive and physical disabilities.
- IFST 410 THE HOSPITALIZED CHILD 3**  
The psychosocial needs of pediatric patients and their caregivers are examined. Emphasis on coping, preparation, medical terminology, play, assessment and family-centered care. Implications for nursing care, child life specialists, pre-medical students and others working with the pediatric population are studied.  
PREREQ: IFST221 or PSYC325.
- IFST 422 FAMILY RELATIONSHIPS 3**  
Interpersonal relationships and problems in courtship, marriage and the family in contemporary society.  
PREREQ: IFST202.
- IFST 428 EDUCATIONAL RESEARCH AND ISSUES IN HUMAN RESOURCES 3**  
Introduction to the research process through study of a problem identified by analysis of clinical experiences; an in-depth examination of selected current educational concerns.  
RESTRICTIONS: Requires permission of instructor.

<b>IFST 430</b>	<b>FAMILY LIFE EDUCATION</b>	<b>3</b>	Investigates curriculum and instructional strategies for use in support, prevention and empowerment-based programs across the lifespan. May be cross-listed with WOMS430. PREREQ: IFST201 or IFST202.
<b>IFST 435</b>	<b>EARLY CHILDHOOD PROGRAMS FOR CHILDREN WITH EXCEPTIONALITIES</b>	<b>4</b>	Philosophy, organization and operation of programs for young children with exceptionalities; development and adaptation of curriculum, materials, facilities and equipment. Clinical experience with children and programs. PREREQ: EDUC230 and IFST340.
<b>IFST 438</b>	<b>LEADERSHIP DEVELOPMENT IN HUMAN SEXUALITY</b>	<b>3</b>	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.
<b>IFST 440</b>	<b>EARLY CHILDHOOD ADMINISTRATION, LEADERSHIP AND ADVOCACY</b>	<b>3</b>	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.
<b>IFST 445</b>	<b>FAMILY, COMMUNITY AND SCHOOL PARTNERSHIPS</b>	<b>2</b>	Emphasis on techniques in working and communicating with families, understanding parent-child relationships and effectively utilizing parent, teacher, home, school and community resources. PREREQ: IFST101. COREQ: IFST459 or EDUC400.
<b>IFST 449</b>	<b>INTERNSHIP IN FAMILY AND COMMUNITY SERVICES</b>	<b>3-10 PF</b>	On-the-job experience in a community and family service agency. RESTRICTIONS: Requires permission of instructor.
<b>IFST 452</b>	<b>ASSESSMENT OF YOUNG CHILDREN</b>	<b>3</b>	Focuses upon the issues in, and techniques of the assessment of physical, socio-emotional, behavioral and cognitive-intellectual development in children. Secondary emphasis on evaluation of test results; written reports, research in assessment and an analysis of remediation/teaching strategies. May be cross-listed with PSYC460. PREREQ: IFST221 or PSYC325.
<b>IFST 459</b>	<b>CHILD DEVELOPMENT PRACTICUM</b>	<b>1-9 PF</b>	Supervised student teaching experience. PREREQ: IFST435, IFST452 and IFST470. RESTRICTIONS: Requires permission of instructor.
<b>IFST 460</b>	<b>WOMEN IN INTERNATIONAL DEVELOPMENT</b>	<b>3</b>	See SOCI460 for course description.
<b>IFST 463</b>	<b>ATYPICAL INFANT AND TODDLER</b>	<b>3</b>	Sensory, motor, affective and psychosocial development in infancy and toddlerhood. Observation and participation with infants. Early diagnosis, assessment and treatment strategies for disabilities of the infant and toddler period. PREREQ: IFST221 and IFST236.
<b>IFST 465</b>	<b>SEMINAR</b>	<b>1-3</b>	Discusses professional issues in the delivery of human services. COREQ: IFST449.
<b>IFST 466</b>	<b>INDEPENDENT STUDY</b>	<b>1-12</b>	
<b>IFST 470</b>	<b>FAMILIES AND CHILDREN AT RISK</b>	<b>3</b>	Deals with social-emotional considerations of disabilities and risk factors upon the development of children and families over the life course. Includes information on family assessment and systems, changing demographics and at-risk families. Includes some clinical counseling skills. PREREQ: IFST201 or IFST221 or PSYC325.
<b>IFST 475</b>	<b>TOPICS IN INDIVIDUAL AND FAMILY STUDIES</b>	<b>1-3</b>	Selected topics focusing on current issues affecting families from an interdisciplinary and global perspective. RESTRICTIONS: Prerequisites vary by topic and instructor.
<b>IFST 480</b>	<b>INDIVIDUAL AND FAMILY STUDIES SENIOR SEMINAR</b>	<b>1-3</b>	Discussion-oriented and problem-centered with emphasis on the role and contributions of the individual to the profession and society.
<b>IFST 490</b>	<b>INSTRUCTIONAL METHODS IN FAMILY AND CONSUMER SCIENCES</b>	<b>3</b>	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.
<b>IFST 491</b>	<b>CURRICULUM AND ASSESSMENT IN FAMILY AND CONSUMER SCIENCES</b>	<b>3</b>	Foundations of curriculum development and evaluation as applied to Family and Consumer Sciences secondary classrooms and community settings. School practicum required. PREREQ: IFST490.
<b>IFST 601</b>	<b>THEORIES OF HUMAN DEVELOPMENT</b>	<b>3</b>	Overview and analysis of classic and contemporary theoretical approaches in human development. Special emphasis on research and theory concerning families as contexts of development.
<b>IFST 603</b>	<b>HUMAN DEVELOPMENT IN LIFE SPAN PERSPECTIVE</b>	<b>3</b>	Systematic survey of developmental domains across the life span. Topical emphasis on multidisciplinary research findings chronicling continuities and discontinuities in individual's status and functioning in physical growth, perception, cognition, language, attachment, personality development, gender and sexuality. PREREQ: IFST601 or permission of instructor.
<b>IFST 604</b>	<b>INTERDISCIPLINARY GERONTOLOGY</b>	<b>3</b>	Considers theoretical and practical approaches to the dimensions of aging. Emphasis on the provisions of material and human resources to meet the basic needs of food, shelter, clothing and income adequacy. Relevant community programs and government services studied.
<b>IFST 605</b>	<b>IMPACT OF AGING ON THE FAMILY</b>	<b>3</b>	Psychological, physical and financial impact of aging persons on younger family members; increased dependence; family adjustment, both positive and conflicting.
<b>IFST 606</b>	<b>SKILLS DEVELOPMENT IN INDIVIDUAL AND FAMILY STUDIES</b>	<b>3</b>	Application of theories and concepts necessary to specific skills and techniques central to working within the student's field of specialization.
<b>IFST 607</b>	<b>SEMINAR IN COMMUNITY DEVELOPMENT AND NONPROFIT LEADERSHIP</b>	<b>1</b>	See UAPP607 for course description.
<b>IFST 608</b>	<b>POVERTY, NEIGHBORHOODS AND COMMUNITY DEVELOPMENT</b>	<b>3</b>	See UAPP608 for course description.
<b>IFST 610</b>	<b>THE HOSPITALIZED CHILD</b>	<b>3</b>	Organization and administration of programs for hospitalized children with emphasis on emotional needs of the children and their parents. Includes terminology and hospital procedures, directed observation and participation in a hospital setting.
<b>IFST 614</b>	<b>EVALUATION PRACTICES</b>	<b>3</b>	Techniques and methods for assessing professional growth of adults as well as performances and learning of adolescents and special clientele; differentiates evaluation and measurement; explores current issues in evaluation.
<b>IFST 615</b>	<b>RESEARCH METHODS</b>	<b>3</b>	Evaluation of existing research reports, articles and monographs, development of data collection techniques, analysis and presentation of data pertaining to child, family and community populations, elements of statistical analysis, evaluation and selection of research designs, preparation of a research project proposal.
<b>IFST 621</b>	<b>FAMILY STUDIES I: EMPIRICAL AND THEORETICAL PERSPECTIVES</b>	<b>3</b>	Examines basic theories in family studies and trends affecting families at the macro level. Includes a survey of the empirical base of the field and covers issues relating to the interface of the family and society and trends in prevention, intervention, education and therapy.
<b>IFST 623</b>	<b>APPLIED HUMAN DEVELOPMENT IN THE SCHOOLS</b>	<b>3</b>	See EDUC623 for course description.
<b>IFST 630</b>	<b>FAMILY LIFE EDUCATION</b>	<b>3</b>	Teaching methods to address family life education and issues in formal educational and community settings and designing quality curricula and pedagogy for support, prevention and empowerment-based experiences.
<b>IFST 637</b>	<b>PROGRAM PLANNING, ASSESSMENT AND EVALUATION</b>	<b>3</b>	Methods of program planning, summative and formative evaluation and assessment including models, rationales and evaluation techniques as they relate to individual classrooms, educational programs and community settings.

<b>IFST 638</b>	<b>ADOLESCENCE AND YOUTH: THEORIES</b>	<b>3</b>	<b>IFST 668</b>	<b>RESEARCH</b>	<b>1-6</b>
A critical review of the theories pertaining to personal, physical and socio-emotional development of the periods from early adolescence through youth by an examination of significant research.					
<b>IFST 639</b>	<b>CURRICULUM METHODS AND ASSESSMENT</b>	<b>3</b>	<b>IFST 669</b>	<b>SUPERVISED FIELD EXPERIENCE AND STUDY</b>	<b>1-12</b>
Curriculum, instruction and methods of accountability as they relate to educational programs in community and family service agencies. Includes curriculum development, assessment and developmentally appropriate practices with emphasis on integrating language and literacy, social science, mathematics, science and the arts			Supervised work with children, adults and/or families in educational and/or community settings. RESTRICTIONS: Credit may be distributed over more than one semester.		
<b>IFST 640</b>	<b>EARLY CHILDHOOD ADMINISTRATION, LEADERSHIP AND ADVOCACY</b>	<b>3</b>	<b>IFST 670</b>	<b>FAMILY RISK AND RESILIENCY</b>	<b>3</b>
Organization, administration and evaluation of early childhood education programs including personnel, facilities, regulations, educational programming, curriculum, management and development. Includes strategies for leadership, professional development and advocacy.			Applied focus on situations which place families at risk across the life span such as poverty, disability, stressors and family dissolution. An examination of family strengths, cultural diversity and techniques for working with families across the life course in community based settings including classrooms, programs, and agencies		
<b>IFST 641</b>	<b>INFANT DEVELOPMENT AND STIMULATION</b>	<b>3-6</b>	<b>IFST 680</b>	<b>PROFESSIONAL SEMINAR IN COUNSELING AND STUDENT AFFAIRS</b>	<b>3</b>
Cognitive, social, emotional and motor development from conception to two years, with implications for home and group care. Concurrent observation of infants required			Introduction to the history, philosophy, roles, organizational structure, professional ethics, professional standards in research, and counseling and student affairs practice in higher education RESTRICTIONS: Open only to majors in counselor education		
<b>IFST 642</b>	<b>LEADERSHIP IN HUMAN SERVICES</b>	<b>3</b>	<b>IFST 681</b>	<b>CAREER DEVELOPMENT: THEORIES AND PRACTICE</b>	<b>3</b>
Examination of how leaders influence and control the direction and effectiveness of human service agencies and institutions. Focuses on trends, issues, theories and research on leadership with emphasis on the unique concerns of women.			Review of the major career development theories as used in the counseling professions. Emphasis on analyzing the world of work and the use of occupational and educational resources. RESTRICTIONS: Open only to majors in counselor education and school counseling.		
<b>IFST 645</b>	<b>PROGRAMMING FOR YOUNG CHILDREN WITH SPECIAL NEEDS</b>	<b>3</b>	<b>IFST 682</b>	<b>STUDENT DEVELOPMENT IN HIGHER EDUCATION</b>	<b>3</b>
Theories, philosophies, organization and evaluation of programs, both mainstreamed and self-contained for young exceptional children. Emphasis on the multidimensional role of teachers. Focuses on working with parents individually and in groups and on child advocacy.			Studies of development in motivation and personality trends in late adolescence and adulthood in the context of higher education institutions. Designed for college counselors and student personnel administrators who deal with student development and institutional impact interactions RESTRICTIONS: Open only to majors in counselor education.		
<b>IFST 650</b>	<b>COMPUTERS IN EARLY CHILDHOOD</b>	<b>3</b>	<b>IFST 683</b>	<b>SEMINAR IN HIGHER EDUCATION ADMINISTRATION</b>	<b>3</b>
Integration of microcomputers into the early childhood, developmental curriculum. Considers theoretical rationale, operation of computers, selection of software and curriculum development. Includes a practicum with young children using microcomputers. PREREQ: Early childhood course work RESTRICTIONS: Early childhood experience acceptable in lieu of prerequisites.			Overview of administrative and management issues faced by leaders in higher education.		
<b>IFST 651</b>	<b>ADVANCED CHILD DEVELOPMENT</b>	<b>3</b>	<b>IFST 684</b>	<b>THEORIES OF COUNSELING</b>	<b>3</b>
Theoretical approaches in psychosocial development in children; and influences on development of self-concept, sex-role behavior, moral development and prejudice.			Theories and techniques used in counseling individuals with personal, social, vocational and educational problems RESTRICTIONS: Open only to majors in counselor education and school counseling		
<b>IFST 655</b>	<b>MEASUREMENT TECHNIQUES FOR CHILDREN AND FAMILIES</b>	<b>3</b>	<b>IFST 685</b>	<b>MULTICULTURAL ISSUES IN COUNSELING</b>	<b>3</b>
Construction and analysis of developmental ratings, behavioral coding procedures, interviews, questionnaires, tests and sociometric measures. appropriate for studying the behavioral development of children and families through the life cycle.			Examines the influence of cultural background, including ethnicity, gender, sexual orientation, socio-economic factors, religious preference and age in the counseling relationship. Introduction to nontraditional theories and techniques useful with special populations. Emphasis on increased sensitivity toward cultural influences. RESTRICTIONS: Open only to majors in counselor education and school counseling.		
<b>IFST 656</b>	<b>SUPERVISION: FUNCTIONS AND TECHNIQUES</b>	<b>3</b>	<b>IFST 686</b>	<b>ASSESSMENT IN COUNSELING</b>	<b>3</b>
Foundations and principles of effective supervision, methods of mentoring, team participation and use of a consultation model in educational settings and family agencies. Focuses on commonalities of skills, techniques and training needed to develop competent, reflective practitioners. May include field supervision			Basic concepts in the use of assessment techniques in the counseling of college students. Selection and interpretation of commonly used instruments. Strategies related to other appraisal methods in counseling RESTRICTIONS: Open only to majors in counselor education		
<b>IFST 658</b>	<b>READINGS IN INDIVIDUAL AND FAMILY STUDIES</b>	<b>3</b>	<b>IFST 687</b>	<b>PRACTICUM IN COLLEGE COUNSELING</b>	<b>3</b>
Emphasis on either infancy, early and/or middle childhood, adolescence, adulthood, gerontology and/or specialized topics in family studies. Emphasis may vary by semester.			Closely supervised counseling experience with college students in the areas of educational, vocational and personal problems. Also includes a two-hour weekly seminar in problems of counseling. RESTRICTIONS: Open only to majors in counselor education		
<b>IFST 660</b>	<b>TEACHING OF LIFE SPAN DEVELOPMENT</b>	<b>3</b>	<b>IFST 688</b>	<b>THE LAW AND STUDENT AFFAIRS</b>	<b>3</b>
Strategies and techniques for effective teaching of life span development at the post-secondary level, including observation, teaching opportunities and mentorships with faculty.			Legal issues which affect the student affairs practitioner in higher education. Review of federal statutes, court rulings and contract law as applied to administrative rules, legal rights of students and institutional liabilities.		
<b>IFST 662</b>	<b>CURRICULUM ANALYSIS IN EARLY CHILDHOOD</b>	<b>3</b>	<b>IFST 689</b>	<b>THE AMERICAN COLLEGE STUDENT</b>	<b>3</b>
Examination and evaluation of curriculum in early childhood including theoretical analysis of pedagogy, curriculum content and child outcomes.			Survey of the attitudes, values and demographic characteristics of American college students. Examines theories of person-environment interaction and methodologies for identifying student needs and assessing developmental change		
<b>IFST 663</b>	<b>ATYPICAL INFANT</b>	<b>3</b>	<b>IFST 690</b>	<b>SPECIAL ISSUES IN COUNSELING WOMEN</b>	<b>3</b>
Sensory, motor and psychosocial development in infancy. Observation and participation with infants. Early diagnosis and assessment of developmental disabilities.			Examines traditional, non-sexist and feminist approaches used to counsel women. Through readings, discussions, presentations and films, students learn about issues particularly relevant to women. Topics may include women and depression, self-esteem, anger, eating disorders, abuse, careers and dependency. RESTRICTIONS: Open to graduate students only		
<b>IFST 665</b>	<b>SEMINAR</b>	<b>1-6</b>			

<b>IFST 691</b>	<b>GROUP COUNSELING</b>	<b>3</b>
Examination of group work and group counseling in higher education as well as primary and secondary school settings. Emphasis on theoretical foundation of group work and group skills training. RESTRICTIONS: Open only to majors in counselor education and school counseling.		
<b>IFST 692</b>	<b>STUDENT PERSONNEL MANAGEMENT</b>	<b>3</b>
Study of the theories and principles of management in student affairs practice in higher education. Managerial, leadership, program development, supervising and organizational issues involved in professional practice.		
<b>IFST 693</b>	<b>GROUP DYNAMICS</b>	<b>3</b>
Theory, strategies and skills needed to work effectively with groups. Emphasis on understanding and managing the factors that affect group facilitation and leadership.		
<b>IFST 694</b>	<b>INTERNSHIP</b>	<b>3</b>
Supervised experiences in counseling or student affairs practice in higher education. Minimum of 240 clock hours of direct service time. RESTRICTIONS: Open only to majors in counselor education.		
<b>IFST 803</b>	<b>HUMAN DEVELOPMENT IN LIFE SPAN PERSPECTIVE</b>	<b>3</b>
Systematic survey of developmental domains across the life span. Topical emphasis on multidisciplinary research findings chronicling continuities and discontinuities in individuals' status and functioning in physical growth, perception, cognition, language, attachment, personality development, gender and sexuality. PREREQ: IFST601 or permission of instructor.		
<b>IFST 815</b>	<b>RESEARCH ISSUES AND DESIGNS</b>	<b>3</b>
Examination of issues in design, sampling, measurement and analysis techniques applicable to research in family studies. PREREQ: One graduate-level methods and design course.		
<b>IFST 823</b>	<b>PROSEMINAR: SOCIAL AND URBAN POLICY</b>	<b>3</b>
See UAPP823 for course description.		
<b>IFST 828</b>	<b>TRENDS AND ISSUES IN INDIVIDUAL AND FAMILY STUDIES</b>	<b>3</b>
Historical and theoretical frameworks for understanding current issues in research, policy development and practice in individual and family studies. Selected issues identified and analyzed for past and future contribution to the field of study.		
<b>IFST 850</b>	<b>THEORIES: FAMILY STUDIES AND HUMAN DEVELOPMENT</b>	<b>3</b>
Advanced analysis of theories of family studies and individual development, behavior and family life and applications to research models. Strong emphasis on historical and philosophical influences on theory building. The function of theory, the process of theory construction and critical components of specific theoretical perspectives examined. PREREQ: IFST621 or permission of instructor.		
<b>IFST 855</b>	<b>FAMILY STUDIES II: ANALYSIS AND CRITICAL ISSUES</b>	<b>3</b>
A critical analysis of topics central to understanding the field of family studies. Emphasis on issues facing contemporary families. Topics include the work-family balance, marriage, divorce, remarriage, parenting, domestic violence, pregnancy, sibling relationships across the lifespan. PREREQ: IFST621 or permission of instructor.		
<b>IFST 860</b>	<b>DIVERSITY IN FAMILIES AND HUMAN DEVELOPMENT</b>	<b>3</b>
Examines the effects of factors such as class, cohort, culture, gender and other components that influence diversity in families and variations in the context of human development. Surveys the impact of socioeconomic influences and demographic changes as they relate to varied family structures and relationships over the life course. PREREQ: IFST601, or IFST621, or permission of instructor.		
<b>IFST 865</b>	<b>ADVANCED SEMINAR IN FAMILY STUDIES</b>	<b>1-3</b>
Varying special interest topics in family studies. Topics usually are presented from an interdisciplinary perspective. RESTRICTIONS: Requires permission of instructor. May be repeated for credit as topic varies.		
<b>IFST 868</b>	<b>RESEARCH</b>	<b>1-6</b>
<b>IFST 869</b>	<b>MASTER'S THESIS</b>	<b>1-6</b>
<b>IFST 870</b>	<b>FAMILY CRISIS AND COPING</b>	<b>3</b>
Examines the research that focuses on families and individuals in crisis situations. Focuses on theories of understanding the differential impact of crisis as well as techniques to cope with the situations. Uses a developmental life span perspective.		

<b>IFST 875</b>	<b>INTERGENERATIONAL RELATIONSHIPS AND DEVELOPMENT</b>	<b>3</b>
Focused consideration of the role of intergenerational relationships in the development of individuals and families. Intensive study of theories and empirical data illustrating the contextually embedded interactions of individual and family development. Particular emphasis on developmental reciprocity in child-parent-grandparent and extended family relationships. PREREQ: IFST603 or permission of instructor.		

<b>IFST 880</b>	<b>FAMILIES AND INSTITUTIONS</b>	<b>3</b>
Focuses on how the family interfaces with a range of institutions such as the legal system, social services, educational and health care systems. Discusses the effects of institutions on families and the influence of families on institutional policies and processes.		

<b>IFST 885</b>	<b>CHILDREN AND COMPUTERS</b>	<b>3</b>
Students participate in building a sound theoretical and pedagogical foundation for use of computers in young children's education. Developmental perspectives such as Piaget, Vygotsky, and NAEYC's guidelines for Developmentally Appropriate Practice form the core of theoretical foundation building.		

<b>IFST 964</b>	<b>PRE-CANDIDACY STUDY</b>	<b>3-12 PF</b>
Research and readings in preparation of dissertation topics 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.		

<b>IFST 969</b>	<b>DOCTORAL DISSERTATION</b>	<b>1-12 PF</b>
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## ITALIAN

<b>ITAL 105</b>	<b>ITALIAN I - ELEMENTARY</b>	<b>4</b>
Introduction to the Italian language and development of speaking, listening, reading and writing skills through the use of basic texts.		

<b>ITAL 106</b>	<b>ITALIAN II - ELEMENTARY/INTERMEDIATE</b>	<b>4</b>
Completion of basic Italian. Increasing mastery of the basic skills of speaking, listening, reading and writing. PREREQ: ITAL105. RESTRICTIONS: Two to three years of high school Italian acceptable in lieu of prerequisite.		

<b>ITAL 107</b>	<b>ITALIAN III - INTERMEDIATE</b>	<b>4</b>
Review of grammar, continued practice in speaking and writing, reading texts of average difficulty. PREREQ: ITAL106. RESTRICTIONS: Four years of high school Italian acceptable in lieu of prerequisite. Satisfies College of Arts and Science language requirement.		

<b>ITAL 200</b>	<b>ITALIAN GRAMMAR REVIEW</b>	<b>3</b>
Systematic review of fundamental aspects of Italian grammar. Study of special problem areas. Some conversational practice. PREREQ: ITAL107.		

<b>ITAL 205</b>	<b>ITALIAN CONVERSATION</b>	<b>3</b>
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.		

<b>ITAL 206</b>	<b>CULTURE THROUGH CONVERSATION</b>	<b>3</b>
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.		

<b>ITAL 208</b>	<b>CONTEMPORARY ITALY I</b>	<b>3</b>
An introduction to contemporary Italy, 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.		

<b>ITAL 211</b>	<b>ITALIAN READING AND COMPOSITION: SHORT FICTION</b>	<b>3</b>
Reading and discussion of Italian short stories. Several short compositions. Grammar review where appropriate. PREREQ: ITAL200, ITAL205 or ITAL206.		

<b>ITAL 212</b>	<b>ITALIAN READING AND COMPOSITION: DRAMA AND PROSE</b>	<b>3</b>
Reading and discussion of some major 20th-century plays and prose texts. Several short compositions. Grammar review where appropriate. PREREQ: ITAL200, ITAL205 or ITAL206		
<b>ITAL 250</b>	<b>INTRODUCTION TO BUSINESS ITALIAN</b>	<b>3</b>
Familiarizes students with characteristics of business Italian (vocabulary, technology, terminology and syntactical patterns) and aspects of the Italian business community. PREREQ: ITAL107		
<b>ITAL 305</b>	<b>ADVANCED ITALIAN CONVERSATION AND COMPOSITION</b>	<b>3</b>
Discussion of current cultural, social and political topics in Italy. Vocabulary building, grammar exercises and frequent compositions. PREREQ: ITAL211 or ITAL212		
<b>ITAL 306</b>	<b>PRACTICAL ORAL/WRITTEN EXPRESSION</b>	<b>3</b>
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		
<b>ITAL 308</b>	<b>CONTEMPORARY ITALY II</b>	<b>3</b>
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		
<b>ITAL 310</b>	<b>SURVEY OF ITALIAN LITERATURE</b>	<b>3</b>
Development of Italian literature from its origins to the mid-17th century. Study and discussion of representative works. PREREQ: ITAL211 or ITAL212		
<b>ITAL 311</b>	<b>SURVEY OF ITALIAN LITERATURE</b>	<b>3</b>
Development of Italian literature from the mid-17th century to the present. Study and discussion of representative works. PREREQ: ITAL211 or ITAL212		
<b>ITAL 325</b>	<b>ITALIAN CIVILIZATION AND CULTURE</b>	<b>3</b>
A survey of the major cultural, social and political developments in Italy from the 15th century to the present. PREREQ: ITAL211 or ITAL212		
<b>ITAL 355</b>	<b>SPECIAL TOPICS</b>	<b>3</b>
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.		
<b>ITAL 366</b>	<b>INDEPENDENT STUDY</b>	<b>1-3</b>
<b>ITAL 401</b>	<b>ADVANCED ITALIAN GRAMMAR AND STYLISTICS</b>	<b>3</b>
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		
<b>ITAL 403</b>	<b>HISTORY OF THE ITALIAN LANGUAGE</b>	<b>3</b>
Development of the Italian language from its Latin origins. Exposition of the <i>questione della lingua</i> ; 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		
<b>ITAL 406</b>	<b>ADVANCED ITALIAN LANGUAGE</b>	<b>3</b>
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		
<b>ITAL 455</b>	<b>SELECTED AUTHORS, WORKS AND THEMES</b>	<b>3</b>
Works of one or more outstanding authors or on a special theme. PREREQ: ITAL310 and ITAL311 RESTRICTIONS: Can be repeated for credit when topics vary.		
<b>ITAL 466</b>	<b>INDEPENDENT STUDY</b>	<b>1-3</b>
<b>ITAL 601</b>	<b>ADVANCED ITALIAN GRAMMAR AND STYLISTICS</b>	<b>3</b>
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.		

<b>ITAL 603</b>	<b>HISTORY OF THE ITALIAN LANGUAGE</b>	<b>3</b>
Development of the Italian language from its Latin origins. Exposition of the <i>questione della lingua</i> ; linguistic analysis of old Italian texts; and the effects of social, political and cultural factors on usage. Influences from and on other languages.		
<b>ITAL 655</b>	<b>SELECTED AUTHORS, WORKS AND THEMES</b>	<b>3</b>
Seminar on works of one or more outstanding authors or on a special theme. RESTRICTIONS: Can be repeated for credit when topics vary		

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**JAPANESE**


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<b>JAPN 105</b>	<b>JAPANESE I - ELEMENTARY</b>	<b>4</b>
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.		
<b>JAPN 106</b>	<b>JAPANESE II - ELEMENTARY/INTERMEDIATE</b>	<b>4</b>
Continued practice in the aural, oral, reading, and writing skills of contemporary Japanese, including the identification and reproduction of basic Kanji characters. Introduction to formality levels and critical verb forms needed for more advanced communication. Media Center resources utilized. PREREQ: JAPN105 RESTRICTIONS: Two to three years of high school Japanese acceptable in lieu of prerequisite.		
<b>JAPN 107</b>	<b>JAPANESE III - INTERMEDIATE</b>	<b>4</b>
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 formality 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		
<b>JAPN 200</b>	<b>JAPANESE GRAMMAR AND COMPOSITION</b>	<b>3</b>
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		
<b>JAPN 204</b>	<b>THE ART OF JAPANESE CALLIGRAPHY</b>	<b>3</b>
Practical training in Japanese calligraphy, using brush, inkstone and sumi ink. Students will work with both phonetic syllabaries and kanji characters. PREREQ: JAPN105		
<b>JAPN 205</b>	<b>JAPANESE CONVERSATION</b>	<b>3</b>
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. PREREQ: JAPN107. Students encouraged to take JAPN205 after JAPN200 RESTRICTIONS: Prerequisite requires a minimum grade of B		
<b>JAPN 206</b>	<b>CULTURE THROUGH CONVERSATION</b>	<b>3</b>
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.		
<b>JAPN 208</b>	<b>CONTEMPORARY JAPAN I</b>	<b>3</b>
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		
<b>JAPN 209</b>	<b>INTERMEDIATE SITUATIONAL JAPANESE</b>	<b>3</b>
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. Skits and role-playing featured. PREREQ: JAPN107		
<b>JAPN 305</b>	<b>JAPANESE CONVERSATION AND COMPOSITION</b>	<b>3</b>
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 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 440 TECHNICAL JAPANESE II** 3  
Further study in the reading and writing of technical Japanese, including the translation of technical writings.  
PREREQ: JAPN340.

**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.

## 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  
A 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 208 INTRODUCTION TO JEWISH PHILOSOPHY** 3  
See PHIL208 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: Recommended: PHIL208/JWST208 Introduction to Jewish Philosophy

**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 SOCI360 for course description.

**JWST 365 STUDIES IN LITERARY GENRES, TYPES AND MOVEMENTS** 3  
See ENGL365 for course description

**JWST 377 ARAB-ISRAELI POLITICS** 3  
See POSC377 for course description

**JWST 381 HISTORY OF ARAB-ISRAELI CONFLICT** 3  
See HIST380 for course description

**JWST 382 STUDIES IN MULTICULTURAL LITERATURE IN ENGLISH** 3  
See ENGL382 for course description

**JWST 409 CONTEMPORARY PROBLEMS OF WORLD POLITICS** 3  
See POSC409 for course description  
RESTRICTIONS: May be repeated once when topics vary

**JWST 430 COMPARATIVE SOCIOLOGY** 3-6  
See SOCI430 for course description.

**JWST 435 SOCIOLOGY OF AMERICAN JEWRY** 3  
See SOCI435 for course description

**JWST 452 PROBLEMS IN URBAN POLITICS** 3  
See POSC452 for course description.

## LATIN

**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 VERGIL** 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

## LEGAL STUDIES

**LEST 210 THE LAW AND YOU** 1 PF  
Provides an opportunity for students to learn more about how the law affects them directly. Prominent guest speakers cover current issues relating to the law, how it operates and how it may affect students and other members of the university community.

**LEST 301 INTRODUCTION TO LEGAL STUDIES** 3  
Introduces legal studies as a multidisciplinary field  
May be cross-listed with CRJU301

**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.

## LINGUISTICS

**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 is 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 the structural aspects of language variation and the mental representation of language. Topics include: regional and social variation in language, sociolinguistics of multilingual/multiethnic 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 the world's languages, examining a number of important phenomena from a wide range of languages. Phenomena are 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 FLT203.

**LING 222 LANGUAGE AND GENDER** 3  
Explores various ways in which gender is 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  
Provides an introduction to the field of communication disorders. Examines the complex behaviors of speech, language and hearing and their changes throughout the lifespan, as well as the 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 the use of norm-referenced tests, defining target behaviors and developing observation skills are covered. Treatment planning and intervention include developing a 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 383 LANGUAGE, POWER AND THE LAW** 3  
Examines a variety of topics which demonstrate the power of language in the legal arena, including the language of mediation, the role of forensic linguistics in murder and product liability cases, gender and power, the 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.  
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.

**LING 409 SYNTAX I** 3  
Introduction to syntactic theory and analysis for advanced undergraduates. Emphasis on argumentation and analysis rather than on the fine points of syntactic theory.  
PREREQ: LING101  
RESTRICTIONS: Requires permission of instructor.

**LING 417 LANGUAGE PLANNING** 3  
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.

**LING 421 METHODS OF TEACHING FOREIGN LANGUAGES** 3  
See FLT421 for course description.

**LING 422 LANGUAGE SYLLABUS DESIGN** 3  
See FLT422 for course description.

**LING 424 SECOND-LANGUAGE TESTING** 3  
See FLT424 for course description.



- LING 433 INTRODUCTION TO ACOUSTIC PHONETICS** 3  
Introduction to articulatory, acoustic, and perceptual characteristics of speech with emphasis on the acoustic properties of phonemes. While primarily a lecture course with assigned text, a few laboratory sessions will provide an introduction to computer-based methods used in instrumental studies of speech  
PREREQ: LING253
- LING 462 LANGUAGE ACQUISITION** 4  
See EDUC462 for course description.
- LING 466 INDEPENDENT STUDY** 1-3
- LING 476 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. The linguistic, psychological and social experiences of the bilingual. Bilingual instruction and models of bilingual education.  
May be cross-listed with EDUC476.  
PREREQ: LING101
- LING 477 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 EDUC477 and/or ENGL477.  
PREREQ: LING101
- LING 480 INTRODUCTION TO SOCIOLINGUISTICS** 3  
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.
- LING 491 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, thematic roles). Some elements of formal semantics.  
PREREQ: LING101
- LING 497 SOCIOLINGUISTICS OF ENGLISH IN 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 498 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; and devising and presenting lesson plans  
May be cross-listed with EDUC498.
- LING 499 ISSUES IN TEACHING LIMITED ENGLISH PROFICIENT STUDENTS** 3  
Addresses theoretical and instructional issues related to teaching Limited English Proficient students. Topics include issues in bilingual education, theories of L2 acquisition, LEP educational models, integrating language and content instruction, documentation and assessment of LEP skills, and understanding cultural diversity.
- LING 601 HISTORICAL LINGUISTICS** 3  
The languages of the world, the Indo-European languages, the comparative method and linguistic evolution.  
PREREQ: Completion of two years of a college language course.
- LING 607 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.
- LING 608 PHONOLOGY II** 3  
Continuation of LING607. More advanced phonological analysis and rule writing. Introduction to recent developments in nonsegmental phonology: autosegmental, metrical and prosodic theories  
PREREQ: LING607.
- LING 609 SYNTAX I** 3  
Introduction to syntactic theory and analysis. Emphasis on argumentation and analysis rather than on the fine points of syntactic theory
- LING 610 SYNTAX II** 3  
Continuation of LING609. More advanced analysis of syntactic structures. Attention given to the theory of Government and Binding and to principles of universal grammar.  
PREREQ: LING609
- LING 612 INTRODUCTION TO MORPHOLOGY** 3  
Introduces major types of morphological phenomena, their analysis and current theoretical approaches to handling them.  
PREREQ: LING607
- LING 617 LANGUAGE PLANNING** 3  
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.
- LING 621 METHODS OF TEACHING FOREIGN LANGUAGES** 3  
See FLIT621 for course description.
- LING 622 LANGUAGE SYLLABUS DESIGN** 3  
See FLIT622 for course description.
- LING 624 SECOND LANGUAGE TESTING** 3  
See FLIT624 for course description.
- LING 633 INTRODUCTION TO ACOUSTIC PHONETICS** 3  
Introduction to articulatory, acoustic, and perceptual characteristics of speech with emphasis on the acoustic properties of phonemes. While primarily a lecture course with assigned text, a few laboratory sessions will provide an introduction to computer-based methods used in instrumental studies of speech.
- LING 675 LANGUAGE ACQUISITION** 4  
See EDUC675 for course description.
- 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. The 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  
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.
- 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 LIMITED ENGLISH PROFICIENT STUDENTS** 3  
Addresses theoretical and instructional issues related to teaching Limited English Proficient (LEP) students. Topics include issues in bilingual education, theories of L2 acquisition, LEP educational models, integrating language and content instruction, documentation and assessment of LEP skills, and understanding cultural diversity.
- LING 802 STUDIES IN OLD AND MIDDLE ENGLISH** 3  
See ENGL802 for course description.

<b>LING 830 SYNTAX III</b>	<b>3</b>
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.	
<b>LING 831 TOPICS IN SYNTAX</b>	<b>3</b>
Current topics in syntactic theory, problems in the syntactic analysis of specific languages PREREQ: LING830 RESTRICTIONS: May be repeated for credit when topics vary.	
<b>LING 848 SEMINAR IN LANGUAGE DEVELOPMENT</b>	<b>3</b>
See EDUC848 for course description.	
<b>LING 850 LINGUISTICS AND WRITING</b>	<b>3</b>
Survey of writing systems. Problems of text structure.	
<b>LING 851 LINGUISTIC FIELD METHODS</b>	<b>3</b>
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.	
<b>LING 853 TOPICS IN THE STRUCTURE OF CHINESE</b>	<b>3</b>
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.	
<b>LING 854 TOPICS IN THE STRUCTURE OF FRENCH</b>	<b>3</b>
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.	
<b>LING 855 TOPICS IN THE STRUCTURE OF GERMAN</b>	<b>3</b>
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.	
<b>LING 856 TOPICS IN THE STRUCTURE OF ITALIAN</b>	<b>3</b>
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.	
<b>LING 857 TOPICS IN THE STRUCTURE OF JAPANESE</b>	<b>3</b>
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.	
<b>LING 861 TOPICS IN PHONOLOGY</b>	<b>3</b>
Detailed examination of one or more current (controversial) issues in phonological theory. PREREQ: LING608 RESTRICTIONS: May be repeated for credit when topics vary.	
<b>LING 862 ACQUISITION OF PHONOLOGY</b>	<b>3</b>
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	
<b>LING 863 PROJECTS IN ACOUSTIC PHONETICS</b>	<b>3</b>
Brief review of the 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 will be suggested by the instructor, however, students may (with instructor's approval) choose a project of their own design.	
<b>LING 880 SECOND LANGUAGE ACQUISITION</b>	<b>3</b>
A 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.	
<b>LING 890 STUDIES IN LINGUISTICS</b>	<b>3</b>
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.	
<b>LING 964 PRE-CANDIDACY STUDY</b>	<b>3-12 PF</b>
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.	
<b>LING 969 DOCTORAL DISSERTATION</b>	<b>1-12 PF</b>

## MARINE STUDIES

<b>MAST 200 THE OCEANS</b>	<b>3</b>
Integrates physical, chemical, geological and biological principles into an overview that addresses why and how the oceans work. Draws heavily on current ocean issues to illustrate processes and problems. RESTRICTIONS: Open only to non-science majors or with permission from instructor.	
<b>MAST 314 COMPARATIVE TERRESTRIAL AND MARINE ECOLOGY</b>	<b>3</b>
See ENWC314 for course description.	
<b>MAST 366 INDEPENDENT STUDY</b>	<b>1-6</b>
<b>MAST 464 MARINE SCIENCE SUMMER INTERNSHIP</b>	<b>1-3</b>
Students design a research project with an advisor and present it to peers, advisors and course instructor.	
<b>MAST 466 INDEPENDENT STUDY</b>	<b>1-3</b>
<b>MAST 468 UNDERGRADUATE RESEARCH</b>	<b>1-6</b>
<b>MAST 482 INTRODUCTION TO OCEAN SCIENCES</b>	<b>3</b>
A quantitative introduction to the ocean world including geography, geophysics, chemistry of water and sediments, physics of ocean circulation and waves and tides, description of oceanic and nearshore environments, and biology of the seas. PREREQ: MATH241 or MATH221; CHEM103 or CHEM111; PHYS201 or PHYS207.	
<b>MAST 601 INTRODUCTION TO OCEANOGRAPHY</b>	<b>3</b>
Topics include the geology and history of the ocean floor, oceanic sediments, the physics of the marine environment and the oceanic circulation, chemical processes in the ocean, and biological processes and production in the oceans. RESTRICTIONS: For non-oceanographers. Requires graduate status.	
<b>MAST 602 PHYSICAL OCEANOGRAPHY</b>	<b>3</b>
Geographic and hydrodynamic aspects of oceanography. The geography of ocean basins; physical properties of seawater; radiation; and observed distributions of temperature, salinity, oxygen and currents. Scalar and vector fields; hydrostatics; kinematics, momentum dynamics, vorticity dynamics, viscous flow and eddy flux. RESTRICTIONS: Requires permission of instructor.	
<b>MAST 603 INTRODUCTION TO MARINE AND AQUATIC EDUCATION</b>	<b>3</b>
Water environments and associated marine and aquatic curricula are highlighted through inquiry learning, lecture and field trips. Emphasized is the integration of science, math, language arts, history and exploratories in development of thematic curricula. For inservice educators. RESTRICTIONS: Inservice educators only.	
<b>MAST 604 ENVIRONMENTAL DATA MANAGEMENT</b>	<b>1</b>
Emphasizes the use of remotely sensed data for research and management of coastal resources. Environmental issues and data requirements are discussed. Case studies illustrate the use of Geographic Information Systems for integrating remotely sensed imagery with ancillary data to address coastal environmental problems. RESTRICTIONS: Requires approval of instructor.	
<b>MAST 605 TOPICS: MARINE SCIENCE EDUCATION</b>	<b>1-4</b>
Stimulates Delaware teachers into incorporating integrated marine sciences into their classroom teaching.	
<b>MAST 606 OCEAN AND ATMOSPHERE REMOTE SENSING</b>	<b>3</b>
Fundamentals of ocean and atmosphere remote sensing including space platforms, their orbits, instruments, data retrieval and image processing methods. Oceanographic and atmospheric applications of remote sensing and new developments in sensors and data analyses.	
<b>MAST 607 WRITING PAPERS IN THE MARINE SCIENCES</b>	<b>3</b>
The process and mechanics of publishing scientific papers in marine journals. Covers organizing data in tables and figures; mechanics of drawing up effective figures; marshalling of tables, figures and scientific ideas into a coherent story; and strategies and techniques used in effective writing.	
<b>MAST 615 INTRODUCTION TO MARINE BIOLOGY</b>	<b>3</b>
Involves laboratory, field and lecture study for a broad understanding of marine biology and biochemistry. RESTRICTIONS: For non-biologically oriented marine studies graduate students.	