UNIVERSITY OF DELAWARE

1995-96 COURSES
The graduate component must then be offered with a graduate standard of
subject to review by the Committee on Undergraduate Studies.

A separately numbered 400-level undergraduate course in the same section.

A student's major is the subject area in which the student has completed the
minimum number of credits required for the major.

With the approval of the graduate student's major department, 500-level
courses taken outside the student's major may be counted toward the
requirements for the graduate degree.

The appropriateness of 600-numbered courses for undergraduate credit is
subject to review by the Committee on Undergraduate Studies.
The course descriptions on the following pages are alphabetized in order of subject area codes.

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ACCOUNTING

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-val-
ume-profit analysis, job-order accounting, budgeting, standard costs and variance analy-
sis, contribution approach to decision analysis, absorption and direct costing
PREREQ: ACCT207

ACCT 260 Introduction to Business Information Systems I 3
Introduction to computers: components and operations. Introduction to management
information/support systems and the systems development process. Emphasis on
microcomputers and software packages used in business

ACCT 261 Introduction to Business Information Systems II 3
Introduction to management information systems. Structured programming techniques for
problem solving with business productivity tools and software. Emphasis on business
applications
PREREQ: ACCT260

ACCT 302 Accounting Information Systems 3
Accounting information and its place within an organization's overall management infor-
mation system. Emphasis on information and documentation, central processing,
data organization, and the analysis, design, development, and audit of computer-based
accounting systems. Includes some computer work
PREREQ: ACCT208, ACCT260
RESTRICTIONS: Requires Junior status

ACCT 313 Federal Taxes for Managers 3
Explores taxable entities, tax aspects of selecting a business form, income concepts, busi-
ness deductions, tax factors in the acquisition, use, and disposition of fixed assets, non-
taxable transactions, capital gains and losses, and tax planning
PREREQ: ACCT207

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, allocative securities and earnings per share cal-
culations; income recognition; accounting for income taxes, pensions and leases;
accounting changes and error analysis; financial reporting and changing prices; prepara-
tion of the statement of cash flows; and disclosure requirements in financial reporting
PREREQ: ACCT315
RESTRICTIONS: Requires 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: ACCT207
RESTRICTIONS: Requires Junior status

ACCT 350 Business Law 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 lia-
ibility, negotiable instruments and accounts' legal liability

ACCT 351 Business Law II 3
Covers a variety of areas of the law, including: 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, finan-
cial 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 413 Income Tax Accounting 3
Analysis of current revenue acts, use of federal law and regulations to determine tax
liability
PREREQ: ACCT208

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 top-
ics may also be covered
PREREQ: ACCT316
RESTRICTIONS: Requires a grade of C or better in ACCT316

ACCT 417 Auditing 3
An introduction to the standards and procedures underlying contemporary auditing. Top-
ics 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

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 part-
nership 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 terminol-
ogy so that students can interpret and evaluate financial statements. Students are encour-
gaged 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 3
Critically examines traditional financial measures as management control devices in
the contemporary context. Explores ways that the management control system can
explicitly support strategic objectives. Includes methods of cost measurement, decision
support using cost information, and how these measures of performance affect the
organization
PREREQ: ACCT800 or equivalent

ACCT 802 Management Information Systems 3
Approaches to information system design, introduction to systems analysis, data base
concepts, system evaluation, justification, and implementation; management and behav-
ioral considerations. Case studies and independent research. No programming
required
PREREQ: ACCT800

ACCT 803 Accounting Systems: Analysis and Implementation 3
Identifying accounting systems requirements and designing systems to meet these
requirements. Topics included are design proposals, cost-benefit considerations, output
and input design, file structures, and record handling, data communication and internal
control
PREREQ: ACCT302

ACCT 807 Applied Statistical Methods in Accounting 3
Promotes understanding and use of statistical methods and models fundamental to
accounting research and practice. Applies statistical techniques in the context of promul-
gated professional standards and other institutional requirements
PREREQ: ACCT327, STAT201 and STAT202
RESTRICTIONS: Open to Accounting graduate students only
ACCT 810 Theory of External Reporting
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: ACCT 316

ACCT 811 Advanced Management Accounting
Examination of concepts and rationale underlying managerial accounting methods. Advanced topics in decision analysis, standard costing and performance measurement.
PREREQ: ACCT 327

ACCT 813 Advanced Federal Tax Accounting
Advanced federal tax concepts including corporations, partnerships, estates and trusts.
PREREQ: ACCT 413

ACCT 817 Advanced Auditing
Analysis of current and prospective developments in professional auditing. Topics include auditing computerized systems and the use of statistical sampling by the auditor.
PREREQ: ACCT 417

ACCT 820 Financial Statement Analysis
Examines contemporary aspects of financial statement analysis such as the supply and demand for accounting information, statistical Properties of accounting numbers and the impact on information on securities prices.
PREREQ: ACCT 316

ACCT 840 Contemporary Issues in Accounting
Selected topics of current interest to the accounting profession.
PREREQ: ACCT 316 and ACCT 327
Restrictions: Requires permission of instructor

ACCT 868 Accounting Research
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: ACCT 800 or equivalent

AIR FORCE SCIENCE

AFSC 100 Development of Air Power
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 deployment in military and non-military operations in support of national objectives. Assesses oral and written communication skills.

AFSC 101 Development of Air Power
Continuation of AFSC 100. 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 200 The Air Force Today I
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 201 The Air Force Today II
Continuation of AFSC 200. 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 310 Leadership and Management I
Focuses on applying concepts in leadership and management by comprehending leadership styles and managerial functions, concepts of individual motivation and organizational dynamics, and decision-making processes. Emphasizes oral and written communication skills, leadership research and behavior.

AFSC 311 Leadership and Management II
Continuation of AFSC 310. 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 Forces in U.S. Society
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 Forces in U.S. Society
Continuation of AFSC 410. 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 211 Literature of the Agricultural and Life Sciences
Promotes familiarity with arrangement of the card catalog, guides to literature, indexes to periodical literature, abstracting services, bibliographic form, and scientific papers and reports. Helps students in scientific writing and reporting.
Restrictions: Not open to freshmen

AGRI 300 Dean's Scholar Seminar
Consists of seven two-hour seminars. Students discuss ideas and topics relevant to agricultural sciences.
Restrictions: Requires 2.75 GPA and an invitation to participate

AMERICAN STUDIES

AMST 314 Introduction to Folklore and Folk Life
See ENGL 314 for course description. May be cross-listed with ENGL 314

AMST 366 Independent Study

AMST 466 Independent Study
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: ANSC 111
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: ANSC 101
RESTRICTIONS: Corequisite mandatory for majors, optional for nonmajors. Offered in Fall only.

ANSC 140 FUNCTIONAL ANATOMY OF DOMESTIC ANIMALS 4
Emphasis on identifying the relationships that exist between form and function associated with growth, digestion, circulation, body defense and locomotion in domestic farm animals.
RESTRICTIONS: Offered in Spring only.

ANSC 201 BEHAVIOR OF DOMESTICATED ANIMALS 3
Feeding, reproductive and social patterns of domesticated mammals and birds. Relationships between physical environment and behavior. Use of telemetry and recording systems.
RESTRICTIONS: Offered in Spring of even-numbered years.

ANSC 221 NUTRITION AND FEEDING OF HORSES 2
Study of proper feeding and use of quality feedstuffs to maintain health and productivity of horses.

ANSC 251 LIVESTOCK NUTRITION AND FEEDING 3
Study of nutrients and their metabolism, nutrient requirements of livestock, nutritional value of feedstuffs and principles of ration formulation.
PREREQ: ANSC 101 and ANSC 140.

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 only.

ANSC 270 BIOTECH: SCIENCE AND SOCIOECONOMIC ISSUES 3
Introduction to agricultural biotechnology and socioeconomic issues. Introduces genetic engineering and the basic scientific theory of biotechnology in animal, plant, food, and economic research and the latest application 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. Uses problem-based. May be cross-listed with FECE 270 and/or PLSC 270.

ANSC 300 PRINCIPLES OF ANIMAL AND PLANT GENETICS 3
See PLSC 300 for course description.

ANSC 304 DAIRY CATTLE JUDGING AND SELECTION 1
Characteristics of breeds, relationship of form to function in young stock and mature animals.
RESTRICTIONS: Offered in Spring of odd-numbered years.

ANSC 305 FOOD SCIENCE 2
See FOSC 305 for course description.

ANSC 306 FOOD SCIENCE LABORATORY 1
See FOSC 306 for course description.

ANSC 310 ANIMAL AND PLANT GENETICS LABORATORY 1
See PLSC 310 for course description.

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

ANSC 332 INTRODUCTION TO ANIMAL DISEASES 3
Nature and mechanisms of disease processes with emphasis on their prevention and control.
PREREQ: ANSC 140.

ANSC 342 EXERCISE PHYSIOLOGY AND CONDITIONING OF HORSES 2
Introduction to equine structure at rest and in motion. Includes anatomical, physiological and management factors pertinent to the development of horses into sound and fit athletes.
PREREQ: ANSC 140.

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 systems.
PREREQ: ANSC 140.
RESTRICTIONS: Offered in Fall only.

ANSC 366 INDEPENDENT STUDY 1-6

ANSC 404 DAIRY PRODUCTION 3
Principles of modern dairy production units emphasizing breed characteristics, genetic principles, sire evaluation and mathematical considerations.
PREREQ: ANSC 101 and ANSC 251.
RESTRICTIONS: Offered in Spring of odd-numbered years.

ANSC 409 FOOD PROCESSING I 4
See FOSC 409 for course description.

ANSC 410 FOOD PROCESSING II 4
See FOSC 410 for course description.

ANSC 417 BEEF CATTLE AND SHEEP PRODUCTION 4
Principles of modern beef cattle and sheep production; nutrition, reproduction, housing, health and management. Requires some out-of-class time for hands-on experience in animal production.
PREREQ: ANSC 101 and ANSC 251.
RESTRICTIONS: Offered in Spring of odd-numbered years.

ANSC 418 SWINE PRODUCTION 4
Principles of modern swine production: nutrition, reproduction, housing, health and management.
PREREQ: ANSC 101 and ANSC 251.
RESTRICTIONS: Offered in Spring of even-numbered years. Laboratory requires some out-of-class time for hands-on experience in animal production.

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: ANSC 140 and ANSC 251.

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: ANSC 101 and ANSC 251.
RESTRICTIONS: Offered in Fall of even-numbered years.

ANSC 428 FOOD CHEMISTRY 4
See FOSC 428 for course description.

ANSC 429 FOOD ANALYSIS 4
See FOSC 429 for course description.

ANSC 431 INFECTION AND IMMUNITY IN ANIMAL DISEASES 4
Study of the relationships of domestic animals with particular infectious agents and the nature of the immune response.
PREREQ: BISC 371.
RESTRICTIONS: Offered in Fall of even-numbered years.

ANSC 441 REPRODUCTIVE PHYSIOLOGY OF DOMESTIC ANIMALS 3
Emphasis on physiology and endocrinology of reproductive function in males and females, comparative aspects of reproductive function and opportunity for enhancing production through newer management practices. Discussion and laboratory involve both classic and current state of knowledge in mammalian and avian reproduction.
PREREQ: ANSC 345.

ANSC 446 ENVIRONMENTAL PHYSIOLOGY OF DOMESTIC ANIMALS 4
Impact of physical environment on function and productivity of domestic animals. Principles of physical environment, animal energetics, shelter design, principles of animal husbandry and biometeorological instrumentation.
PREREQ: ANSC 345 or BISC 306.
RESTRICTIONS: Offered in Fall of even-numbered years.

ANSC 452 ADVANCED COMPARATIVE ANIMAL NUTRITION 4
Comparative approach to the study of nutrients and their metabolism among species. Application of basic principles of nutrition and metabolism to feeding practices and programs. Lab exercises demonstrate nutritional principles, methodologies used in determining ingredient composition and quality, nutritional requirements and status of the animal.
PREREQ: ANSC 251.
ANSC 464 ANIMAL SCIENCE FIELD EXPERIENCE 1-3 PF
Opportunity to gain career-related work experience in a field related to the animal sciences and to explore potential occupational areas
RESTRICTIONS: Maximum of 3 credits allowed for Animal Science majors; maximum of six credits allowed for B.S. in Agriculture

ANSC 465 SEMINAR 1
Development and presentation of oral reports on selected topics related to animal science Property selection, design, production and use of visual aids Emphasis on the development of communication skills
RESTRICTIONS: Senior status recommended

ANSC 466 INDEPENDENT STUDY 1-6

ANSC 470 PRINCIPLES OF MOLECULAR GENETICS 3
Uses fundamentals of nucleic acid biochemistry (replication, repair, recombination) and bacterial genetics to provide the background needed for detailed study of selected topics in animal and plant molecular biology
PREREQ: BISC301, and ANSC300 or PLSC300 or ENTO300

ANSC 609 COMPARATIVE Vertebrate Histology 4
See BISC618 for course description

ANSC 624 MONOGRAGRIC 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 NTD1624
PREREQ: ANSC452 or NTD1400, and CHEM214
RESTRICTIONS: Offered in Spring of odd-numbered years

ANSC 630 TRACE MINERALS AND VITAMINS 3
See NTD1630 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
EG: ANSC332 or ANSC633
RESTRICTIONS: Offered in Spring of even-numbered years

ANSC 633 Poultry Pathology 3
Poultry diseases with emphasis on their causes, prevention, treatment and control
ANSC332, ANSC431 and ANSC635
ONS: Offered in Spring of odd-numbered years

ANSC 635 INTRODUCTION TO VIROLOGY 3
Study of the properties and processes of animal viruses influencing the pathogenesis, diagnosis and control of disease. Laboratory emphasis on standard methods of detecting activity
EG: ANSC431 or BISC371

ANSC 639 Food Microbiology 4
See FOSC639 for course description

ANSC 643 MOLECULAR ENDOCRINOLOGY 3
Brief overview of endocrinology covering hormone types and hormone systems. Detailed discussion of molecular aspects of hormone action including hormone-receptor interactions, second messengers and gene regulation by hormone. Presents methodologies used to approach current topics in endocrinology
PREREQ: ANSC345 or ANSC441
 RESTRICTIONS: Offered in Spring of odd-numbered years

ANSC 645 AVIAN PHYSIOLOGY 4
Systemic and comparative physiology of birds. Nervous, respiratory, digestive, excretory, endocrine and thermoregulatory systems
PREREQ: ANSC345
RESTRICTIONS: Offered in Fall of odd-numbered years

ANSC 654 Ruminant Nutrition and Metabolism 3
Basic aspects of nutrition and metabolism of ruminant animals with emphasis on ruminant microbiology, lactation, physiology and growth May be cross-listed with NTD1654
PREREQ: ANSC452 or NTD1400 and CHEM214

ANSC 668 RESEARCH 1-6

ANSC 670 PRINCIPLES OF MOLECULAR GENETICS 3
Uses fundamentals of nucleic acid biochemistry (replication, repair, recombination) and bacterial genetics to provide background needed for detailed study of selected topics in animal and plant molecular biology
PREREQ: BISC301, and ANSC300 or PLSC300 or ENTO300

ANSC 842 Avian Microanatomy 3
Study of avian histology using microscopy. Examines the microscopic structure, cytological 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 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 870 MOLECULAR BIOLOGY IN AGRICULTURE 2
Illustrates principles of recombinant DNA technology and the application of these methods in plant and animal agricultural research
PREREQ: CHEM527, and ANSC300 or PLSC300
RESTRICTIONS: Concurrent enrollment in ANSC871 recommended

ANSC 871 MOLECULAR BIOLOGY IN AGRICULTURE LABORATORY 2
Utilizes recombinant DNA technology to illustrate application in plant and animal agricultural research. Exercises focus on construction of plasmids and lambda libraries, screening of libraries and characterization of recombinant clones
COREQ: ANSC870

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 coursework
RESTRICTIONS: Not open to students who have been admitted to candidacy

ANSC 969 DOCTORAL DISSERTATION 1-12 PF

ANTHROPOLOGY

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 and 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 198 HONORS TOPICS 1
Weekly meetings with faculty to expand on topics treated in 100-level courses in which the student is currently enrolled

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 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
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
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
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
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
Anthropological studies of societies and culture areas throughout the world to illustrate their characteristics and anthropological issues.

ANTH 231 Personality and Culture
Relationship of the individual to culture. Child-rearing customs and life cycles in cross-cultural perspective. Cultural influences on motivation and cognition.

ANTH 251 Introduction to Ethnic Arts
General survey of the ethnocrats 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
Anthropology applied to practical problems, including community development, directed change, agrarian reform and urban dislocation, particularly in Third World countries.

ANTH 259 Hunting Societies
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 260 Sociocultural History of Africa
Development of African civilization; the varieties of these social systems as functioning entities through time, and the ways they have affected each other and have been changed by the impact of Western colonialism.

ANTH 261 Peoples and Cultures of the Middle East
Cultures, institutions and ethnic groups of the Middle East. Description and analysis of major cultural traditions and social institutions.

ANTH 265 High Civilizations of the Americas
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
Early civilization in Southeast Asia, the Near East, Egypt, China and India.

ANTH 275 Delaware Prehistoric Archaeology
Overview of the prehistoric lifeways 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
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 298 Honors Topics
Weekly meetings with faculty to expand on topics treated in 200-level courses in which the student is currently enrolled.

ANTH 300 Primatology
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
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 316 Introduction to Material Culture Studies
Introduces material culture studies, broadly defined as the study of all things produced by human beings and all ways human beings have altered the physical environment. Explores the concepts, approaches and methods of numerous disciplines which investigate human material culture. May be cross-listed with HIST316.

ANTH 320 Prehistory of North America
Major cultural and social developments of prehistoric humans in North America, from the entrance of the Paleoinds to the arrival of Europeans in the 16th century.

ANTH 322 The City in American Culture
Approaches the study of the historic American city from an interdisciplinary perspective. Emphasis on reconstructing the culture and life of the city at specific points in time, as well as on the processes of urbanization and change. May be cross-listed with HIST322.

ANTH 323 Prehistory of South America
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
Survey of world prehistory, excluding the Americas, 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
Cultures and subcultures of Europe, with special attention to the rural sectors and their historical development.

ANTH 327 Peoples of the Caribbean
Culture, history and variations of Caribbean island peoples; basic characteristics of social institutions, religion, language, and continuity and change to the modern period.

ANTH 330 Development and Underdevelopment
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
Social institutions and cultural traditions of Africa; political, economic, legal and kinship systems, and modes of thought.

ANTH 337 South American Indians
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
Arts and crafts technological processes invented by or available to tribal societies of South America. Artistic and technical achievements in ceramic and textile.

ANTH 340 Historical Archaeology
Survey of the concepts and methods of ancient archaeologists in studying processes of cultural change.

ANTH 342 Issues in American Culture: Archaeological Perspectives
Archaeological Perspectives on Issues of concern in contemporary American culture, including the environment, multiculturalism, war, gender, technology and production, and class.

ANTH 345 Methods of Cultural Analysis
Introduces the range of methods employed by scholars in the study of human cultures: observation, participation, interview techniques, the study of historic documents and the study of material culture by anthropologists, archaeologists and others.

ANTH 360 Humanities Colloquium
See ARSC360 for course description.

ANTH 363 Women in Cross-Cultural Perspective
See WOMS363 for course description.

ANTH 366 Independent Study
1-6

ANTH 368 Anthropology of Slavery
Types and forms of servitude that have existed in societies around the world; and the use of case studies to understand particular societies in greater detail.

ANTH 370 Culture of Food Production and Economic Development
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
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 377 Ecological Anthropology
Ecology in human adaptation. The ecology of hunting and gathering economies; domestication of plants and animals; development of craft and industrial technologies.
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 HISP 379.

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 390 Honors Colloquium 3
See ARSC 390 for description. May be cross-listed with WOMS 390.
RESTRICTIONS: Requires a GPA of 3.0 or higher.

ANTH 398 Honor Topics 1
Weekly meetings with faculty to expand on topics treated in 400-level courses in which the student is concurrently enrolled.

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 402 Fossil Humans and the Pleistocene Epochs 3
 Seminar course dealing with the details of Pleistocene climatic and geological events; evolutionary development of humans within this context.
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 451 Myth and Culture 3
The relationship 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 ARTH 457.

ANTH 460 Humanities Colloquium 3
See ARSC 460 for course description.

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 HIST 463.

ANTH 465 Philosophy of Social Science 3
See PHIL 454 for course description.

ANTH 466 Independent Study 1-6
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. Tutori- nal 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. Open to majors only. Requires permission of instructor.

ANTH 487 Tutorial in Archaeology 3
History, theory and method in the field of archaeology. 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. Open to majors only. Requires permission of instructor.

ANTH 498 Honor Topics 1
Weekly meetings with faculty to expand on topics treated in 400-level courses in which the student is concurrently enrolled.

ANTH 601 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 602 Fossil Humans and the Pleistocene Epochs 3
Seminar course dealing with the details of Pleistocene climatic and geological events; evolutionary development of humans within this context.

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 610 Archaeological Analysis of Material Culture 3
Procedures of archaeological laboratory analysis stressing lithic and ceramic analysis, microscopy, experimental archaeology and application of the principles of artifact classification and taxonomy.
PREREQ: ANTH 627.

ANTH 628 Prehistory of Eastern North America 3
Detailed examination of the cultural sequence and prehistoric adaptations of eastern North America from Paleo-Indian times to European contact.

ANTH 631 Myth and Culture 3
Comparative study of the relationships between world view, cosmology, mythology and social institutions, illustrating the analytic methods of structuralist and functional anthropology.
RESTRICTIONS: Requires permission of instructor.

ANTH 637 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 ARTH 457.

ANTH 650 Humanities Colloquium 3
See ARSC 460 for course description. May be cross-listed with MALS 650.

ANTH 653 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 HIST 463.

ARABIC

ARAB 105 Arabic I - Elementary 4
Introduction to the Arabic language and development of speaking, listening, reading and writing skills through the use of basic texts. Language laboratory as needed.

ARAB 106 Arabic II - Elementary/Intermediate 4
Completion of basic Arabic. Increasing mastery of the basic skills of speaking, listening, reading and writing. PREREQ: ARAB 105.
RESTRICTIONS: Two to three years of high school Arabic acceptable in lieu of ARAB 106.

ARAB 107 Arabic III - Intermediate 4
Review of grammar, continued practice in speaking and writing and reading texts of average difficulty.
PREREQ: ARAB 106.
RESTRICTIONS: Four years of high school Arabic acceptable in lieu of ARAB 106.
Satisfies Arts and Science foreign language requirement.

ARTS AND SCIENCE

ARSC 125 The Shaping of the Modern Mind 1 PF
Lectures by faculty from various departments on classical, medieval and Renaissance thinkers who have most deeply influenced the modern mind.

ARSC 126 The Shaping of the Modern Mind 1 PF
Lectures by faculty from various departments on 17th- to 20th-century thinkers who have most deeply influenced the modern mind.

ARSC 127 Shaping of the Modern World 3
Introductory lectures by faculty from disciplines throughout the University on what makes the world international and interdependent. Examines historical and contemporary issues from different regions and cultures of the world.

ARSC 293 Honors Short Course 1
Topics vary.
RESTRICTIONS: Three and one-half-week course.
ARSC 294  HONORS SHORT COURSE: MULTICULTURAL  1  
Approved topic is: Myth and Expression. Course counts toward the three-credit multicultural requirement  
REstrictions: Three and one-half-week course

ARSC 295  HONORS PERFORMING ARTS FORUM  1  
Study done mostly through video and film presentations, with some live performances. Presentations include orchestras, solos, dance, theatre and opera  
REstrictions: For students with an interest in serious music and excellence in performance

ARSC 296  HONORS FORUM: MULTICULTURAL  1  
Approved topics are: Women in Western Thought: Roots and Reflections - Issues in Contemporary Afro-American Culture; and Playing with Stories. Course counts toward the three-credit multicultural requirement

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

ARSC 360  HUMANITIES COLLOQUIUM  3  
Papers and discussion by faculty members and students participating in Humanities Semester offerings. Interdisciplinary approach: topics related to all courses in a particular group offering. May be cross-listed with ENGL360, HIST360, ANTH360, ART360, CMLT360, PLIT360, PHIL360  
REstrictions: Requires enrollment (current or past) in two courses offered in a particular Humanities Semester group. May be repeated once for credit when topics vary

ARSC 366  INDEPENDENT STUDY  1-6

ARSC 390  HONORS COLLOQUIUM  3  
Team-taught colloquium. Specific topics vary

ARSC 391  HONORS COLLOQUIUM  3  
See ARSC390 for course description

ARSC 392  HONORS COLLOQUIUM: MULTICULTURAL  3  
Team-taught colloquium. Approved colloquia are: Development of Civilization: The Case of the Americas; Giving Form to Expression; Recent Modernization in China; Home and Homelessness in America: Changing Ideals and Realities; Racism, Sexism and Speciesism; and Images of American Labor in Fiction, Film and Folk Song. Specific topics vary

ARSC 466  INDEPENDENT STUDY  1-6

ARSC 869  MASTER'S THESIS  1-6

ART 110  FOUNDATION DRAWING I  3  
Basic elements of visual thinking through the manipulation of various drawing media and techniques. Emphasis on perspective, line, form and spatial relationships  
COREQ: ART 110 or ART 113

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: ART 110 or ART 112

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: ART 110  
COREQ: ART 111 or ART 113

ART 113  FOUNDATION 3D DESIGN  3  
Development of craftsmanship, use of media and techniques to the application of three-dimensional design principles  
COREQ: ART 110 or ART 112

ART 114  FOUNDATION COLLOQUIUM  0 PF  
Weekly forum for the discussion of issues common to beginning level students concurrently enrolled in various sections of foundation art courses. Presentations will include an overview of the art departments and examination of professional art practices  
COREQ: ART 110 and ART 111/3 or ART 113; ART 112 and ART 111/3 or ART 113

ART 129  DESIGN IN VISUAL ARTS  3  
Introduction to design through the physical application of various art media. Study of design criteria and art objectives as they relate to the environment  
REstrictions: Open to nonmajors and nonminors only
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 prac-
tice 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 con-
tent, function and context
PREREQ: ART 201 and ART 211
COREQ: ART 304

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: ART 302
COREQ: ART 305

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, eval-
uation of marketing strategies, conceptual thinking and creative composition for solutions 
to consumer and trade magazine, newspaper and outdoor advertising
PREREQ: ART 201 and ART 211
COREQ: ART 302

ART 305  ADVERTISING DESIGN II  3
Application of the principles of concept and design to more complex advertising prob-
lems. Development of basic presentation and communication skills as well as the analysis 
and implementation of creative strategies.
PREREQ: ART 304
COREQ: ART 303

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  INTERMEDIATE APPLIED PHOTOGRAPHY  3
Photography as applied to visual communications Making of images for design, editori-
al and advertising applications. Studio techniques, lighting and set building as related to 
contemporary professional practice and imagery
PREREQ: ART 211 or ART 380

ART 311  APPLIED PHOTOGRAPHY  3
Study and application of photographic solutions to specific graphic and advertising 
design problems, including still life, location, studio techniques and the relation-
ship between the photographer, the art director and the designer
PREREQ: ART 310

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 62 credit hours

ART 320  INTERMEDIATE ILLUSTRATION  3
Application of creative illustration imagery to editorial and advertising design problems.
PREREQ: ART 220
RESTRICTIONS: May be repeated for up to six credit hours

ART 321  TOPICS: ILLUSTRATION  3
In-depth study of selected media and functions of illustration. Aims to develop profes-
sional level skills in the handling of materials and in the conceptualization of images.
RESTRICTIONS: Requires permission of instructor. May be repeated for up to six credit 
hours

ART 323  AIRBRUSH  3
Presents elementary uses of the airbrush and various airbrush media and materials
PREREQ: ART 223, ART 234, or ART 236
RESTRICTIONS: May be repeated for up to nine credit hours

ART 330  ADVANCED FIGURE DRAWING  3
Continued studies in figure drawing. Emphasis on advanced media techniques, descrip-
tion and personal expression.
PREREQ: ART 230
RESTRICTIONS: May be repeated for credit when topics vary

ART 331  INTERMEDIATE PAINTING  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: ART 231
RESTRICTIONS: May be repeated for up to six credit hours

ART 334  FIGURE PAINTING  3
Exploration of painting the human figure. Emphasis on structural analysis, form, color 
and technique
PREREQ: ART 230 and ART 231

ART 336  ADVANCED WATERCOLOR  3
In-depth study of the aesthetics, materials and techniques of watercolor
PREREQ: ART 236

ART 341  WOODCUT AND ETCHING  3
Introduction to basic woodcut and/or intaglio block relief processes. Introduction to 
intaglio processes including drypoint, line etching, soft ground, lifeguard and aquatint 
techniques

ART 342  INTRODUCTION TO MONOPRINTING AND PAPERMAKING 
PREREQ: ART 201 and ART 211

ART 350  INTERMEDIATE SCULPTURE I  3
Problems in sculptural media and aesthetics
PREREQ: ART 250

ART 351  INTERMEDIATE SCULPTURE II  3
Further development of concepts and techniques of sculpture.
PREREQ: ART 350

ART 360  INTERMEDIATE METALS  3
Problems in various metal media
RESTRICTIONS: May be repeated up to six credit hours

ART 366  INDEPENDENT STUDY  1-6

ART 370  FIBER WORK II  3-9
Intermediate level course dealing with fabric forms, off-loom and on-loom media
PREREQ: ART 270 or ART 371 or ART 372 or ART 373
RESTRICTIONS: May be repeated for up to six credit hours

ART 371  FABRIC FORMS  3
Introduction to surface design and embellishment of commercially made fabrics through 
new and traditional textile design methods, such as direct pigment and dye applications; 
resist methods; and reconstruction processes including stitching, applique, and quilting
Individual conceptual development of imagery and forms

ART 372  FIBER FORMS: OFF LOOM  3
Introduction to use of simple felted fabrication and off loom textile processes in problem 
solving of low relief, 3D, apparel and site specific media applications. Processes include 
weaving, knitting, and basketry to emphasize individual concepts

ART 373  ON LOOM WEAVING  3
Introduction to creative use of hand looms and computer driven multiple harness looms 
for creative development of innovative cloth structures. Applications of color, texture and 
weave design principles to produce low relief and/or non-planar formats as related to 
conceptual expression

ART 380  INTERMEDIATE PHOTOGRAPHY: BLACK & WHITE  3
Use of the medium for artistic communication. Advanced technical and aesthetic con-
ccepts as related to fine and applied art problems.
PREREQ: ART 280

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: ART 380

ART 382  ALTERNATIVE PHOTOGRAPHIC PROCESSES  3
Non-silver photographic processes such as cyanotype, gum-bichromate, photo transfer, 
and vein-dye brown. Using existing negatives, students will create, alter and manipulate 
images
PREREQ: ART 280
RESTRICTIONS: Ability to work independently

ART 390  INTERMEDIATE CERAMICS I  3
Continuation of Beginning Ceramics
PREREQ: ART 290

ART 399  INTERMEDIATE GRAPHIC DESIGN  3
Continuation of Introduction to Graphic Design
PREREQ: ART 300

ART 402  ADVANCED GRAPHIC DESIGN  3
Regarded as an advanced course in graphic design focusing on the conceptual develop-
ment of visual solutions to complex design problems. Emphasis is on the design pro-
cess as a means of developing creative solutions to problems in a variety of 
applications including print and electronic media.
PREREQ: ART 304 and ART 305

ART 409  advanced ceramics  3
Application of the principles of concept and design to more complex advertising prob-
lems. Development of basic presentation and communication skills as well as the analysis 
and implementation of creative strategies.
PREREQ: ART 304
COREQ: ART 303

ART 410  ADVANCED ILLUSTRATION  3
Study of the principles of concept and design and their application to more complex ad-
vertising problems. Emphasis on the development of basic presentation and communi-
cation skills as well as the analysis and implementation of creative strategies.
PREREQ: ART 310

ART 411  ADVANCED PHOTOGRAPHY  3
Study and application of photographic solutions to specific graphic and advertising 
design problems, including still life, location, studio techniques and the relation-
ship between the photographer, the art director and the designer
PREREQ: ART 310

ART 415  ADVANCED PAINTING  3
Study and development of advanced techniques in painting. Emphasis on the develop-
ment of personal style and the application of innovative and experimental techniques 
in painting.
PREREQ: ART 331

ART 420  ADVANCED SCULPTURE  3
Advanced level course in sculpture focusing on the conceptual development and visual 
expression of ideas. Emphasis on the exploration of form and material through a variety 
of sculptural techniques and processes.
PREREQ: ART 350

ART 421  ADVANCED METALWORK  3
Intermediate level course dealing with metal media. Emphasis on the conceptual 
development and visual expression of ideas. Advanced technical and aesthetic con-
ccepts as related to fine and applied art problems.
PREREQ: ART 360

ART 422  ADVANCED WOODCUT AND ETCHING  3
Advanced level course in intaglio processes, including drypoint, line etching, soft ground, 
lifeguard and aquatint techniques. Emphasis on the conceptual development and visual 
expression of ideas. Advanced technical and aesthetic concepts as related to fine and 
applied art problems.
PREREQ: ART 342

ART 423  ADVANCED AIRBRUSH  3
Advanced level course in the use of the airbrush and various airbrush media and mate-
rials. Emphasis on the conceptual development and visual expression of ideas. Advanced 
technical and aesthetic concepts as related to fine and applied art problems.
PREREQ: ART 323

ART 424  ADVANCED BOOK ARTS  3
Advanced level course in book arts. Emphasis on the conceptual development and visual 
expression of ideas. Advanced technical and aesthetic concepts as related to fine and 
applied art problems.
PREREQ: ART 309

ART 425  ADVANCED GRAPHIC DESIGN  3
Advanced level course in graphic design focusing on the conceptual development of visual 
solutions to complex design problems. Emphasis is on the design process as a means of 
developing creative solutions to problems in a variety of applications including print and e-
lectronic media.
PREREQ: ART 402

ART 426  ADVANCED INTERMEDIATE GRAPHIC DESIGN  3
Advanced level course in graphic design focusing on the conceptual development of visual 
solutions to complex design problems. Emphasis is on the design process as a means of 
developing creative solutions to problems in a variety of applications including print and e-
lectronic media.
PREREQ: ART 402

ART 427  ADVANCED GRAPHIC DESIGN II  3
Advanced level course in graphic design focusing on the conceptual development of visual 
solutions to complex design problems. Emphasis is on the design process as a means of 
developing creative solutions to problems in a variety of applications including print and e-
lectronic media.
PREREQ: ART 402

ART 428  ADVANCED GRAPHIC DESIGN III  3
Advanced level course in graphic design focusing on the conceptual development of visual 
solutions to complex design problems. Emphasis is on the design process as a means of 
developing creative solutions to problems in a variety of applications including print and e-
lectronic media.
PREREQ: ART 402
ART 391 Intermediate Ceramics II 3
Continuation of Intermediate Ceramics I with emphasis on the technical properties of clay and glazes
PREQ: ART 390
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.
PREQ: ART 303 and ART 305
COREG: ART 403
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.
PREQ: ART 303 and ART 305
COREG: ART 403
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.
PREQ: ART 402 and ART 403
COREG: ART 405
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.
PREQ: ART 402 and ART 403
COREG: ART 405
ART 408 Practicum 3
Field experience in an advertising agency, design studio, corporate design department or commercial photography studio in the student's discipline concentration.
PREQ: ART 303 and ART 305
RESTRICTIONS: VC senior level only
ART 410 Advanced Applied Photography 3
Introduction to large format techniques and equipment and their application to advertising, graphic design, and editorial requirements. Assignments with emphasis on studio lighting and professional practice.
PREQ: ART 310
ART 411 Advanced Applied Photography II 3-6
Continuation of ART 410 directed toward the production of a portfolio which accurately and effectively defines the student's conceptual and practical capabilities in applied photography situations.
PREQ: ART 410
RESTRICTIONS: May be repeated for up to nine credit hours.
ART 416 Professional Practices 3
Discussion of selection, presentation and installation of work in preparation for the BFA exhibition; documentation of art work and resume writing; strategies for application to graduate school, art galleries and grants; and refinement as professional artists.
RESTRICTIONS: BFA senior level 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 senior level only
ART 420 Advanced Illustration 3
Specializes in the areas of story, cinema and product illustration.
PREQ: ART 320
RESTRICTIONS: May be repeated for up to six credit hours
ART 421 Illustration Studio 3
Directs portfolio/resume preparation and aids in developing a specific area of illustration for each student. Explores advanced illustration techniques.
PREQ: ART 320
RESTRICTIONS: May be repeated for up to nine credit hours.
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.
PREQ: ART 230
COREG: 400 level art course
RESTRICTIONS: May be repeated for 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.
PREQ: Six credits of ART 331
RESTRICTIONS: May be repeated for up to six 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.
PREQ: Six credits of ART 331
RESTRICTIONS: May be repeated for 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.
PREQ: ART 241 and ART 340 and/or ART 341
RESTRICTIONS: May be repeated for up to six credit hours.
ART 441 Advanced Printmaking 3
Advanced techniques in lithography and screenprinting or papermaking, monoprinting, etching and woodcut. Processes vary according to instructor.
PREQ: ART 241 and ART 340 and/or ART 341
RESTRICTIONS: May be repeated for up to nine credit hours.
ART 450 Sculpture Studio 3-6
Advanced studio work based on agreement between student and instructor as to content and quantity of work required.
PREQ: ART 351
RESTRICTIONS: May be repeated for up to six credit hours.
ART 451 Advanced Sculpture 3
Continuation of Intermediate Sculpture. Further development of concepts and techniques of sculpture.
PREQ: ART 351
RESTRICTIONS: May be repeated for up to nine credit hours.
ART 460 Metals Studio 3
Advanced studio work based on agreement between student and instructor as to content and quantity of work required.
PREQ: Six credits in ART 360
RESTRICTIONS: May be repeated for up to six credit hours.
ART 461 Advanced Metals 3
Advanced problems in jewelry and metalwork.
PREQ: Six credits in ART 360
RESTRICTIONS: May be repeated for up to nine credit hours.
ART 466 Independent Study 1-6
ART 470 Advanced Fibers 3
In-depth study and production of fiber works according to student-selected media from previous fibers coursework. Critical evaluation of creative work as well as professional skills and portfolio enhancement and exhibition participation.
PREQ: ART 270 or ART 370 or ART 371 or ART 372 or ART 373
RESTRICTIONS: May be repeated for up to six credit hours.
ART 471 Fibers Studio 3
Mature study of selected media from previous fibers coursework. Presentation and critical evaluation along with development of advanced professional skills, portfolio refinement, exhibition participation and field experience.
PREQ: ART 270 or ART 370 or ART 371 or ART 372 or ART 373.
RESTRICTIONS: May be repeated for up to nine credit hours.
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.
PREQ: ART 381
RESTRICTIONS: May be repeated for up to six credit hours.
ART 482 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.
PREQ: ART 381
RESTRICTIONS: May be repeated for 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.
PREQ: ART 380
RESTRICTIONS: May be repeated for up to nine credit hours.
ART 484 The Creative Portrait 3
Concentrates on developing portrait skills in a wide array of situations. Techniques for photographing diverse individuals are explored in detail.
PREQ: ART 380
RESTRICTIONS: Previous photographic experience
ART 485  THE PHOTOGRAPHIC SEQUENCE  3
Term long projects aimed at making a coherent body of images, each one relating to
and extending the meaning of the others. Issues such as content, style, size, structure and
flow explored in depth.
PREREQ: ART 380
RESTRICTIONS: Previous photographic experience

ART 486  PHOTO REPORTAGE AND DOCUMENTATION  3
Study and production of photographs dealing with analysis and record. Examination of
aesthetic, social and political interplay. Individual and team projects, color and black
and white prints and slides, single and multiple images.
PREREQ: ART 380
RESTRICTIONS: Previous photographic experience

ART 490  ADVANCED CERAMICS  3
Continuation of Intermediate Ceramics II with emphasis on individual development of
design and form.
PREREQ: ART 391
RESTRICTIONS: May be repeated for up to six 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: ART 491
RESTRICTIONS: May be repeated for up to nine 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.

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.

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.

ART 606  METALS TUTORIAL  3
Studio experience for those students whose principal mode of artistic expression and
prior studies are primarily in disciplines other than metals.

ART 607  FIBERS TUTORIAL  3
Studio experience for those students whose principal mode of artistic expression and
prior studies are primarily in disciplines other than fibers.

ART 608  PHOTOGRAPHY TUTORIAL  3
Studio experience for those students whose principal mode of artistic expression and
prior studies are primarily in discipline other than photography.

ART 609  CERAMICS TUTORIAL  3
Studio experience for those students whose principal mode of artistic expression and
prior studies are primarily in disciplines other than ceramics.

ART 610  ADVANCED APPLIED PHOTOGRAPHY  3
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: ART 411
RESTRICTIONS: May be repeated for up to twelve credit hours. Permission of instructor
required.

ART 611  ADVANCED APPLIED PHOTOGRAPHY  3
Continuation of ART 610 directed toward the production of a portfolio which accurately
and effectively defines the student’s conceptual and practical capabilities in applied pho-
tography situations.
PREREQ: ART 411
RESTRICTIONS: May be repeated for up to twelve credit hours. Permission of instructor
required.

ART 630  DRAWING STUDIO  3
Works on paper using traditional and non-traditional media. The nature of the work is an
extension of student creative direction.
RESTRICTIONS: May be repeated for up to six credit hours. Permission of instructor
required.

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

ART 633  PAINTING STUDIO  3-6
Advanced studio work based on agreement between student and instructor as to content
and quantity of work required.
RESTRICTIONS: May be repeated for up to eighteen credit hours. Permission of instructor
required.

ART 640  PRINTMAKING STUDIO  3-6
Advanced studio work based on agreement between student and instructor as to content
and quantity of work required.
RESTRICTIONS: May be repeated for up to eighteen credit hours. Permission of instructor
required.

ART 641  PRINTMAKING  3-6
Provides independent work in a chosen print area. Course requirements will be deter-
mined by agreement of the student and the teacher.
RESTRICTIONS: May be repeated for up to eighteen credit hours. Permission of instructor
required.

ART 650  SCULPTURE STUDIO  3-6
Advanced studio work based on agreement between student and instructor as to content
and quantity of work required.
RESTRICTIONS: May be repeated for up to eighteen credit hours. Permission of instructor
required.

ART 651  SCULPTURE  3-6
Courses in development of idioms and imagery through sculptural media.
RESTRICTIONS: May be repeated for up to six credit hours.

ART 660  JEWELRY STUDIO AND METALWORK  3-6
Advanced studio work based on agreement between student and instructor as to content
and quantity of work required.
RESTRICTIONS: May be repeated for up to eighteen credit hours. Permission of instructor
required.

ART 661  JEWELRY AND METALWORK  3-6
Advanced problems in jewelry techniques.
RESTRICTIONS: May be repeated for up to six credit hours.

ART 662  ENAMELING  3-6
Application of advanced enameling techniques.
RESTRICTIONS: May be repeated for up to six credit hours.

ART 670  FIBERS  3-6
Application of advanced fiber techniques.
RESTRICTIONS: May be repeated for up to six credit hours.

ART 671  FIBERS STUDIO  3-6
Advanced studio work based on agreement between student and instructor as to content
and quantity of work required.
RESTRICTIONS: May be repeated for up to six credit hours.

ART 678  SEMINAR: STUDIO INSTRUCTION PRACTICUM  3
Planning, instruction and evaluation of art disciplines at the college or equivalent level.
RESTRICTIONS: Requires permission of instructor. May be repeated for up to nine credit
hours.

ART 679  SEMINAR: CURRENT ISSUES IN ART  3
Readings, discussions, presentations and on-site visits dealing with issues related to the
practice of art.
RESTRICTIONS: Requires permission of instructor. May be repeated for up to nine credit
hours.

ART 681  MATERIALS AND TECHNIQUES OF THE CONTEMPORARY
PAINTER AND DRAFTSMAN  3
Twentieth-century artists' materials. Topics: acrylic emulsion and solution, alkyd resin, PVA
paints, collage-assemblage, solvent-photo transfer, synthetic fiber canvas, paper, panels,
oil pastels, point sticks, felt-tip markers, colored inks/pencils, airbrush-spray gun, and non-
and storage environments. May be crosslisted with ARTC681 and/or ARTH681.

ART 682  STUDIO IN THE MATERIALS AND TECHNIQUES OF DRAWING
INS THE WEST  3
See ARTC680 for course description.

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

ART 684  PHOTOGRAPHY STUDIO  3-6
Advanced studio work based on agreement between student and instructor as to content
and quantity of work required.
RESTRICTIONS: May be repeated for up to eighteen credit hours. Permission of instructor
required.
ART 685  Color Mixing and Matching  3
See ARTC685 for course description

ART 688  Studio Materials and Techniques of Painting I  3
See ARTC688 for course description

ART 689  Studio Materials and Techniques of Painting II  3
See ARTC689 for course description

ART 690  Studio in the Materials and Techniques of Printmaking I  3
See ARTC690 for course description

ART 691  Ceramics  3-6
Problems in throwing, glazing and firing techniques.
RESTRICTIONS: May be repeated for up to eighteen credit hours. Permission of instructor required

ART 692  Ceramics Studio  3
Advanced studio work based on agreement between student and instructor as to content and quantity of work required.
RESTRICTIONS: May be repeated for up to eighteen credit hours. Permission of instructor required

ART 698  MFA Exhibition  3
Selection, presentation and installation of art work in an exhibition space culminating the studio component of graduate study
RESTRICTIONS: Approval of the student's individual Graduate Committee

ART 699  MFA Supporting Paper  3
Development of a written and photographic document in support of issues and concerns characterizing personal artistic development experienced during graduate study
RESTRICTIONS: Approval of the student's individual Graduate Committee

ART CONSERVATION

ARTC 301  Care and Preservation of Cultural Property  3
Examines philosophy and practice of art conservation and the issues pertaining to collections management of cultural property. Typical deterioration characteristics and preservation alternatives for a wide variety of materials likely to be encountered in a fine arts or archival collection will be presented and discussed.

ARTC 466  Independent Study  1-6

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

ARTC 616  Conservation Research Methods  3
Introduction to 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

ARTC 666  Independent Study  1-6

ARTC 670  Chemical and Physical Techniques Used in the Examination of Art Materials I  3
Classroom discussion and laboratory application of important chemical and physical techniques that art conservators should be able to perform on their own to identify and characterize organic art materials.
RESTRICTIONS: Full-time fellowship students only

ARTC 671  Chemical and Physical Techniques Used in the Examination of Art Materials II  3
Classroom discussion and laboratory application of important chemical and physical techniques that art conservators should be able to perform on their own to identify and characterize metals, glass, ceramics, and natural and synthetic polymers. Also, basic structure, composition and deterioration mechanics of such materials.
PREREQ: ARTC670
RESTRICTIONS: Full-time fellowship students only

ARTC 672  Chemical and Physical Techniques Used in the Examination of Art Materials III  3
Classroom discussion and laboratory application of more sophisticated analytical and physical techniques used by the scientific 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

ARTC 673  Chemical and Physical Techniques Used in the Examination of Art Materials IV  3
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

ARTC 680  Studio in the Materials and Techniques of Drawing in the West  3
Lecture-studio presentation on materials and tools, supports and techniques of wet and dry media drawing in the West from about the year 1400 to the present. Topics include the development and manufacture of paper, pens, brushes, inks, watercolor paint, charcoal, metal points, graphite pencils, natural and fabricated chalks, crayons, pastels, erasers and fixatives. Includes studio reconstructions of masterworks, lectures and library research. May be cross-listed with ART 682 and/or ARTH680.
RESTRICTIONS: Requires permission of instructor.

ARTC 681  Materials and Techniques of the Contemporary Painter and Draftsman  3
See ART 681 for course description

ARTC 685  Color Mixing and Matching  3
Lecture-studio presentation covering analytical and practical aspects of mixing and matching colorants without instrumentation. Pigments, dyes and the manufacture of paint studied. Major topics include color interaction, nomenclature and the Munsell system of color description. May be cross-listed with ART 685
RESTRICTIONS: Requires permission of instructor.

ARTC 688  Studio Materials and Techniques of Painting I  3
Major materials including tools, supports and techniques of architectural painting, manuscript illumination and panel painting in encaustic, watercolor, and egg tempera from about 1500 BC to AD 1500. Major topics include true fresco and egg tempera painting. Studio reconstructions, lectures and library research. May be cross-listed with ART 688 and/or ARTH688.
RESTRICTIONS: Requires permission of instructor.

ARTC 689  Studio Materials and Techniques of Painting II  3
Major masters and the materials, tools and techniques of indirect and direct oil painting. Time frame: 1500-1900. Major topics include the development of canvas, brushes, oil paint, medium, varnishes, solvents and the complex relationship between indirect and direct techniques. Includes studio reconstructions of masterworks, lectures and library research. May be cross-listed with ART 689 and/or ARTH689.
RESTRICTIONS: Requires permission of instructor.

ARTC 690  Studio in the Materials and Techniques of Printmaking I  3
Major masters and the materials, tools, and techniques of relief, planographic and intaglio printmaking. Time frame: ca 1400-1900. Major topics include woodcut, copperplate engraving, etching, drypoint, aquatint, mezzotint, lithograph and wood engraving. Studio reconstructions, lectures and library research. May be cross-listed with ART 690 and/or ARTH690.
RESTRICTIONS: Requires permission of instructor.

ARTC 695  Seminar in Art Conservation  1
Oral reports on current work in the fields of art conservation, art history, ethics, philosophy and museum science.
PREREQ: ARTC685
RESTRICTIONS: Full-time fellowship students only

ARTC 696  Advanced Apprenticeship and Research in Art Conservation  6
ARTC 696  Advanced Apprenticeship and Research in Art Conservation  6
Discussion, demonstration, practice and research on current treatment techniques used in the conservation of ceramics, glass, metals, paintings, paper, textiles, wood, photographs and other materials with the supervision of museum conservators. May be cross-listed with ART 696.
PREREQ: ARTC684 and ARTC685
RESTRICTIONS: Full-time fellowship students only
ARTC 869  ADVANCED APPRENTICESHIP AND RESEARCH IN ART CONSERVATION II 6
Discussion, demonstration, practice and research on current treatment techniques used in the conservation of ceramics, glass, metals, paintings, paper, wood, photography and objects made with other materials. Requirements for this course may be fulfilled by work in cooperating institutions outside The Winterthur Museum
PREREQ: ARTC 865 and ARTC 866
RESTRICTIONS: Full-time fellowship students only

ARTC 870  INTERNSHIP IN CONSERVATION 1-9
A third year of study at an accredited institution working with a master conservator in the student’s field of interest
PREREQ: ARTC 869
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 coursework.
RESTRICTIONS: Not open to students who have been admitted to candidacy.

ARTC 969  DOCTORAL DISSERTATION 1-12 PF

ART HISTORY

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
RESTRICTIONS: Usually offered in Fall semester

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
RESTRICTIONS: Usually offered in Spring semester

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. Focus on the arts of Buddhism; also considers Hindu, Confucian, Taoist and other localized religious and cultural influences on the visual arts

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 207  ORIGINS OF ART 3
Art and architecture of the Stone Age, the Near East, Egypt, Crete, Mycenaean Greece and Barbarian peoples. Includes politics and religion as factors influencing artistic change. Ancient literature used to clarify the meaning of the works
RESTRICTIONS: Offered in Fall semester, every other year

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
RESTRICTIONS: Usually offered in Fall semester, every other year

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
RESTRICTIONS: Usually offered in Spring semester, every other year

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
RESTRICTIONS: Usually offered in Spring semester, every other year

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
RESTRICTIONS: Usually offered in Fall semester

ARTH 218  HIGH RENAISSANCE AND MANIERIST 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
RESTRICTIONS: Usually offered in Spring semester

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
RESTRICTIONS: Usually offered in Spring semester

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
RESTRICTIONS: Usually offered in Fall semester

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
RESTRICTIONS: Usually offered in Spring semester

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
RESTRICTIONS: Usually offered in Fall semester

ARTH 231  AMERICAN ART: 1865-PRESENT 3
Architecture, painting, sculpture, photography and decorative arts of the United States from the Civil War 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
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 India 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 Indian culture.

ARTH 236  THE ARTS OF ISLAM  3
Survey of architecture, painting, ceramics and metalwork in Islam in Western and Southern Asia, Islamic Africa and the Iberian peninsula. Also treats influences of Islamic design on the arts of Judaeo-Christian Europe and the rich secular cultures that flourished in Moslem nations.

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. 

RESTRICTIONS: Usually offered in Spring semester.

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 308  MODERN ARCHITECTURE 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 309  MODERN ARCHITECTURE II: THE TWENTIETH CENTURY  3
Aesthetic and technological developments in architecture, interior design and the planned environment from the early work of Wright through the contributions of the Bauhaus, Mies van der Rohe and Le Corbusier to Post-Modernism and other trends of the last third of the 20th century.

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 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 321  HISTORY OF AFRO-AMERICAN ART  3
See BMAS320 for course description.

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 339  ART AND ARCHITECTURE OF EUROPE  3
Primary focus on painting, sculpture and architecture in Central Europe from the Romansque to the Modern Era. Subject matter determined by country in which overseas program is conducted.

RESTRICTIONS: Offered only in conjunction with a foreign study program. May be repeated for credit when topics vary.

ARTH 341  BRITISH ART AND ART INSTITUTIONS  3
Provides an introduction to British Art and Art institutions from 1700 to present day. Special emphasis placed on collecting of art, display in museums, and the British School of painting.

ARTH 360  HUMANITIES COLOQUIUM  3
See ARSC350 for course description.

ARTH 366  INDEPENDENT STUDY  1-6

ARTH 402  UNDERGRADUATE SEMINAR IN THE HISTORY OF ART  3

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. Topics change with each time of offering. Recent topics include Arch高校o Greek Vase Painting, 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. Topics change with each time of offering. 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. Topics change with each time of offering. 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, Bruneleschi 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. Topics change with each time of offering. Recent topics include Bernini and Roman Baroque Sculpture, Seicento Poetics and Imagery, Caravaggism, 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
Seventeenth-century art in northern Europe. Topics change with each time of offering. Recent topics include Rembrandt and Rubens, Vermeer and Dutch Genre Painting, Northern Baroque Portraiture, and Prints in the Age of Rembrandt.

RESTRICTIONS: May be repeated for credit when topics vary.

ARTH 419  SEMINAR IN EIGHTEEN-THIRTY-THIRTY-ART  3
Art from the Enlightenment to the Age of Revolution. Topics change with each time of offering. Recent topics include Goya and the Spanish Enlightenment, David and Early Romanticism.

RESTRICTIONS: May be repeated for credit when topics vary.

ARTH 421  SEMINAR IN NINETEENTH-CENTURY ART  3
Art from David to Impressionism. Topics change with each time of offering. 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 423  SEMINAR IN TWENTIETH-CENTURY ART  3
Art in Europe, with some reference to American art, from Post-Impressionism to the present. Topics change with each time of offering. Recent topics include Symbolism, Picasso, Dada and Surrealism, Cubism and its Influence, and PostModernism.

PREREQ: ARTH227 or ARTH228

RESTRICTIONS: May be repeated for credit when topics vary.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARTH 424</td>
<td>Seminar in Nineteenth-Century Photography</td>
<td>3</td>
<td>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 &quot;Art&quot; Photography.</td>
</tr>
<tr>
<td>ARTH 427</td>
<td>Seminar in Twentieth-Century Photography</td>
<td>3</td>
<td>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.</td>
</tr>
<tr>
<td>ARTH 429</td>
<td>Seminar in Modern Architecture</td>
<td>3</td>
<td>Architecture in Europe and/or America from 1750 to the present: Topics change with each time of offering. Recent topics include the Architecture of Neoclassicism, and Sullivan, Wright, and the Prairie School.</td>
</tr>
<tr>
<td>ARTH 430</td>
<td>Seminar: Regional Arts and Architecture</td>
<td>3</td>
<td>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 Settlers. Topics include architecture, landscape, decorative arts, and material life.</td>
</tr>
<tr>
<td>ARTH 431</td>
<td>Seminar in American Architecture</td>
<td>3</td>
<td>American architecture from the Colonies to the present: Topics change with each time of offering. Recent topics include Architecture of the Colonial and Federal periods, Nineteenth-Century American Architecture, and Philadelphia Architecture.</td>
</tr>
<tr>
<td>ARTH 432</td>
<td>Making the American City</td>
<td>3</td>
<td>Examination of historical and cultural issues related to housing, consumerism, gender, ethnicity, craft, poverty and wealth as a means to interpreting the city as artifact and symbolic setting. Includes field trips to cities in the region. Students will work with primary sources including archaeological materials, architecture and documentary evidence.</td>
</tr>
<tr>
<td>ARTH 435</td>
<td>Seminar in American Art</td>
<td>3</td>
<td>American art from the Colonies to the present: Topics change with each time of offering. Recent topics include Eakins and American Realism, Early American Modernism, and American Painting and Sculpture after World War II.</td>
</tr>
<tr>
<td>ARTH 440</td>
<td>Seminar on Prints and Drawings</td>
<td>3</td>
<td>Graphic art from the 15th to 19th century with an emphasis on original works of art. Topics change with each time of offering. Recent topics include Renaissance and Baroque Graphic Art, Prints in the Age of Durer, and Problems in Prints from the Renaissance to the 19th Century.</td>
</tr>
<tr>
<td>ARTH 454</td>
<td>Vernacular Architecture</td>
<td>3</td>
<td>See HIST454 for course description.</td>
</tr>
<tr>
<td>ARTH 457</td>
<td>Survey of African Art</td>
<td>3</td>
<td>See ANTH457 for course description.</td>
</tr>
<tr>
<td>ARTH 466</td>
<td>Independent Study 1-6</td>
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<tr>
<td>ARTH 605</td>
<td>Studies in Greek and Roman Art</td>
<td>3</td>
<td>The art of antiquity from the origins of Greek civilization to the fall of Rome: Recent topics include: Archaising Greek Vase Painting, Hellenistic Greek Sculpture, Late Roman Portraiture, and Roman Architecture.</td>
</tr>
<tr>
<td>ARTH 606</td>
<td>Studies in Medieval Art</td>
<td>3</td>
<td>The art of Europe from the fall of Rome to the late Gothic period: Topics change with each time of offering. Recent topics include the Court of Chartres, Early Irish and Anglo-Saxon Art, and Medieval Ivories.</td>
</tr>
<tr>
<td>ARTH 608</td>
<td>Studies in Northern Renaissance Art</td>
<td>3</td>
<td>The arts in Northern Europe from 1300 to 1600: Topics may change with each time of offering. Recent topics include: Northern Baroque Portraiture, Late Renaissance Portraiture, and Renaissance Architecture.</td>
</tr>
<tr>
<td>ARTH 611</td>
<td>Studies in Italian Renaissance Art</td>
<td>3</td>
<td>Italian art from 1300 to 1600: Topics change with each time of offering. Recent topics include: Florence and Siena, Italian Renaissance Architecture, and Renaissance Architecture in the Age of Michelangelo.</td>
</tr>
<tr>
<td>ARTH 614</td>
<td>Studies in Italian Renaissance Architecture</td>
<td>3</td>
<td>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.</td>
</tr>
<tr>
<td>ARTH 615</td>
<td>Studies in Early Christian and Byzantine Art</td>
<td>3</td>
<td>The beginnings of Christian expression under the Romans to the fall of the Byzantine Empire: Topic of study may change with each time of offering. Restrictions: May be repeated for credit when topics vary.</td>
</tr>
<tr>
<td>ARTH 616</td>
<td>Studies in Italian Baroque Art</td>
<td>3</td>
<td>Italian art in the 17th century: Recent topics include: Baroque Architecture, Seicento Poetics and Imagery, Caravaggio, and Origins of the Baroque: The Carracci and their Academy. Restrictions: May be repeated for credit when topics vary.</td>
</tr>
<tr>
<td>ARTH 617</td>
<td>Studies in Northern Baroque Art</td>
<td>3</td>
<td>Seventeenth-century art in northern Europe: Recent topics include: Rembrandt and Rubens, Vermeer and Dutch Genre Painting, Northern Baroque Portraiture, and Prints in the Age of Rembrandt. Restrictions: May be repeated for credit when topics vary.</td>
</tr>
<tr>
<td>ARTH 619</td>
<td>Studies in Eighteenth-Century Art</td>
<td>3</td>
<td>Art from the Enlightenment to the Age of Revolution: Recent topics include: Goya and the Spanish Enlightenment, J. L. David and Early Romanticism. Restrictions: May be repeated for credit when topics vary.</td>
</tr>
<tr>
<td>ARTH 621</td>
<td>Studies in Nineteenth-Century Art</td>
<td>3</td>
<td>Art from David to Impressionism: Recent topics include: Gericault, Delacroix, Cézanne, Art and Politics (1780-1860): The Theory and Practice of Romanticism, Historicism from David to Gerome, and Orientalism. Restrictions: May be repeated for credit when topics vary.</td>
</tr>
<tr>
<td>ARTH 622</td>
<td>Research Topics in Historic Preservation</td>
<td>3</td>
<td>See URAF636 for course description.</td>
</tr>
<tr>
<td>ARTH 623</td>
<td>Studies in Twentieth-Century Art</td>
<td>3</td>
<td>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.</td>
</tr>
<tr>
<td>ARTH 628</td>
<td>Seminar in Historic Preservation</td>
<td>3</td>
<td>See URAF629 for course description.</td>
</tr>
<tr>
<td>ARTH 629</td>
<td>Studies in Modern Architecture</td>
<td>3</td>
<td>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.</td>
</tr>
<tr>
<td>ARTH 632</td>
<td>Making the American City</td>
<td>3</td>
<td>See URAF632 for course description.</td>
</tr>
<tr>
<td>ARTH 634</td>
<td>Historic Preservation Studio</td>
<td>3</td>
<td>See URAF630 for course description.</td>
</tr>
<tr>
<td>ARTH 636</td>
<td>Studies in American Art 1875-Present</td>
<td>3</td>
<td>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.</td>
</tr>
<tr>
<td>ARTH 637</td>
<td>Studies in English Art and Architecture</td>
<td>3</td>
<td>The art of England, emphasizing the period from the 16th century through the end of the 19th century: Recent topics include: British Country House, British Painting, English Architecture, and Collecting in England. Restrictions: May be repeated for credit when topics vary.</td>
</tr>
</tbody>
</table>
ARTH 638  European Decorative Arts  3
Interiors, furniture and decorative arts in Europe from the Renaissance to the 20th century. Application of art historical techniques and interpretation. Field trips to New York and Philadelphia
RESTRICTIONS: May be repeated for credit when topics vary

ARTH 639  American Decorative Arts  3
Interiors, furniture and decorative arts in America from the 17th century to the present
RESTRICTIONS: May be repeated for credit when topics vary

ARTH 640  Studies in Eighteenth-Century Art  3
Art and art theory in England and the Continent. Topic of study may change with each time of offering
PREREQ: ARTH214 or ARTH215
RESTRICTIONS: May be repeated for credit when topics vary

ARTH 647  Seminar in Prints and Drawings  3
Recent topics include Renaissance and Baroque Graphic Art, Prints in the Age of Durer, and Problems in Prints from the Renaissance to the 19th Century
RESTRICTIONS: May be repeated for credit when topics vary

ARTH 657  Survey of African Art  3
See ARTH657 for course description

ARTH 680  Studio in the Materials and Techniques of Drawing in the West  3
See ARTH680 for course description

ARTH 681  Materials and Techniques of the Contemporary Painter and Draftsman  3
See ARTH681 for course description

ARTH 688  Studio Materials and Techniques of Painting I  3
See ARTH688 for course description

ARTH 689  Studio Materials and Techniques of Painting II  3
See ARTH689 for course description

ARTH 690  Studio in the Materials and Techniques of Printmaking I  3
See ARTH690 for course description

ARTH 691  Introduction to Decorative Arts in America to 1850  3
See ARTH691 for course description

ARTH 811  Studies in Nineteenth- and Twentieth-Century European and American Sculpture  3
See ARTH811 for course description

ARTH 812  Studies in American Painting Before 1800  3
See ARTH812 for course description

ARTH 850  Bibliography and Research Methods in Art History  0 PF
See ARTH850 for course description

ARTH 860  Reading and Research  1-9 PF
See ARTH860 for course description

ARTH 869  Master's Thesis  1-6
See ARTH869 for course description

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

ARTH 969  Doctoral Dissertation  1-12 PF

BLACK AMERICAN STUDIES

BAMS 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 204  Urban Communities  3
See SOCI204 for course description

BAMS 205  Contemporary Afro-American Issues  3
May be cross-listed with PHIL110

BAMS 206  Survey of Afro-American Culture  3
See ARTH906 for course description

BAMS 210  African Civilizations and World History  3
African social, economic and cultural contributions to the whole of human civilization in antiquity, medieval, renaissance and modern times

BAMS 212  Afro-Caribbean Life and Culture  3
Study of Afro-Caribbean life and culture examines the time of slavery and the struggle for civil rights. May be cross-listed with HIST212

BAMS 220  The American Civil Rights Movement  3
See HIST220 for course description

BAMS 230  Images of Race and Ethnicity in American Culture  3
See ARTH230 for course description

BAMS 231  Institutions and Race  3
See ARTH231 for course description

BAMS 304  History of Black America to the Civil War  3
May be cross-listed with HIST304

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 HIST306

BAMS 307  Black Thought and Philosophy  3
See ARTH307 for course description

BAMS 308  Delaware Black History  3
A survey course in Delaware Delaware history. The Black American in Delaware from colonial times to recent developments

BAMS 309  History of Black Nationalism  3
See ARTH309 for course description

BAMS 312  Institutions and Race  3
See ARTH312 for course description
BAMS 313 African American Literature I 3
See ENGL344 for course description.

BAMS 320 History of Afro-American Art 3
Review and study of major artistic movements and works by Afro-American artists from the early American colonial times to the Harlem Renaissance era to the present. May be cross-listed with ARTH321.
RESTRICTIONS: ARTH150 recommended.

BAMS 324 Afro-American Music 3
Historical analysis of origins and development of the Black musical experience in America. Contributions of Afro-American music studied by examining the function and meaning of the music, its idioms and characteristics, and its growth and development.

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

BAMS 331 History of Caribbean I 3
See HIST331 for course description.

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

BAMS 335 Race, Class and Crime 3
See CRJU355 for course description.

BAMS 360 Methodology and Black American Studies 3
Research methods, techniques and data-collecting as applied to the Afro-American experience.

BAMS 361 Race, Power and Social Conflict 3
See SOCIO31 for course description.

BAMS 395 Pan Africanism 3
See HIST395 for course description.

BAMS 415 Race, Class and Gender 3
See SOCIO415 for course description.

BAMS 432 Psychological Perspectives on the Black American 3
See PSYC416 for course description.

BAMS 433 Economic Development and Black America 3
Problems and causes of economic disparity, alternative goals and strategy for the economic development of Black America.
PREREQ: ECON115.

BAMS 434 Politics and Black America 3
Historical examination and review of the Black presence in the American political process. The emergence and thrust for Black participation in the political arena.
PREREQ: POSC105.

BAMS 440 Topics in Black American Studies 3
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.

BAMS 620 Third World: Problems and Issues 3
Problems and issues of the Third World; limitation and scope of Afro-American impact on the Third World.

BAMS 625 Curriculum Materials and Methods in Afro-American Studies 3
Curriculum laboratory to familiarize prospective and practicing teachers with trends, methods, materials and strategies for teaching Afro-American studies.
RESTRICTIONS: Requires permission of instructor.

BAMS 630 Counseling in the Black Community 3
Basic foundation in understanding the dynamics and effects society has on the Black personality as related to the counseling process.
RESTRICTIONS: Requires permission of instructor.

BAMS 650 Black Community Studies 3
Investigation and analysis of various topics and developments of interest and significance to the Black community. Topics vary.
RESTRICTIONS: May be repeated for credit when topics vary.

BAMS 660 Research and Black American Studies 1-6
PREREQ: Advanced students.

BIOLOGICAL SCIENCES

BISC 100 Freshman Seminar 1 PF
Five to seven carefully selected primary journal articles analyzed in discussion format. Emphasis on development of a sophisticated appreciation of the experimental frontier in an important area of modern biological research by examination of both classical and current papers.
RESTRICTIONS: Open to Freshman majors by faculty invitation only.

BISC 103 General Biology 3
The nature of science and biology as a science, origin of life, and structure and function of cells and multicellular organisms.
RESTRICTIONS: Open to non-majors only.

BISC 104 Neurobiology of the Brain 3
Survey of modern knowledge about neurons and their organization into functional circuits.
RESTRICTIONS: Open to non-majors only.

BISC 105 Human Heredity and Development 3
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.

BISC 106 Elementary Human Physiology 3
The structure and function of humans; mechanisms of maintenance and reproductive behavior.
RESTRICTIONS: Open to non-majors only.

BISC 107 Elementary Evolutionary Ecology 3
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.

BISC 110 Viruses, Genes and Cancer 3
Recent advances in biology at the cellular and subcellular levels of organization, techniques used in modern biology, and implications for society.
RESTRICTIONS: Open to non-majors only.

BISC 113 General Biology Laboratory 1
Structure and function of cells, and selected experiments dealing with the physiology of plants and animals.
COREQ: BISC103.

BISC 115 Human Heredity and Development Laboratory 1
Laboratory exercises dealing with probability, selection, karyotyping and pedigrees of humans.
COREQ: BISC105.

BISC 116 Elementary Human Physiology Laboratory 1
Selected experiments in physiology that demonstrate some of the concepts developed in BISC106, and a study of human anatomy.
COREQ: BISC106.

BISC 117 Elementary Evolutionary Ecology Laboratory 1
Laboratory exercises to complement the subject matter of BISC107.
COREQ: BISC107.

BISC 152 Biology of Human Sexuality 3
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.

BISC 171 Microbiology in Modern Society 3
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 1 4
Biological analysis of the nature of life, cell division, genetics and development. Also, the origin and diversity of life. Laboratory focus is 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  
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 276  HUMAN PHYSIOLOGY  
Physiology of the basic organ systems of humans.
PREREQ: BISC206 or BISC207, and CHEM101, CHEM103, CHEM105 or CHEM111
RESTRICTIONS: Open to non-majors only.

BISC 301  MOLECULAR BIOLOGY OF THE CELL  
Introduction to the molecular biology of eucaryotes and prokaryotes. 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 302  GENERAL ECOLOGY  
Interactions between organisms and their environments, population dynamics and interactions, communities, energy transfer within an ecological system, and components of the ecosystem.
PREREQ: BISC 208.
RESTRICTIONS: Either BISC302 or BISC321, but not both, will count toward Biology major.

BISC 303  GENETIC AND EVOLUTIONARY BIOLOGY  
The physical and chemical basis of heredity, the nature and mechanisms of gene action, genes in populations, speciation. Laboratory included.
PREREQ: BISC207 and one semester of organic chemistry.

BISC 305  CELL PHYSIOLOGY  
Cell Physiology covers the structure and function of eucaryotic cell organelles. Emphasis is put on dynamic processes such as membrane transport, cell motility and protein trafficking. Current studies from the literature and experimental techniques are also stressed.
PREREQ: BISC207, BISC208, CHEM103 and CHEM104.

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

BISC 311  MOLECULAR BIOLOGY OF THE CELL  
Introduction to the molecular biology of eucaryotes and prokaryotes. 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.
RESTRICTIONS: Chemical Engineering majors only.

BISC 312  GENERAL ECOLOGY LABORATORY  
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 321  ENVIRONMENTAL BIOLOGY  
Basic ecological principles with major emphasis on the effect of man-caused environmental alterations on populations, communities and ecosystems.
RESTRICTIONS: Either BISC302 or BISC321, but not both, will count toward Biology major.

BISC 324  INVERTEBRATE ZOOLOGY  
Structure and function, life cycles, phylogenetic relationships and ecology of the major invertebrate phyla.
PREREQ: BISC207 and BISC208.

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

BISC 330  BIOLOGY OF VISION  
An integrative approach to the study of vision. Topics are the physics of light, the biochemistry of visual pigments, the electrophysiology of the visual pathway, the psychophysics of visual perception and robotic vision. Emphasis on an interdisciplinary approach to the subject.
PREREQ: BISC207 and BISC208.

BISC 366  INDEPENDENT STUDY  
1-6
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>BISC 494</td>
<td>Experimental Ecology 3</td>
<td>3</td>
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<td>BISC 495</td>
<td>Evolution 3</td>
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<tr>
<td>BISC 498</td>
<td>Topics in Biology 3</td>
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<td>BISC 499</td>
<td>Computers in Biological Research 4</td>
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<td>BISC 507</td>
<td>Ecosystems and Environmental Biology 3</td>
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<td>BISC 601</td>
<td>Immunobiology 4</td>
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<tr>
<td>BISC 602</td>
<td>Molecular Biology of Animal Cells 3</td>
<td>3</td>
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<td>BISC 604</td>
<td>Recombinant DNA Laboratory 4</td>
<td>4</td>
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<td>BISC 605</td>
<td>Advanced Mammalian Physiology 4</td>
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<td>BISC 606</td>
<td>Advanced Mammalian Physiology 4</td>
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<td>BISC 608</td>
<td>Genetic Toxicology 2</td>
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<tr>
<td>BISC 610</td>
<td>General Endocrinology 3</td>
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<tr>
<td>BISC 612</td>
<td>Marine Ecology 4</td>
<td>4</td>
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<tr>
<td>BISC 617</td>
<td>Laboratory Techniques for Electron Microscopy 3</td>
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<td>BISC 618</td>
<td>Comparative Vertebrate Histology 4</td>
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<tr>
<td>BISC 626</td>
<td>Neuroscience I 4</td>
<td>4</td>
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<tr>
<td>BISC 627</td>
<td>Neuroscience II 3</td>
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<td>BISC 629</td>
<td>Immunobiology 4</td>
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<td>BISC 630</td>
<td>Ichthyology 4</td>
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<td>BISC 637</td>
<td>Population Ecology 3</td>
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<td>BISC 641</td>
<td>Microbial Ecology 3</td>
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<td>BISC 642</td>
<td>Evolutionary Biology 4</td>
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<td>BISC 643</td>
<td>Environmental Science 3</td>
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<tr>
<td>BISC 649</td>
<td>Physiology of Flowering Plants 3</td>
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<td>BISC 650</td>
<td>Bacterial Physiology 3</td>
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<tr>
<td>BISC 653</td>
<td>Recent Advances in Molecular Biology 2</td>
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<td>BISC 654</td>
<td>Biochemical Genetics 3</td>
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<td>BISC 658</td>
<td>Developmental Genetics 3</td>
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<tr>
<td>BISC 660</td>
<td>Environmental Physiology 3</td>
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**RESTRICTIONS:**
- Requires permission of instructor for the first three courses.
- Requires Junior or Senior status for BISC 495.
- May be cross-listed with CSCI 498.
- Requires consent of instructor for BISC 601.
- Requires permission of instructor for BISC 602.
- Requires permission of instructor for BISC 604.
- Requires Junior or Senior status for BISC 610.
- Requires permission of instructor for BISC 617.
- Requires permission of instructor for BISC 618.
- Requires Junior or Senior status for BISC 629.
- Requires consent of instructor for BISC 637.
- Requires Junior or Senior status for BISC 643.
- Requires permission of instructor for BISC 650.
- Requires permission of instructor for BISC 654.
- Requires Junior or Senior status for BISC 658.

**PREREQ:**
- BISC 302 or BISC 208
- BISC 207 or BISC 208
- BISC 207 or BISC 208 (or two BISC 100 level courses)
- BISC 207 or BISC 208
- Requires consent of instructor
- Requires permission of instructor
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**PREREQ:**
- BISC 302
- BISC 324
- Biochemistry
- BISC 303 or Biochemistry
- Chemical and molecular biology
- Biochemistry
- BISC 306
- Bacteriology
- Genetics
- Biochemistry
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BISC 661  BIOLagy OF STRIATED MUSCLE  
Structure and function of striated muscle studied through a review of the literature. Major topics include the organization of the contractile apparatus, the molecular basis of contraction, muscle fiber types, motor units and their relationship to muscle activity, and changes that occur in muscles associated with growth, aging, training and/or injury. 
PREREQUISITE: BISC306 or BISC406

BISC 670  IMMUNOBIOLOGY  
Preparation of antigens and antiserum; antibody analysis by precipitation, agglutination, complement fixation and other serological techniques. 
COREQ: BISC671

BISC 672  NEUROIMMUNOLOGY  
Examines reciprocal communication between the nervous and immune systems. Analyzes the influence of humoral (neurotransmitters and neuromodulators) and neural (neurotransmitter pathways) factors on components comprising the immune system; and the influence of humoral factors (immunoregulators, released by immune system cells) on the central nervous system. 
PREREQUISITE: BISC471, BISC670, or BISC671; and BISC306 or BISC406

BISC 673  TOPICS IN IMMUNOGENETICS  
In-depth discussion of a number of topics in immunogenetics, e.g., genetics of the immunoglobulin molecule, genetics of the cellular immune response, genetic basis of human immunological diseases. 
PREREQUISITE: Course in Immunology
RESTRICTIONS: With instructor’s permission, may be repeated once for credit

BISC 675  CARDIOPULMONARY PHYSIOLOGY  
The physiology and biophysics of the mammalian heart, lungs and circulation including gaseous exchange and transport between the circulating medium and the external environment. 
PREREQUISITE: A physiology course at or above the 300 level. 
COREQ: BISC675
RESTRICTIONS: Corequisite applies to biology majors only

BISC 676  CARDIOPULMONARY SEMINAR  
Mammalian cardiopulmonary physiology. 
COREQ: BISC675

BISC 679  VIROLOGY  
Molecular biology of animal viruses. Virus structure and organization; mechanisms of penetration, replication, maturation and transformation. 
PREREQUISITE: BISC301 or Biochemistry

BISC 693  HUMAN GENETICS  
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 counselling, multifactorial inheritance and the genetics of cancer. 
PREREQUISITE: BISC303

BISC 694  EXPERIMENTAL ECOLOGY  
Provides "hands-on" experience with techniques of modern experimental ecology. Emphasis on individual research projects in local natural habitats which expose students to experimental design, sampling techniques and data interpretation. 
PREREQUISITE: BISC302
RESTRICTIONS: Requires permission of instructor. For biology majors

BISC 696  VERTEBRATE REPRODUCTION  
Neural, neuroendocrine and endocrine mechanisms regulating vertebrate reproduction. 
PREREQUISITE: BISC306

BISC 697  REPRODUCTION TECHNIQUES  
Experimental techniques used in laboratory investigations of the physiology and endocrinology of vertebrate reproduction. 
PREREQUISITE: BISC696

BISC 698  COMPARATIVE ENDOCRINOLOGY  
Functional evolution of hormone systems throughout the animal kingdom. Chemical integration of physiological processes regulating day-to-day and season-to-season adaptations of organisms to environmental changes. 
PREREQUISITE: BISC306 or BISC406
RESTRICTIONS: Biochemistry recommended

BISC 699  COMPUTERS IN BIOLOGICAL RESEARCH  
Survey of current topics in biological research utilizing computers. Topics include data acquisition, analysis, interpretation, image analysis and modeling of biological phenomena. Student development of software to solve specific problems in biological research. 
PREREQUISITE: BISC207 and BISC208
RESTRICTIONS: Requires consent of instructor

BISC 701  SEMINAR IN ECOLOGY  
Critical examination of selected topics in ecology, through evaluation of relevant literature. Students prepare seminars on topics provided each semester. 
PREREQUISITE: Requires permission of instructor.

BISC 802  CELL AND GENETIC SYSTEMS  
Critical examination of selected topics in cell and genetic systems through presentations given by researchers from both inside and outside the University community. 
RESTRICTIONS: Requires permission of instructor.

BISC 806  ADVANCES IN PHYSIOLOGY  
Colloquium and special studies on a selected aspect of animal physiology. 
RESTRICTIONS: May be repeated for up to 10 credits when topics vary. Offered only in Spring

BISC 810  ADVANCED ENDOCRINOLOGY  
Selected topics pertaining to hormonal function. 

BISC 820  ENVIRONMENTAL RESEARCH  
See GEOG620 for course description. 

BISC 868  RESEARCH  

BISC 869  MASTER’S THESIS  

BISC 964  PRE-CANDIDACY STUDY  
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

BISC 969  DOCTORAL DISSERTATION  

BUSINESS ADMINISTRATION

BUAD 030  COOPERATIVE EDUCATION PROGRAM  
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.

BUAD 100  INTRODUCTION TO BUSINESS  
A survey of basic business concepts designed for 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.

BUAD 301  INTRODUCTION TO MARKETING  
Management of the marketing functions, marketing research, product planning, distribution channels, pricing, personal selling and advertising. Emphasis on consumer and industrial markets. 
PREREQUISITE: ECON151

BUAD 302  MARKETING RESEARCH  
Focus on the marketing research process as an aid in making decision making. Defining marketing problems, identifying marketing information needs, developing methods to gather information, and applying research results to marketing problems. 
PREREQUISITE: STAT202, BUAD301, and ACCT260

BUAD 306  OPERATIONS MANAGEMENT  
Analysis of major problems faced by operations managers at different levels of management. Topics include scheduling, forecasting, process design, inventory management and quality management. 
PREREQUISITE: MATH330, STAT202, and ACCT260

BUAD 309  MANAGEMENT AND ORGANIZATIONAL BEHAVIOR  
The processes and procedures used to manage performance effectively, including behavioral implications and an awareness of the individual’s impact on others.

BUAD 341  ENVIRONMENT OF MULTINATIONAL CORPORATIONS  
An 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.
PREREQUISITE: ECON152

BUAD 346  ANALYSIS OF OPERATIONS PROBLEMS  
Intensive treatment of topics covered in BUAD300 to include the investigation and development of the decision making process in an operations environment. Emphasis on practical applications.
PREREQUISITE: BUAD306
BUSINESS ADMINISTRATION

BUAD 366 INDEPENDENT STUDY 1-6

BUAD 382 INTERNATIONAL BUSINESS MANAGEMENT 3
PREREQ: BUAD 306

BUAD 385 ADMINISTRATIVE THEORY 3
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: BUAD 309

BUAD 391 SEMINAR ON INTERNATIONAL MANAGEMENT 3
Seminar on selected topics in international management. Combines lectures and visits to local organizations. Research paper typically required.
PREREQ: BUAD 309
RESTRICTIONS: Taught abroad. Counts as BUAD elective for BSBA candidates

BUAD 392 SEMINAR ON INTERNATIONAL MARKETING MANAGEMENT 3
Seminar on selected topics in international marketing management. Combines lectures and visits to local organizations. Research paper typically required.
PREREQ: BUAD 301
RESTRICTIONS: Taught abroad. Counts as BUAD elective for BSBA candidates

BUAD 394 SEMINAR ON INTERNATIONAL OPERATIONS MANAGEMENT 3
Seminar on selected topics in international operations management. Combines lectures and visits to local organizations. Research paper typically required.
PREREQ: BUAD 306
RESTRICTIONS: Taught abroad. Counts as BUAD elective for BSBA candidates

BUAD 420 INDUSTRIAL RELATIONS 3
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

BUAD 421 HUMAN RESOURCE MANAGEMENT 3
Emphasizes key human resource management requirements: acquisition of personnel (planning, selecting, recruiting and training) and maintenance of personnel (evaluation, compensation, working conditions and labor relations)

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: BUAD 309

BUAD 429 SEMINAR ON ORGANIZATIONS 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: BUAD 309

BUAD 441 BUSINESS POLICY 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: BUAD 301, BUAD 306, BUAD 309, and FINC 311
RESTRICTIONS: Requires Senior standing in business administration or accounting

BUAD 442 NEW VENTURE PLANNING 3
Entrepreneurship and entrepreneurial activities studied through lecture and coursework. Business knowledge applied to the development of business plans for new ventures of the students' choosing
PREREQ: BUAD 301, BUAD 306, BUAD 309, and FINC 311

BUAD 444 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
RESTRICTIONS: Requires Senior status in Business Administration or Accounting

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: BUAD 306

BUAD 447 OPERATIONS MANAGEMENT STRATEGY 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: BUAD 306

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: BUAD 306, ACCT 261
RESTRICTIONS: Requires Senior status. Not open to students who have taken BUED 431

BUAD 449 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: BUAD 301

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: BUAD 301

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: BUAD 301

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: BUAD 301

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: BUAD 301

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 480 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 481 DESIGN AND MANUFACTURING OF OPERATIONS 3
Overviews major concerns in the design and management of operations within a business. Focuses on topics such as product design, layout and process design, job design and measurement, forecasting, project, production and staff scheduling, inventory control, and materials management in both manufacturing and service industries
PREREQ: BUAD 320

BUAD 482 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: BUAD 381

BUAD 483 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: BUAD 381

BUAD 484 SPECIAL TOPICS IN OPERATIONS MANAGEMENT 1-3
Covers various topics in operations management at all levels of the firm. Individual inquiry stressed
PREREQ: BUAD 381
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, project selec-
tion, competitive benchmarking, concurrent engineering, and successful project manage-
ment. 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 defin-
tion on decision making. Uses various problems involving uncertainty to enhance deci-
sion 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  SOCIAL, ETHICAL, LEGAL AND POLITICAL ENVIRONMENT OF THE FIRM  3
Examines the social, legal, and ethical rights and obligations of the firm, employers, and
employees, with respect to product safety, sales, advertising, hiring and firing, company
loyalty, the environment and the community

BUAD 841  INTERNATIONAL BUSINESS MANAGEMENT  3
Development of business strategies for the multinational business organization. Emphasis
on dealing with international governmental constraints and organization structures. Proj-
ects focusing on the assessment of the business environment in specific countries

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. Course 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 to them and prepare formal presentations of
their findings.
PREREQ: Requires 24 MBA credits

BUAD 864  INTERNSHIP I  PF
Fieldwork designed to allow a student to apply acquired knowledge in a corporate set-
ting. 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 870  ORGANIZATIONAL BEHAVIOR AND ADMINISTRATION  3
Develops a knowledge base and requisite skills for managing individual, group, and
organizational processes through the use of diagnostic models, cases, and/or experi-
mental exercises. Individual and organizational level topics are emphasized. Some
group level topics are also included

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 imple-
ment 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 873  MANAGEMENT, ORGANIZATION, AND INFORMATION PROCESSING  3
Analyzes organizations as complex systems whose major function is information process-
ing. Emphasizes organizational structure and culture as information processors. Investi-
gates the role of information technology as an information processing tool and its effects
on organizations
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  HUMAN RESOURCE ADMINISTRATION  3
Examines the personnel/human resources function focusing on five key areas: 1) pro-
curement, 2) training and development, 3) compensation, 4) security, and 5) labor-man-
agement 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 administra-
tion as well as inspection of the various environmental factors (history, philosophy, law
and structure) that underpin collective bargaining

BUAD 878  INTERNATIONAL BUSINESS CULTURES  3
Focuses on cultural similarities and differences worldwide and how they affect manag-
ers' 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, following. Negotiation is broadly defined to include many
varieties of bargaining, third party dispute intervention and organizational justice
PREREQ: BUAD870

BUAD 880  COMPETITIVE MARKETING STRATEGY  3
Focuses on developing customer focused plans and strategies for projects and business
units in an increasingly competitive global environment. Emphasizes managerial prac-
tices relating to project/service offering, pricing, promotion, and physical distribution
and how these are integrated to satisfy industrial and ultimate consumers
PREREQ: ACCT800 and ECON551

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 limitation of marketing research data, enabling them to evaluate mar-
keting 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, seg-
mentation, 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 lec-
ture, 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

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: ACC2760

BUEC 330 SYSTEMS ANALYSIS AND IMPLEMENTATION
3
Provides a conceptual basis for the analysis of business information problems and the design and implementation of systems to solve those problems. Considers alternative methodologies for analyzing, designing and implementing management information systems.

BUEC 366 INDEPENDENT STUDY 1-6

BUEC 430 INFORMATION PLANNING AND DATA MANAGEMENT
3
Emphasis on applying a systems approach to planning information requirements for an organization. Considers both theoretical and practical data base methodologies.
PREREQ: BUEC330 and BUEC325

BUEC 431 DECISION SUPPORT SYSTEMS
3
The process of 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: BUIC430
RESTRICTIONS: M/DSS minor must take BUEC432 as a corequisite

BUEC 432 SYSTEMS DEVELOPMENT
3
Capstone course in the Business and Economics M/DSS minor. Emphasis on applying the concepts of project management to real management information problems.
PREREQ: BUIC430
RESTRICTIONS: M/DSS minor must take BUEC431 as a corequisite

BUEC 466 INDEPENDENT STUDY 1-6

CHEMICAL ENGINEERING

CHEG 009 CHEMICAL ENGINEERING 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.
COREQ: MATH242

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.
PREREQ: CHEG112 and MATH243
COREQ: CHEM443

CHEG 266 SPECIAL PROBLEM 1-3
RESTRICTIONS: Course will not count toward graduation in Chemical Engineering

CHEG 320 ENGINEERING ECONOMICS AND RISK ANALYSIS 2
Principles of engineering economics, risk assessment and analysis, and environmental and safety issues within the context of chemical engineering design.
PREREQ: MATH302, CHEG112

CHEG 325 CHEMICAL ENGINEERING THERMODYNAMICS 3
A continuation of CHEG231. The thermodynamics of mixtures; phase and chemical equilibrium.
PREREQ: 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: CHEG325, CHEM444 and MATH302

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: MATH302 and CHEG231

CHEG 342 HEAT AND MASS TRANSFER 4
PREREQ: CHEG341

CHEG 345 CHEMICAL ENGINEERING LABORATORY 1 3
Laboratory studies demonstrating the principles of fluid mechanics, heat transfer, mass transfer and thermodynamics. Emphasis on correlation of experimental results and written and oral presentation.
PREREQ: CHEG325 and CHEG341.
COREQ: CHEG342

CHEG 366 INDEPENDENT STUDY 1-6

CHEG 401 CHEMICAL PROCESS DYNAMICS AND CONTROL 3
Analysis of transients in chemical processing equipment and chemical reactors. Frequency response analysis, state variable, representation and design of linear control systems.
PREREQ: MATH302, CHEG332 and CHEG443

CHEG 432 CHEMICAL PROCESS ANALYSIS 4
A study of the principles and techniques used to develop a process design.Skills are developed by considering process synthesis case studies.
PREREQ: CHEG320, CHEG332 and CHEG443.
COREQ: CHEG401

CHEG 443 MASS TRANSFER OPERATIONS 3
Application of chemical engineering fundamentals to the design of mass transfer processes for separation and purification. Examples in design of distillation, absorption and extraction equipment.
PREREQ: 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: 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 PATENT LAW 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 601 STRUCTURE AND PROPERTIES OF POLYMERIC MATERIALS 3
See Masc601 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

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CHEG 603 POLYMERIZATION REACTION ENGINEERING 3
Introduction to polymer chemistry and reactor design with emphasis on mechanics and kinetics of polymerization, macromolecular structure, and the influence of reactor geometry and process conditions on polymer properties.
PREREQ: CHEM444

CHEG 604 INTRODUCTION TO POLYMER SCIENCE AND ENGINEERING II 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.
PREREQ: CHEG603

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-liquids 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
Industrial catalytic reactions, mechanisms, kinetics and phase behavior. Theory of catalysis from solutions to non-uniform surfaces.
PREREQ: CHEM343, CHEM444, CHEM444 and CEG332

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. Flow-sheetsing 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 pipelines and viscous mixing discussed. Emphasis on recent research on the effects of mixing on chemical reactions.

CHEG 616 CHEMISTRY AND PHYSICS OF SURFACES AND INTERFACES 3
Fundamental and engineering aspects of metal, inorganic and polymer surfaces; their structure and defects, characterization, thermodynamics, adsorption and electronic properties. Applications to catalysis, microelectronics, mechanical properties and environment sensitive behavior. May be cross-listed with MASC616.

CHEG 620 BIOCHEMICAL ENGINEERING 3
Application of chemical engineering principles to design and analysis of biological reactors and product recovery processes. Includes introduction to microbiology, biochemistry and molecular biology with emphasis on recombinant cells.
PREREQ: CHEG332 and CHEG342

CHEG 622 RISKS, HAZARDS, AND THE ENVIRONMENT 3
Topics include: Risks—reliability engineering, failure analysis, design and operation of hazardous processes; hazards—toxicology and risk assessment, pharmacokinetics, fate and transport of chemicals in the environment, environment—dispersion of chemicals and particulates, source models, chemical and biological treatment of wastes.
PREREQ: CHEG341 and CHEG325
COREQ: CHEG342

CHEG 635 AIR POLLUTION AND ITS CONTROL 3
See CIEG635 for course description

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

CHEG 691 TECHNICAL PROJECT MANAGEMENT 3
The organization, planning, and control of technical projects. Emphasis on the application of quantitative techniques of management, critical path analysis, linear programming, stochastic decision making, risk analysis and forecasting.
RESTRICTIONS: Requires permission of instructor

CHEG 801 PROCESS CONTROL AND DYNAMICS 3
Extension of SISO control concepts to MIMO systems appropriate to the chemical industry. Direct synthesis methods, internal model reference control, robust control and control in stochastic systems.
PREREQ: Undergraduate control course

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 826 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 mathematical methods to the solution of chemical engineering problems. Use of ordinary and partial differential equations and of difference equations in fluid flow, heat transfer, diffusion and other related operations.
PREREQ: CHEG443 and MATH302

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

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 835 APPLIED CHEMICAL KINETICS 3
The application of modern methods and recent experimental data to the design of chemical reaction equipment.
PREREQ: Requires undergraduate reaction engineering and physical chemistry

CHEG 836 APPLIED CHEMICAL KINETICS 3
Topics in chemical reaction engineering, applied kinetics and industrial catalysis.
PREREQ: CHEG835

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 960 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

CHEMISTRY AND BIOCHEMISTRY

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 MATH101 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, equilibria and energy relationships. 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 of CHEM103. Includes one three-hour laboratory per week that is a continuation of the laboratory experience begun in CHEM103.
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 5
Nuclear chemistry, periodicity, structure and bonding, classes of reactions, stoichiometry, solution chemistry, chemical equilibria and electrochemistry. Includes one three-hour laboratory per week.
COREQ: MATH101
RESTRICTIONS: For majors in the physical and natural sciences, mathematics and engineering. Only one course among CHEM101, CHEM103, CHEM105 and CHEM111 can count toward graduation.

CHEM 106 Elementary Biochemistry Laboratory 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, equilibrium, reaction kinetics and the important classes of substances.
PREREQ: One semester of college chemistry.
COREQ: CHEM119, and MATH115 or higher math course.
RESTRICTIONS: For chemistry and chemical engineering students. One year of high school chemistry recommended. Only one course among CHEM101, CHEM103, CHEM105 and CHEM111 can count toward graduation.

CHEM 112 General Chemistry 3
A continuation of CHEM111.
PREREQ: CHEM103 or CHEM111.
COREQ: CHEM120.
RESTRICTIONS: For chemistry and chemical engineering students. 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 semester of college chemistry.
COREQ: CHEM111 and MATH115.
RESTRICTIONS: One year of high school chemistry accepted in lieu of prerequisite. Only one course among CHEM102, CHEM104 and CHEM112 can count toward graduation.

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.
COREQ: CHEM112.

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 CHEM115.
RESTRICTIONS: Designed for students of agriculture, human resources and medical technology.

CHEM 214 Elementary Biochemistry 3
Principal classes of biomolecules and their metabolic interrelationships.
PREREQ: CHEM213.

CHEM 216 Elementary Biochemistry Laboratory 1
Principal classes of biomolecules and their metabolic interrelationships.
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 310 Computers in Chemistry 3
Introduction to computers, programming and typical applications of computers in chemistry. Applications include data analysis, numerical methods, curve-fitting, chemical structure coding and the use of chemical data bases.
PREREQ: MATH242 and CHEM120 or CHEM220 and CHEM221.

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 B.S. credit in chemistry. 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: Not for chemistry and chemical engineering majors and any other students desiring fuller treatment than in CHEM321. CHEM321 and CHEM331 cannot both be counted toward graduation.

CHEM 332 Organic Chemistry 3
Major classes and reactions of organic compounds, emphasizing stereochemistry, reaction mechanisms and synthetic methods.
PREREQ: CHEM331.
COREQ: CHEM334.
RESTRICTIONS: For chemistry and chemical engineering majors and any other students desiring fuller treatment than in CHEM321. CHEM321 and CHEM331 cannot 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 350 Chemistry in a Foreign Language 1 PF
Chemical topics, generally of an introductory nature, presented in a foreign language.
PREREQ: CHEM104.
RESTRICTIONS: CHEM112 recommended. Requires proficiency of the intermediate, 107 or higher, level of the language used to teach the course. Taught entirely in the foreign language. May be repeated for credit when languages are different.

CHEM 365 Seminar 1 PF

CHEM 366 Independent Study 1-3 PF
CHEM 418 INTRODUCTORY PHYSICAL CHEMISTRY 3
Less rigorous than CHEM 443-444. Kinetics and mechanisms of reactions; chemical ther-
dymanics; states of matter; phase and chemical equilibrium; colligative properties of
solutions; and atomic and molecular structure.
PREREQ: General Chemistry and Calculus (MATH211 and MATH222 or MATH241)
RESTRICTIONS: Course acceptable for B.A. but not B.S. degree in chemistry.
CHEM 414 and CHEM 444 cannot both be counted toward graduation.
CHEM 419 INTRODUCTORY PHYSICAL CHEMISTRY 3
Continuation of CHEM 418.
PREREQ: CHEM 418
RESTRICTIONS: CHEM 414 and CHEM 444 cannot both be counted toward graduation.
CHEM 423 INSTRUMENTAL METHODS 3
Study of the principles of design and application of spectroscopic, chromatographic and
electroanalytical instrumentation in chemical analysis.
PREREQ: CHEM 322 or CHEM 332
COREQ: CHEM 418 or CHEM 444.
CHEM 428 INSTRUMENTAL METHODS LABORATORY 1
Application of spectroscopic, chromatographic and electroanalytical techniques to the
solution of chemical problems.
PREREQ: CHEM 322 or CHEM 334.
COREQ: CHEM 445.
CHEM 443 PHYSICAL CHEMISTRY 3
Application of the principles and methods of mathematics and physics to the quantitative
study of chemical problems.
PREREQ: CHEM 120 or CHEM 220 and CHEM 221, MATH 242 (MATH 243 recommend-
ed), PHYS 208 (recommended) and PHYS 202.
RESTRICTIONS: CHEM 414 and CHEM 444 cannot both be counted toward graduation.
CHEM 444 PHYSICAL CHEMISTRY 3
Continuation of CHEM 443.
PREREQ: CHEM 120 or CHEM 220 and CHEM 221, MATH 242 (MATH 243 recommend-
ed), PHYS 208 (recommended) and PHYS 202.
RESTRICTIONS: CHEM 414 and CHEM 444 cannot both be counted toward graduation.
CHEM 445 PHYSICAL CHEMISTRY LABORATORY 1
Physical methods for studying properties of matter.
PREREQ: CHEM 120 or CHEM 220 and CHEM 221.
RESTRICTIONS: To be taken concurrently with or subsequent to CHEM 443 and
CHEM 444, or CHEM 418 or CHEM 419.
CHEM 446 PHYSICAL CHEMISTRY LABORATORY 1
Continuation of CHEM 445.
PREREQ: CHEM 120 or CHEM 220 and CHEM 221.
CHEM 457 INORGANIC CHEMISTRY 3
Basic theoretical concepts of inorganic chemistry with emphasis on structure, bonding
and reactions.
PREREQ: CHEM 418 or CHEM 444, and CHEM 112.
CHEM 458 INORGANIC CHEMISTRY LABORATORY 1
Laboratory synthesis and characterization of inorganic and organometallic compounds
and independent study.
COREQ: CHEM 457.
CHEM 465 SENIOR SEMINAR 1 PF
RESTRICTIONS: Requires Senior status.
CHEM 466 INDEPENDENT STUDY 1-3 PF
CHEM 468 UNDERGRADUATE RESEARCH 1-6 PF
Chemistry research on an assigned subject under the supervision of a member of the
staff.
RESTRICTIONS: Requires permission of instructor. Letter grade upon completion of writ-
ten thesis.
CHEM 502 ENVIRONMENTAL CHEMISTRY 3
Chemical principles underlying and analytical tools employed in air and water pollution,
the greenhouse effect, ozone layer depletion, waste disposal and recycling, energy con-
servation, and other selected environmental topics.
PREREQ: An undergraduate level Chemistry or Calculus course.
RESTRICTIONS: Open to Environmental Science graduate students.
CHEM 527 INTRODUCTORY BIOCHEMISTRY 3
A one-semester survey of the fundamentals of biochemistry.
PREREQ: CHEM 322 or CHEM 332.
RESTRICTIONS: For undergraduate majors in biology and chemistry, graduate students
in agriculture, biology, nutrition, marine sciences and engineering not using bio-
chemistry professionally. BISC 103 or BISC 207 strongly recommended.
CHEM 610 HISTORY OF CHEMISTRY 3
A survey of the development of chemistry. Use made of the UNIDel Collection of Rare
Books in the History of Chemistry.
PREREQ: General Chemistry.
CHEM 620 ANALYTICAL SPECTROSCOPY 3
Experimental aspects of electronic and vibrational spectroscopy. Linear and nonlinear
optics: photon counting, Fourier transformation, and topics from the current literature.
PREREQ: CHEM 437 and CHEM 438.
CHEM 621 CHEMICAL SEPARATIONS 2
Fundamental description of chemical separations. Zone broadening and separation effi-
ciency; and chemistry of separations. Application of fundamental principles to chro-
matography, electrophoresis, field-flow fractionation and newly emerging techniques.
PREREQ: CHEM 457 and CHEM 438.
CHEM 622 ELECTROANALYTICAL CHEMISTRY 3
Analytical applications of electrochemistry: dynamic and steady-state methods of poten-
tiometry, coulometry, voltammetry, and ancillary techniques.
RESTRICTIONS: Requires Senior or graduate status in chemistry. Offered in Fall of even-
numbered years.
CHEM 623 CHEMOMETRICS 3
Provides chemists with an introduction to modern methods of reducing and analyzing
chemical data using computers. Covers probability and simple statistics, optimization
methods, pattern recognition, factor analysis, regression, and data transformation.
PREREQ: CHEM 437.
CHEM 624 INTERPRETATION OF MASS SPECTRA 1
Molecular ions and elemental composition from precise mass and isotopic ratios. Frag-
mentation mechanisms and the correlations of electron ionization mass spectra with
molecular structure.
RESTRICTIONS: Requires Junior, Senior or graduate status in chemistry.
CHEM 625 CHEMICAL IONIZATION MASS SPECTROMETRY 1
Analytical applications of ion/molecule reactions. Mechanisms and thermochemical
kinetics of gaseous ionic reactions. Correlations of spectra with molecular structure.
Atmospheric pressure ionization mass spectrometry.
RESTRICTIONS: Requires Junior, Senior or graduate status in chemistry.
CHEM 626 INSTRUMENTAL METHODS IN MASS SPECTROMETRY 2
Experimental techniques in analytical mass spectrometry. Ionization mechanisms and
applications.
RESTRICTIONS: Requires Senior or graduate status in chemistry.
CHEM 627 PRACTICAL MASS SPECTROMETRY 1
Instrumentation and experiments in gas chromatography/mass spectrometry.
RESTRICTIONS: Requires permission of instructor.
CHEM 632 ADVANCED ORGANIC CHEMISTRY PHYSICAL 3
Stereochemistry and reactivity of organic compounds; and reaction mechanisms, structure
and bonding.
PREREQ: CHEM 432.
CHEM 634 ADVANCED ORGANIC CHEMISTRY: SYNTHESIS AND
CHEM 644 MECHANISMS OF
CHEMISTRY 3
Intermediary metabolism of lipids, amino acids, purines and pyrimidines; nucleic acid
metabolism; protein and nucleic acid synthesis; molecular basis of genetic regulation;
and citric acid cycle.
CHEM 641 BIOCHEMISTRY 3
Intermediary metabolism of lipids, amino acids, purines and pyrimidines; nucleic acid
metabolism; protein and nucleic acid synthesis; molecular basis of genetic regulation;
and selected topics.
PREREQ: CHEM 441.
CHEM 643 INTERMEDIARY METABOLISM 3
General principles of intermediary metabolism with emphasis on biosynthetic pathways
of amino acids, nucleotides, coenzymes, antibiotics and toxic secondary metabolites.
PREREQ: CHEM 642.
CHEM 644 MECHANISMS OF ENZYME CATALYSIS 3
Detailed chemical mechanism of enzyme catalysis for several representatives. Emphasis
on kinetic and physical organic methods.
PREREQ: CHEM 441.
CIVIL AND ENVIRONMENTAL ENGINEERING

CHEM 645 MECHANISMS OF ENZYME REGULATION 3
Mechanisms of regulation of enzymes are considered with emphasis on models for allosteric regulation, role of association-disassociation reactions and enzyme-catalyzed covalent modification. Modern experimentation approaches are discussed with examples taken from the recent literature.
PREREQ: CHEM641

CHEM 647 BIOCHEMICAL EVOLUTION 3
The origins and evolution of life as reconstructed from geochemical, biochemical and genetic evidence.
PREREQ: CHEM642 or CHEM527

CHEM 648 MEMBRANE BIOCHEMISTRY 3
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

CHEM 649 PROTEIN BIOCHEMISTRY 3
Addresses the current level of understanding of protein structure, stability and reactions, both in vitro and in vivo. Readings in textbook and reference literature, lectures and case studies.
PREREQ: CHEM641.

CHEM 651 ADVANCED INORGANIC CHEMISTRY I 3
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.

CHEM 652 ORGANOMETALLIC CHEMISTRY 3
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.

CHEM 654 ADVANCED INORGANIC CHEMISTRY II 3
A group theoretical approach to structure and bonding in inorganic compounds.
PREREQ: CHEM444 and CHEM457.

CHEM 655 MARINE INORGANIC CHEMISTRY 3
See MAST850 for course description.

CHEM 671 QUANTUM CHEMISTRY 3
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.

CHEM 672 SPECTROSCOPY 3
Application of quantum theory to the interpretation of absorption and emission spectra in terms of atomic and molecular properties.
PREREQ: CHEM671.

CHEM 674 CHEMICAL DYNAMICS 3
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.

CHEM 677 CHEMICAL THERMODYNAMICS 3
The elements of classical and statistical thermodynamics and their application to chemical problems.
PREREQ: CHEM443.

CHEM 680 INTRODUCTORY POLYMER SCIENCE 3
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.

CHEM 820 SPECIAL TOPICS IN ANALYTICAL CHEMISTRY 1-3
Advanced topics in analytical and techniques from the current literature.
PREREQ: CHEM620, CHEM621, CHEM622 or CHEM623.
RESTRICTIONS: May be repeated for credit when topics vary.

CHEM 830 SPECIAL TOPICS IN ORGANIC CHEMISTRY 1-3
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.

CHEM 840 MODERN TOPICS IN BIOCHEMISTRY 1-3
Detailed examination of a number of problems of current research interest in biochemistry.
PREREQ: CHEM641.
RESTRICTIONS: May be repeated for credit when topics vary.

CHEM 850 SPECIAL TOPICS IN INORGANIC CHEMISTRY 1-3
Advanced topics selected from the chemistry of the less common elements, metal hydrides, organometallic compounds and coordination compounds.
PREREQ: CHEM651.
RESTRICTIONS: May be repeated for credit when topics vary.

CHEM 855 MARINE INORGANIC CHEMISTRY 3
See MAST850 for course description.

CHEM 865 SEMINAR 0 PF
CHEM 868 RESEARCH 1-9
CHEM 869 MASTER'S THESIS 1-6

CHEM 871 STATISTICAL THERMODYNAMICS 3
Applications of statistical mechanics to chemical problems.
RESTRICTIONS: Requires permission of instructor.

CHEM 874 SPECIAL TOPICS IN PHYSICAL CHEMISTRY 1-3
RESTRICTIONS: Requires permission of instructor. May be repeated for credit when topics vary.

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

CHEM 969 DOCTORAL DISSERTATION 1-12 PF

CHINESE

CHIN 105 CHINESE I - ELEMENTARY 4
Introduction to the Chinese language and development of speaking, listening, reading and writing skills through the use of basic texts. Language laboratory as needed.

CHIN 106 CHINESE II - ELEMENTARY/INTERMEDIATE 4
Completion of basic Chinese. Increasing mastery of the basic skills of speaking, listening, reading and writing.
PREREQ: CHIN105.

CHIN 107 CHINESE III - INTERMEDIATE 4
Review of grammar, continued practice in speaking and writing, and reading texts of average difficulty.
PREREQ: CHIN106.
RESTRICTIONS: Satisfies the Arts and Science foreign language requirement.

CIVIL AND ENVIRONMENTAL ENGINEERING

CIEG 125 INTRODUCTION TO CIVIL ENGINEERING 2
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.

CIEG 135 INTRODUCTION TO ENVIRONMENTAL ENGINEERING 1
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.

CIEG 211 STATICS 3
Analysis of force systems and equilibrium of rigid bodies in two and three dimensions. Determination of centers of gravity and of centroids. Analysis of statically determinate trusses, simple frames and "machines." Introduction to the analysis of beams.
COREQ: MATH243.

CIEG 212 STRENGTH OF MATERIALS 3
Stresses and displacements in axially loaded beams and in bars subjected to tension. 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.
CIEG 213  MATERIALS LABORATORY  1
Experiments in mechanics of materials, complementing the content of CIEG212. Emphasis on behavior of steel, aluminum, concrete and timber in civil engineering systems.
COREQ: CIEG212.

CIEG 223  SURVEYING  3
Surveying instruments and their use, differential leveling, traverses, route surveying, triangulation and field astronomy. Also includes computer methods for area, cut/fill, grade elevations and other processing of survey data.
PREREQ: MATH15, MATH221 or MATH241.

CIEG 301  ANALYSIS OF STRUCTURES  4
PREREQ: CIEG212, MATH302.
COREQ: MATH302.

CIEG 311  DYNAMICS  3
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: PHYS220 and MATH243.

CIEG 331  INTRODUCTION TO ENVIRONMENTAL ENGINEERING  3
Interactions within the environment and associated engineering problems. Discussion of air, water, waste, soil, wastewater, treatment, solid wastes and their effect on the environment.
PREREQ: CHEM103 and MATH242.

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
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 402  STEEL DESIGN  3
Design of metal structures; connections, tension members, columns, and beams with and without lateral support.
PREREQ: CIEG303.

CIEG 403  CONCRETE DESIGN  3
Reinforced concrete structures; ultimate strength design; and related topics.
PREREQ: CIEG301.

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 406  STRUCTURAL MATERIALS  3
Specification, evaluation and testing of materials commonly used in structural engineering. Emphasis on concrete, concrete structures, epoxy, wood and metals.
PREREQ: CIEG212, CIEG213, and MASC302.

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  RELIABILITY DESIGN IN CIVIL ENGINEERING  3
Reliability analysis of civil engineering systems, using concepts and methods of probability and statistics to supplement the engineer's judgment when addressing uncertainty in design. Topics include elements of probability and statistics, measurement of reliability, time to failure, reliability bounds, confidence of reliability and Monte Carlo simulation.

CIEG 416  RANDOM VIBRATION  3
PREREQ: CIEG311 and MATH302.

CIEG 417  ADVANCED STRUCTURAL ANALYSES  3
PREREQ: CIEG212 and MATH302.

CIEG 418  CONTINUOUSLY SUPPORTED STRUCTURES  3
PREREQ: CIEG212 and MATH302.

CIEG 420  SOIL MECHANICS  4
Soil properties, soil-water interaction, soil stresses, two-dimensional flow, soil compressibility, shear strength and lateral earth pressures.
PREREQ: CIEG212 and MECH305.

CIEG 421  FOUNDATIONS AND SUBSTRUCTURES  3
Design of earth dams, embankments, retaining structures, cofelflows, footings, caissons and piles. Numerical methods, combining soil mechanics and structural analysis.
PREREQ: CIEG420.

CIEG 422  EARTH STRUCTURES ENGINEERING  3
Properties of soils and methods to determine them: water flow through inhomogeneous and anisotropic earth mass; predictions of porewater 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. Software used in problem solving.
PREREQ: CIEG420.

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: CIEG331 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: CIEG331.

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: CIEG331.

CIEG 435  INDUSTRIAL WASTES MANAGEMENT  3
Covers industrial survey and treatment technologies for liquid, solid and gaseous wastes. Emphasis on the applications and design of phisical-chemical and biological treatment processes. Particulate removal from industrial emission sources. Resource recovery and reuse presented as an important option for the management of industrial wastes.
PREREQ: CIEG331.

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: CIEG331.

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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 hydrology; and groundwater flow.
PREREQ: MECH305

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: MECH305

CIEG 452 TRANSPORTATION FACILITIES DESIGN 3
Theoretical concepts of general transportation demand, supply and flow analysis. Planning and design of multimodal transportation facilities including streets and highways, railways and guideways, airports, and harbors and ports.
PREREQ: CIEG451

CIEG 453 TRAFFIC ENGINEERING 3
Essential elements of traffic engineering including road users characteristics, vehicle kinematics and roadway and geometric design; traffic engineering studies and analysis such as highway capacity concepts, statistical accident studies and origin-destination studies; other elements such as traffic control devices and signal systems coordination.
PREREQ: CIEG451

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: CIEG451

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 3
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: MECH305

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 ENGINEERING MANAGEMENT 3
Present worth concept; annual costs, rate of return and break-even studies; replacement analysis; depreciation, depletion and income tax. Criteria for public works investment including benefit-cost and marginal analysis and the handling of risk and uncertainty. Applications to engineering projects and problems.

CIEG 601 INTRODUCTION TO THE FINITE ELEMENT METHOD 3
Discussion of approximate solution procedures: finite difference method, weighted residual method, 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: CIEG403

CIEG 605 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 606 STRUCTURAL MATERIALS 3
Specification, evaluation and testing of materials commonly used in structural engineering. Emphasis on concrete, steel, composite admixtures, epoxies, wood and metals.
PREREQ: CIEG612, CIEG213 and MASC302

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.

CIEG 615 RELIABILITY DESIGN IN CIVIL ENGINEERING 3
Reliability analysis of civil engineering systems using concepts and methods of probability and statistics to supplement the engineer's judgment when addressing uncertainty in design. Topics include elements of probability and statistics, measure of reliability, time to failure, reliability bounds, confidence of reliability and Monte Carlo simulation.

CIEG 616 RANDOM VIBRATION 3
PREREQ: CIEG311 and MATH302.

CIEG 617 ADVANCED STRUCTURAL ANALYSES 3
PREREQ: CIEG212 and MATH302.

CIEG 618 CONTINUOUSLY SUPPORTED STRUCTURES 3
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; steadystate flow through porous media; consolidation and time rate settlement; shear strength of cohesive soils.
PREREQ: CIEG420

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 homogeneous and anisotropic earth mass; predictions of pore-water pressures; stresses and settlement predictions; slope stability: type and cause 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: CIEG420

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: CIEG420

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: CIEG420

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.

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<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>CIEG 634</td>
<td>Physical Aspects of Environmental Engineering</td>
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<tr>
<td>PREREQ:</td>
<td>CIEG632 and CIEG634</td>
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<tr>
<td></td>
<td>Principles and applications of colloid chemistry to environmental systems. Elements of physical chemistry, mass transfer, and phase separation relevant in environmental engineering. Colloid and particle characterization; rheological, diffusive, and settling behavior of colloidal systems; adsorption and electrical double layer theory; electrokinetics; particle stability and flocculation.</td>
</tr>
<tr>
<td>CIEG 635</td>
<td>Air Pollution and its Control</td>
</tr>
<tr>
<td>PREREQ:</td>
<td>CIEG632 and CIEG634</td>
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<tr>
<td></td>
<td>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. May be cross-listed with CIEG635</td>
</tr>
<tr>
<td>RESTRICTIONS:</td>
<td>Requires upper division or graduate standing in engineering</td>
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<tr>
<td>CIEG 636</td>
<td>Biological Aspects of Environmental Engineering</td>
</tr>
<tr>
<td>PREREQ:</td>
<td>CIEG632 and CIEG634</td>
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<tr>
<td></td>
<td>Presents fundamental molecular biological concepts which pertain to cellullar function in the environment and in engineered environmental treatment systems. Briefly reviews elementary organic chemical classifications.</td>
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<tr>
<td>CIEG 637</td>
<td>Water and Wastewater Quality</td>
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<td>PREREQ:</td>
<td>CIEG632 and CIEG634</td>
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<tr>
<td></td>
<td>Principles and applications of analysis of solids, organic load, dissolved oxygen, disinfectants, heavy metals, trace metals, trace organic compounds and microorganisms. Lecture and laboratory.</td>
</tr>
<tr>
<td>CIEG 638</td>
<td>Hydrodynamics</td>
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<tr>
<td>PREREQ:</td>
<td>CIEG632 and CIEG634</td>
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<tr>
<td></td>
<td>Kinematics and dynamics of incompressible fluids with emphasis on engineering problems in the hydraulic and hydrologic environment. Governing equations, solutions for laminar, creeping and porous media flows. Turbulence, boundary layers, potential flows, wave waves, and straited and rotating systems.</td>
</tr>
<tr>
<td>CIEG 650</td>
<td>Urban Transportation Systems</td>
</tr>
<tr>
<td>PREREQ:</td>
<td>CIEG632 and CIEG634</td>
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<td></td>
<td>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 CIEG650</td>
</tr>
<tr>
<td>RESTRICTIONS:</td>
<td>Requires permission of instructor</td>
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<tr>
<td>CIEG 651</td>
<td>Transportation Facilities Design</td>
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<tr>
<td>PREREQ:</td>
<td>CIEG632 and CIEG634</td>
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<tr>
<td></td>
<td>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.</td>
</tr>
<tr>
<td>RESTRICTIONS:</td>
<td>Requires permission of instructor</td>
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<tr>
<td>CIEG 652</td>
<td>Urban Transportation Planning</td>
</tr>
<tr>
<td>PREREQ:</td>
<td>CIEG632 and CIEG634</td>
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<tr>
<td></td>
<td>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.</td>
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<td>RESTRICTIONS:</td>
<td>Requires permission of instructor</td>
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<tr>
<td>CIEG 653</td>
<td>Railroad Engineering</td>
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<tr>
<td>PREREQ:</td>
<td>CIEG632 and CIEG634</td>
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<tr>
<td></td>
<td>Evaluation 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.</td>
</tr>
<tr>
<td>CIEG 654</td>
<td>Introduction to Ocean Engineering</td>
</tr>
<tr>
<td>PREREQ:</td>
<td>CIEG632 and CIEG634</td>
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<tr>
<td></td>
<td>Acquaints the engineer with the problems of design in the ocean. Water waves and tides, wave forces on structures, corrosion and fouling, coastal structures and littoral processes.</td>
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<tr>
<td>CIEG 655</td>
<td>Water Wave Mechanics</td>
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<td>PREREQ:</td>
<td>CIEG632 and CIEG634</td>
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<tr>
<td></td>
<td>Primary emphasis on linear wave wave theory and its applications. Shallow, refraction and diffraction of waves as well as wave forces. Finite amplitude waves. Laboratory experiments to verify the theoretical developments.</td>
</tr>
<tr>
<td>CIEG 656</td>
<td>Transport and Mixing Processes</td>
</tr>
<tr>
<td>PREREQ:</td>
<td>CIEG632 and CIEG634</td>
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<tr>
<td></td>
<td>Application of hydrodynamics to mixing and transport processes in the water environment.</td>
</tr>
<tr>
<td>CIEG 657</td>
<td>Sediment Transport Mechanics</td>
</tr>
<tr>
<td>PREREQ:</td>
<td>CIEG632 and CIEG634</td>
</tr>
<tr>
<td></td>
<td>Mechanics and mathematical modelling 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.</td>
</tr>
<tr>
<td>CIEG 658</td>
<td>Littoral Processes</td>
</tr>
<tr>
<td>PREREQ:</td>
<td>CIEG632 and CIEG634</td>
</tr>
<tr>
<td></td>
<td>Coastal morphology, equilibrium beach profiles, onshore-offshore response, sediment transport relationships, and budgets around inlets and along open coasts, modeling of shoreline response, analyses of beach problems and recommendations of remedial measures.</td>
</tr>
<tr>
<td>CIEG 659</td>
<td>Water Wave Spectra</td>
</tr>
<tr>
<td>PREREQ:</td>
<td>CIEG632 and CIEG634</td>
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<tr>
<td></td>
<td>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.</td>
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<td>RESTRICTIONS:</td>
<td>Requires permission of instructor</td>
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<tr>
<td>CIEG 660</td>
<td>Nearshore Hydrodynamics</td>
</tr>
<tr>
<td>PREREQ:</td>
<td>CIEG632 and CIEG634</td>
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<td></td>
<td>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, infragravity and edge waves and nearshore modeling.</td>
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<tr>
<td>CIEG 661</td>
<td>Groundwater Hydrology</td>
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<tr>
<td>PREREQ:</td>
<td>CIEG632 and CIEG634</td>
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<td></td>
<td>A qualitative analysis of groundwater in the hydrologic cycle. Topics include groundwater movement, Darcy’s law, mathematical formulation of groundwater problems, groundwater pollution, salt water intrusion, well hydraulics and unsaturated flow.</td>
</tr>
<tr>
<td>CIEG 662</td>
<td>Advanced Topics in Finite Element Analysis</td>
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<tr>
<td>PREREQ:</td>
<td>CIEG632 and CIEG634</td>
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<td></td>
<td>Review of elementary aspects of the finite element method. Application of the method to linear one-, two- and three-dimensional problems in applied mechanics. Basic and advanced numerical methods and computer programming techniques appropriate to finite element analysis (includes two to three computational laboratory classes).</td>
</tr>
<tr>
<td>CIEG 663</td>
<td>Advanced Steel Design</td>
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<tr>
<td>PREREQ:</td>
<td>CIEG632 and CIEG634</td>
</tr>
<tr>
<td></td>
<td>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.</td>
</tr>
<tr>
<td>CIEG 664</td>
<td>Advanced Concrete Design</td>
</tr>
<tr>
<td>PREREQ:</td>
<td>CIEG632 and CIEG634</td>
</tr>
<tr>
<td></td>
<td>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.</td>
</tr>
<tr>
<td>CIEG 665</td>
<td>Advanced Structural Dynamics</td>
</tr>
<tr>
<td>PREREQ:</td>
<td>CIEG632 and CIEG634</td>
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<tr>
<td></td>
<td>Linear and nonlinear dynamic analysis of multiple degree of freedom systems subjected to earthquakes, 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.</td>
</tr>
<tr>
<td>CIEG 666</td>
<td>Analytical Structural Dynamics</td>
</tr>
<tr>
<td>PREREQ:</td>
<td>CIEG632 and CIEG634</td>
</tr>
<tr>
<td>CIEG 667</td>
<td>Stability of Structures</td>
</tr>
<tr>
<td>PREREQ:</td>
<td>CIEG632 and CIEG634</td>
</tr>
<tr>
<td>CIEG 668</td>
<td>Inelastic Behavior of Geomaterials</td>
</tr>
<tr>
<td>PREREQ:</td>
<td>CIEG632 and CIEG634</td>
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<td></td>
<td>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.</td>
</tr>
<tr>
<td>CIEG 669</td>
<td>Theory of Water Treatment</td>
</tr>
<tr>
<td>PREREQ:</td>
<td>CIEG632 and CIEG634</td>
</tr>
<tr>
<td></td>
<td>Application of physical, chemical and engineering techniques to water treatment processes. Coagulation, sedimentation, filtration and disinfection. Advanced purification methods including adsorption and demineralization processes. Apologies were given in the title for any inconvenience or error in the Trybe. If we have any questions or comments, please feel free to contact us.</td>
</tr>
</tbody>
</table>
CISC 832 Theory of Wastewater Treatment 3
Composition of wastes; physical, chemical and biological methods of wastewater treatment; treatment and disposal of sludges produced at wastewater treatment plants
PREREQ: CIEG636

CISC 833 Fate of Pollutants in the Environment 3
Study of processes affecting the distribution of inorganic and organic pollutants in the environment. Equilibrium and kinetics of exchange among soil, water, sediment, air and biota. Photosynthesis, hydrolysis, oxidation, reduction and complexation of chemicals. Models used to describe fate of chemicals
PREREQ: CIEG632 and CIEG634

CISC 842 Design of Water and Wastewater Treatment Systems 3
Presents design implementation and unit operation of water and wastewater treatment processes. Whenever possible, utilizes computer modeling and computer-aided design principles
COREQ: CIEG681 and CIEG692

CISC 865 Civil Engineering Seminar 1

CISC 868 Research 1-6

CISC 869 Master's Thesis 1-6
An independent investigation under supervision of a member of the civil engineering graduate faculty

CISC 870 Offshore Design 3
Naval hydrodynamics, behavior of submerged and floating bodies, and ship waves. Tsunamis and harbor response
PREREQ: CIEG672 and CIEG659

CISC 872 Advanced Water Wave Mechanics 3
Development of infinite amplitude wave theories such as solitary, cordial, Stokes and stream function. Application to coastal and ocean engineering problems
PREREQ: CIEG659, CIEG672

CISC 891 Mechanics of Fluids in Porous Media 3
Physical and mathematical description of flow through porous media; conservation of mass, energy and momentum; Darcy's law; general equations of single and multiphase flow, partially saturated flow, heat and mass transfer, hydrodynamic dispersion, deformation of porous media, elastic, plastic and viscous behavior of actual material and applications to engineering problems

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

CISC 969 Doctoral Dissertation 1-12 PF

COMPUTER AND INFORMATION SCIENCE

CISC 101 Computers and Information Systems 3
Introduces basic concepts of computer organization, terminology, usage and discusses the impact of computers on society. It introduces word processing, spreadsheets, databases, electronic mail, bulletin boards, windowing systems, networks, and very simple programming
RESTRICTIONS: Not open to CIS Majors

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 PCs
RESTRICTIONS: Does not count toward graduation if taken after CISC180 or 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 120 Object Oriented Programming in C++ 2
A bridging course to prepare students from CISC105 or CISC106 for CISC220. Any student who expects their future career to involve some programming is encouraged to take computer science through CISC220 Data Structures
PREREQ: CISC105 or CISC106
RESTRICTIONS: Not open to students who have taken CISC181

CISC 135 Topics in Programming Languages 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: A computer programming course
RESTRICTIONS: Credit for CISC 135 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: none
COREQ: MATH115, MATH171 or MATH241
RESTRICTIONS: Requires prior programming experience. Not open to students who have taken CISC105

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: CISC181 or CISC120
COREQ: MATH210 or MATH242

CISC 260 Machine Organization and Microcomputers 3
Introduction to the basics of machine organization. Programming tools and techniques at the machine and assembly levels. Assembly language programming
PREREQ: CISC181
RESTRICTIONS: CISC220 recommended as a Pre-requisite

CISC 280 Programming Paradigms 3
Structure and interpretation of computer programs. Procedural and data abstractions (high level). Different paradigms (mind sets) that programmers use. Procedural and functional programming, logic and object oriented programming
PREREQ: CISC220 and MATH241

CISC 310 Logic and Programming 3
Propositional and predicate logic languages and proof methods; their use in specifying and verifying properties and correctness of programs; and the use of these techniques for constructing good programs
PREREQ: CISC220 and MATH315

CISC 320 Algorithms and Advanced Programming 3
Design and analysis of algorithms; worst-case/average-case analysis, proof techniques for correctness and performance of graph algorithms, control abstractions (divide and conquer, greedy method, branch and bound); NP-hard and NP-complete problems
PREREQ: CISC310 and MATH315

CISC 330 Computer Architecture 3
Principles and techniques used in the architecture of digital computers. Machine elements and their interconnection. Stack machines and other computer architectures
PREREQ: ELEC202 and CISC260

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: CISC260
RESTRICTIONS: CISC360 recommended as a Pre-requisite

CISC 366 Independent Study 1-6

CISC 401 Elements of the Theory of Computation 3
General models of computation, formal languages and automata theory, and algorithmic unsolvability
PREREQ: Course in which student was required to prove theorems
RESTRICTIONS: Credit cannot be received for both CISC401 and CISC601

CISC 403 Program Verification 3
Structured design, specification and verification of programs, proof rules
PREREQ: CISC310
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: CISC310
RESTRICTIONS: Credit cannot be received for both CISC404 and CISC604

CISC 409 Topics in Theoretical Computer Science 3
Courses vary to coincide with the interests of students and current faculty
PREREQ: CISC401/601
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 computa·  
tion to solve a problem from student's own discipline. May be crosslisted with MATH313.  
RESTRICTIONS: Credit cannot be received for both CISC423 and CISC623.

CISC 426  
**SIMULATION OF CONTINUOUS SYSTEMS**  
3  
Computer simulation of systems described in terms of differential equations. Study and use  
of continuous system simulation languages, analog and hybrid computers.  
PREREQ: MATH243, CISC220.  
RESTRICTIONS: MATH302 is recommended as a prerequisite. A student cannot receive  
credit for both CISC426 and CISC626.

CISC 427  
**SIMULATION OF DISCRETE SYSTEMS**  
3  
Modeling and computer simulation of systems characterized by stochastic discrete  
events. Study and use of discrete system simulation languages.  
PREREQ: CISC220.  
RESTRICTIONS: Credit cannot be received for both CISC427 and CISC627.

CISC 429  
**TOPICS IN SCIENTIFIC AND ALGEBRAIC COMPUTATION**  
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: CISC220, CISC310.  
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, modelling and object hierarchy, and animation.  
PREREQ: CISC410, CISC320 or CISC621.  
RESTRICTIONS: Credit cannot be received for both CISC440 and CISC640.

CISC 444  
**PARALLEL AND DISTRIBUTED APPLICATIONS**  
Study tools and techniques for programming applications on shared and distributed  
memory multiprocessors and workstation networks. Development, analysis, testing, and  
validation of many-processor programs will be covered. Students will put principles into  
practice on a significant project of their own choosing.  
PREREQ: CISC361 and CISC320.  
RESTRICTIONS: Credit cannot be received for both CISC444 and CISC644.

CISC 449  
**TOPICS IN COMPUTER APPLICATIONS**  
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  
Introduction to local area and long haul computer communication networks. Analysis,  
design and implementation of network protocols.  
PREREQ: CISC360, CISC361 or CISC631.  
RESTRICTIONS: Credit cannot be received for both CISC450 and CISC650.

CISC 459  
**TOPICS IN COMMUNICATIONS, DISTRIBUTED COMPUTING AND NETWORKS**  
Contents vary to coincide with the interests of students and current faculty.  
PREREQ: CISC450/650.  
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. Multi·  
computer and multiprocessor architectures. Parallel machines.  
PREREQ: CISC360.  
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 and abstract data types.  
PREREQ: CISC310.  
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 CISC310.

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 475  
**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 realistic examples and homework projects  
to cover all aspects of object-oriented lifecycle, from the requirements to coding in C++  
RESTRICTIONS: Requires C++ and permission of instructor. Credit cannot be received  
for both CISC475 and CISC675.

CISC 479  
**TOPICS IN ARCHITECTURE AND SOFTWARE**  
Contents will vary to coincide with the interests of students and faculty.  
PREREQ: CISC462/662, CISC663 or CISC361.  
RESTRICTIONS: Credit cannot be received for both CISC479 and CISC679.

CISC 480  
**COMPUTERS AND THE MIND**  
3  
Application of the computational paradigm to the cognitive sciences. Tentative answers to  
questions like the following: Is the computer in some important sense a model of the mind?  
Is there a general concept of cognition independent of its realization in man or machines?  
PREREQ: MATH243 and CISC220.  
RESTRICTIONS: Credit cannot be received for both CISC481 and CISC681.

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 VERIFICATION**  
3  
Structured design, specification and verification of programs. Proof rules.  
PREREQ: CISC310.  
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, complete·  
ness, compactness and undecidability. Automated theorem proving also covered.  
PREREQ: CISC310.  
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. Equally  
important given to techniques and specific algorithms. Particular topics include advanced  
data structures, graph algorithms, disjoint set manipulation, sorting and selection, amor·  
tization analysis, NP-completeness, and matrix and polynomial multiplication.  
PREREQ: CISC320 and MATH315.

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 compu·  
tation to solve a problem from student's own discipline. May be cross-listed with  
MATH313.  
RESTRICTIONS: Credit cannot be received for both CISC623 and CISC423.

CISC 626  
**SIMULATION OF CONTINUOUS SYSTEMS**  
3  
Computer simulation of systems described in terms of differential equations. Study and use  
of continuous system simulation languages, analog and hybrid computers.  
PREREQ: MATH243 and CISC220.  
RESTRICTIONS: Credit cannot be received for both CISC626 and CISC426.

CISC 627  
**SIMULATION OF DISCRETE SYSTEMS**  
3  
Modeling and computer simulation of systems characterized by stochastic discrete  
events. Study and use of discrete system simulation languages.  
PREREQ: CISC220.  
RESTRICTIONS: Credit cannot be received for both CISC627 and CISC427.

CISC 629  
**TOPICS IN SCIENTIFIC AND ALGEBRAIC COMPUTATION**  
Contents vary to coincide with the interests of students and current faculty.  
RESTRICTIONS: Credit cannot be received for both CISC629 and CISC429.
CISC 633  INTRODUCTION TO COMPUTER INSTRUCTION  
3  See EUST633 for course description

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 CISC310  
RESTRICTIONS: Credit cannot be received for both CISC637 or CISC437

CISC 640  COMPUTER GRAPHICS  
3  Computer graphics technology, two- and three-dimensional systems, graphics software systems, modeling and object hierarchy, and animation.  
PREREQ: CISC410; CISC320 or CISC621  
RESTRICTIONS: Credit cannot be received for both CISC640 and CISC440

CISC 644  PARALLEL AND DISTRIBUTED APPLICATIONS  
3  Study tools and techniques for programming applications on shared and distributed memory multiprocessors and workstation networks. Development, analysis, testing, and validation of many-processor programs will be covered. Students will put principles into practice on a significant project of their own choosing.  
PREREQ: Requires permission of instructor  
RESTRICTIONS: Credit cannot be received for both CISC644 and CISC444

CISC 649  TOPICS IN COMPUTER APPLICATIONS  
3  Contents will vary to coincide with the interests of students and current faculty  
PREREQ: CISC650  
RESTRICTIONS: Credit cannot be received for both CISC649 and CISC449

CISC 650  COMPUTER NETWORKS  
3  Introduction to local area and long haul computer communication networks. Analysis, design and implementation of network protocols.  
PREREQ: CISC360; CISC361 or CISC663  
RESTRICTIONS: Credit cannot be received for both CISC650 and CISC450

CISC 659  TOPICS IN COMMUNICATIONS, DISTRIBUTED COMPUTING AND NETWORKS  
3  Contents vary to coincide with the interests of students and current 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. Multi-processor and multiprocessor architectures. Parallel machines.  
PREREQ: CISC360  
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  
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: CISC310  
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: CISC230 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 679  TOPICS IN ARCHITECTURE AND SOFTWARE SYSTEMS  
3  Contents will vary to coincide with the interests of students and current faculty.  
PREREQ: CISC662 and CISC663  
RESTRICTIONS: Credit cannot be received for both CISC679 and CISC479

CISC 681  ARTIFICIAL INTELLIGENCE  
3  Programming techniques for problems not amenable to algorithmic solutions. Problem formulating search strategies, the space states, applications of logic, knowledge representation, planning and application areas.  
PREREQ: CISC220 and CISC310  
RESTRICTIONS: Credit cannot be received for both CISC681 and CISC481

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

CISC 691  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  MACHINE LEARNING  
3  Mathematically circumstances 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 current faculty.  
PREREQ: CISC601

CISC 811  PARALLEL ALGORITHMS  
3  Study of design and analysis techniques for parallel algorithms is conducted. Topics include: basic techniques of parallel algorithm design; searching and sorting in parallel; parallel tree and graph algorithms; and complexity issues, including the relationships among PRAM models, the class NC, and P-completeness.  
PREREQ: CISC621

CISC 822  ALGEBRAIC ALGORITHMS  
PREREQ: CISC621 or CISC623 (preferably both)  
RESTRICTIONS: Offered in alternate years MATH450 or MATH650 recommended as prerequisites

CISC 829  ADVANCED TOPICS IN SCIENTIFIC AND ALGEBRAIC COMPUTATION  
3  Contents vary to coincide with the interests of students and current faculty

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

CISC 851  SYSTEMS MODELING  
PREREQ: CISC360

CISC 852  COMPUTER NETWORK PERFORMANCE  
3  Performance analysis of local area, wide area and interconnected networks. Queueing 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 854  LOCAL AREA NETWORKS  
3  LAN protocols, topologies, transmission media, standards, design and selection, management and current research.  
PREREQ: CISC650

CISC 856  UPPER LAYER PROTOCOLS  
PREREQ: CISC650

CISC 857  INTERCONNECTION OF NETWORKS  
3  Overview of WAN, LAN and MAN technologies; internetworking techniques; 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 849  ADVANCED TOPICS IN COMPUTER APPLICATIONS  
3  Contents vary to coincide with the interests of students and current faculty.
COMM 200 INTRODUCTION TO HUMAN COMMUNICATION SYSTEMS 3
An analysis of human communication systems emphasizing the communication strategies used to relate, inform, persuade and manage conflict in personal, nonpersonal and male/female relationships.

COMM 245 MASS COMMUNICATION AND CULTURE 3
The relationship between media and culture, how media affect culture (i.e., socialization and role modeling); and exploration of new forms of mass communication.

COMM 251 THE DEVELOPMENT OF VERBAL COMMUNICATION 3
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.

COMM 255 FUNDAMENTALS OF COMMUNICATION 3
Introduction to theories in communication with applications: Developing, analyzing, and critiquing communication in different settings.
RESTRICTIONS: Not open to Seniors. Not open to communication majors.

COMM 256 PRINCIPLES OF COMMUNICATION THEORY 3
Introduction to theories and research in communication with survey of the areas of the field.

COMM 263 INTERNATIONAL SOCIAL CONDUCT 3
Introduction to basic attitudes toward interpersonal relations and socioeconomic and political responsibilities in various cultures. An experiential course integrating foreign and U.S. students.
RESTRICTIONS: Offered only in Winter. Not for major credit.

COMM 301 INTRODUCTION TO COMMUNICATION RESEARCH METHODS 3
The conceptual bases of research methodology: formulating questions, designing, conducting and analyzing research.
PREREQ: COMM256.

COMM 309 INTRODUCTION TO PUBLIC RELATIONS 3
The role of public relations in various settings, including corporations, nonprofit organizations and educational institutions. Tactics and strategies for writing news releases, designing a public relations campaign and working with the media.
PREREQ: ENGL307.

COMM 311 COMMUNICATION TECHNIQUES 3
A technical approach to the research, organization, compilation and production stages of public relations communications including radio, television, in- and out-of-house publications (newsletters, annual reports, correspondence and news releases) and advertising design.
PREREQ: COMM309 and ENGL307.

COMM 312 ORAL COMMUNICATION IN BUSINESS 3
Provides a variety of oral communication skills needed for public presentations, use of visual aids in speeches and extemporaneous speaking. Consists primarily of structured and critiqued student performances.
RESTRICTIONS: Not open to communication and communication interest majors.

COMM 325 TELEVISION PRODUCTION 3
Television as a mass communication media. Background, programming, production and studio procedures. Educational television, broadcasting and closed circuit laboratory observation and practices.

COMM 330 COMMUNICATION AND SOCIAL BEHAVIOR 3
An introduction to verbal and nonverbal communication including perceptual processes, symbol systems, communicative functions and patterns, and cultural contexts.

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

COMM 356 SMALL GROUP COMMUNICATION 3
Examines basic group processes, structures and functions. Emphasizes both theory and practical applications.
RESTRICTIONS: Requires permission of instructor.

COMM 361 INTERPERSONAL COMMUNICATION 3
Focus on dyadic relationships as created, maintained and modified through verbal and nonverbal interaction.

COMM 365 LEGAL ISSUES OF THE MASS MEDIA 3
Survey of legal issues affecting the development and performance of the mass media. The foundation of American communications law outlined through the study of First Amendment theory, its origin and development. Legal issues concerning libel, obscenity, copyright and broadcast regulation discussed.

COMM 366 INDEPENDENT STUDY 1-3

COMM 370 THEORIES OF MASS COMMUNICATION 3
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.

COMM 388 TV PRODUCTION PRACTICUM 3 PF
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.

COMM 409 PUBLIC RELATIONS PLANNING 3
Problems and practices of public relations using case study illustrations. Focus on assessment of program design and development.
PREREQ: COMM309 and ENGL307.

COMM 413 PUBLIC RELATIONS MANAGEMENT 3
Introduction to management tools of the public relations practitioner beyond specific case studies. Discussion of management approaches solely within confines of PR area. Topics: budgeting, managing human resources, approach/philosophy of PR program, charting trends and problems of assessment.
PREREQ: COMM309.

COMM 417 COMMUNICATION AND THE MANAGEMENT OF CONFLICT 3
An examination of communication and the conflict process in an interpersonal setting. Emphasis on the structure of conflict interaction and on the skills of assessing and intervening in conflict situations.

COMM 418 TOPICS IN MASS COMMUNICATION 3
Topics vary from semester to semester and include 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 421 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: Requires permission of instructor. Course offered in Madrid, Spain and Costa Rica only.

COMM 424 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.
RESTRICTIONS: Requires permission of instructor.

COMM 435 ADVANCED TV PRODUCTION AND DIRECTION 3
Analysis and synthesis of the production, planning and videotaping of TV programs; news and public affairs, drama, variety and instructional programming.
PREREQ: COMM325.

COMM 438 SPEECH AND LANGUAGE IN HUMAN BEHAVIOR 3
Theories of speech and language. Psycholinguistic approaches to problems of meaning, different types of texts, models of language use and acquisition and language and cognition.

COMM 440 TOPICS IN INTERPERSONAL AND ORGANIZATIONAL COMMUNICATION 3
Significant research, theories and literature in communication, research design and theory building. May be cross-listed with WOMS440.
RESTRICTIONS: May be repeated three times for credit when topics vary.

COMM 450 MASS COMMUNICATION EFFECTS 3
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.
RESTRICTIONS: Requires permission of instructor.

COMM 452 COMMUNICATION, POWER AND VALUES 3
How influence is created and resisted through communication in personal relations, public relations and advertising; personal values, persuasive strategies and ethics in exercising and resisting social power.
CRJU 203 PROBLEMS OF CORRECTIONS 3
General overview of the American corrections system and a survey of the most pressing correctional problems of the 1990s. 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 304 CRIMINOLOGY 3
See SOC304 for course description.

CRJU 313 THE STUDY OF MURDER 3
An historical and contemporary analysis of capital 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. May be cross-listed with HIST234.

CRJU 324 AMERICAN CONSTITUTIONAL HISTORY 3
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 HIST234.

CRJU 330 POPULATION, LAW AND SOCIETY 3
See SOC330 for course description.

CRJU 332 CRIMINAL VIOLENCE IN AMERICA 3
General overview of various aspects of criminal violence. In-depth analysis of child abuse, rape, domestic violence and black-on-black homicide.

CRJU 336 THE DETECTIVE IN FILM AND FICTION 3
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. PREREQ: CRJU201 RESTRICTIONS: Junior and senior majors only.

CRJU 340 THE JUVENILE JUSTICE SYSTEM 3
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.

CRJU 345 SOCIOLOGY OF LAW 3
See SOC345 for course description.

CRJU 346 PSYCHOLOGY AND THE LAW 3
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.

CRJU 347 THE JURY: GUILTY OR NOT GUILTY 3
Observations of actual criminal and civil trials, mock jury deliberations of trials; lectures on jury research; films; and meetings with judges, prosecutors and defense attorneys. COREQ: PSYC347 RESTRICTIONS: Requires permission of instructor.

CRJU 348 THEORIES OF SOCIAL WORK PRACTICE 3
See SOC348 for course description.

CRJU 350 WOMEN AND CRIMINAL JUSTICE 3
Reviews historical and contemporary explanations for women's participation in crime and evaluates these explanations in light of current research. Other topics include treatment of women offenders by judicial and correctional systems, women as victims of crime and women as criminal justice personnel. May be cross-listed with WOMS350.

CRJU 355 RACE, CLASS AND CRIME 3
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.

CRJU 357 SEMINAR ON THE POLICE 3
Teaches students to criticize and analyze research and theory in the scholarly literature on policing.

CRJU 366 INDEPENDENT STUDY 1-6

CRJU 370 PRISON AND PRISON SUBCULTURES 3
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.

CRJU 375 CRIMINAL PROCEDURE 3
Intensive analysis of criminal court procedures that occur once a case is actually brought against an accused. Emphasis on trial tactics and procedures.

CRJU 420 CRIMINAL JUSTICE ADMINISTRATION 3
Aids those planning a career as an administrator in the criminal justice system. Topics typically include basic administrative policy and budgetary matters. PREREQ: CRJU110.

CRJU 425 CRIMINAL LAW AND SOCIAL POLICY 3
Analyzes the role of the American judiciary in making social policy and examines the manner in which the courts have adjudicated controversial sociological issues. Topics typically include capital punishment, abortion, the right to privacy, search and seizure, the Miranda rule, and freedom of speech and press.

CRJU 428 CORPORATE CRIME 3
See SOC428 for course description.

CRJU 437 SEMINAR ON CORRECTIONS 3
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.

CRJU 446 JUDGING THE JURY 3
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.

CRJU 448 COMMUNITY-BASED TREATMENT 3
See SOC448 for course description.

CRJU 450 PRISONERS AND THE LAW 3
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.

CRJU 455 THE ECOLOGY OF CRIME 3
Examines the structure of urban areas and the way in which the arrangement and organization of urban areas influence the spatial distribution of crime and the behavior of offenders in urban spaces. May be cross-listed with GEOG441.

CRJU 456 LAWYERS AND SOCIETY 3
See SOC456 for course description.

CRJU 457 CRIMINAL EVIDENCE 3
The study of the laws of evidence and how they are used in the criminal courts and their effect on the administration of justice.

CRJU 460 CRIMINAL JUSTICE POLICY 3
A critical examination of criminal justice policy in the United States over the past thirty years, with emphasis on the two major theoretical positions that have dominated criminal justice policy making during that period.

CRJU 466 INDEPENDENT STUDY 1-6

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: SOC301.

CRJU 495 FIELD EXPERIENCE IN CRIMINAL JUSTICE 4 PF
Practicum involving actual field experience in criminal justice. May be cross-listed with SOC495. RESTRICTIONS: Requires permission of instructor.

CENTER FOR SCIENCE AND CULTURE

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
Considers societal theories and medical practices concerning women and discusses their biological basis, their biological effects, sources of information with which to evaluate them, etc. Emphasis on preparing the student to make own medical and obstetrical decisions and to critically evaluate claims concerning male/female differences. May be cross-listed with WOMS233.
CSCC 241 ETHICAL ISSUES IN HEALTH CARE 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 242 SOCIETY AND THE HEALTH PROFESSIONS 3
Interdisciplinary course on the historical development and character of professional institutions in health care. Material on Asian, European and Latin American societies used for comparison to the health professions in America. May be cross-listed with SOCI242.

CSCC 243 SOCIETY, POLITICS AND HEALTH CARE 3
An interdisciplinary study of the political, social, economic and humanistic issues of health care delivery. May be cross-listed with SOCI243.

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 271 COMPARATIVE MEDICAL SYSTEMS 3
Survey of research on the relationships between traditional and modern medicine in Asian, African and Latin American cultures, including research on the evolution of infectious diseases and their effect on the historical development of Asian, African and American Indian civilizations.

CSCC 310 SOCIOLGY OF HEALTH CARE 3
See SOCI310 for course description.

CSCC 311 HOSPITALS 3
See SOCI311 for course description.

CSCC 330 VARYING AUTHORS, THEMES AND MOVEMENTS 3
See HLIT330 for course description.

CSCC 341 ETHICS OF ENGINEERING PROFESSION 1
See PHIL341 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. May be cross-listed with SOCI355.

CSCC 361 HOW TECHNOLOGY WORKS IN SOCIETY 1 PF
How do modern technical things work? How do scientists and engineers work in development, design and production? What impact does modern technology have on people, society, environment, and international competitiveness? These questions will be addressed by experts from each major field of science and engineering. May be cross-listed with EGGG361.

CSCC 365 STUDIES IN LITERARY GENRE, TYPES AND MOVEMENTS 3
See ENGL365 for course description.

CSCC 366 INDEPENDENT STUDY 1-6
See ENGL368 for course description.

CSCC 369 LITERATURE AND SCIENCE 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.
PREREQ: HIST101 or HIST102.

CSCC 385 HISTORY OF BIOLOGICAL IDEAS 3
Historical analysis of the major intellectual and scientific concepts of biology. Development since the mid-19th century that had a direct relationship to modern medical education, infectious diseases and social biology. May be cross-listed with HIST385.

CSCC 389 TOPICS IN WOMEN AND HEALTH ISSUES 3
See WOMS389 for course description.

CSCC 410 HEALTH SERVICES PRACTICUM AND SEMINAR 4
See SOCIC410 for course description.

CSCC 411 SEMINAR IN AMERICAN HISTORY 3
See HIST411 for course description.

CSCC 444 MEDICAL ETHICS 3
See PHIL444 for course description.

CSCC 480 ISSUES IN HEALTH CARE 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 health care team, etc.
RESTRICTIONS: BALS-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 health care 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 health care 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.

EARLY AMERICAN CULTURE

EAMC 602 MATERIAL LIFE IN EARLY AMERICA 3
American domestic environments and decorative arts within social and economic context 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 603 HISTORY OF FURNITURE IN AMERICA 3
American furniture from the colonial era to the Civil War. Considers European design sources and stylistic influences. Introduction to bibliography, research tools and methods, familiarization with major classes of objects, analysis of formal and functional changes over time, region and economic level.
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. May be cross-listed with MSTAT604.
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 MSTAT605, MSTAT606 and/or URAF611.
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 MSTAT606.
RESTRICTIONS: Requires permission of instructor.

EAMC 671 CONNOISSEURSHIP OF THE DECORATIVE ARTS IN AMERICA I 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 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 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.

EAMC 801 INTRODUCTION TO DECORATIVE ARTS IN AMERICA TO 1850 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
<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON 100</td>
<td>Economic Issues and Policies</td>
<td>3</td>
<td>Takes a non-technical 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 ECON 151 or ECON 152.</td>
</tr>
<tr>
<td>ECON 151</td>
<td>Introduction to Microeconomics: Prices and Markets</td>
<td>3</td>
<td>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: MATH 114 or MATH 115.</td>
</tr>
<tr>
<td>ECON 152</td>
<td>Introduction to Macroeconomics: The National Economy</td>
<td>3</td>
<td>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: ECON 151.</td>
</tr>
<tr>
<td>ECON 251</td>
<td>Managerial Economics</td>
<td>3</td>
<td>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: ECON 251 and STAT 201. Restrictions: Credit can be earned for only one among ECON 251, ECON 300 or ECON 301.</td>
</tr>
<tr>
<td>ECON 300</td>
<td>Intermediate Microeconomic Theory</td>
<td>3</td>
<td>Price determination and income distribution in a market economy; the behavior of firms and industry under conditions of pure and imperfect competition. Prereq: ECON 151. Restrictions: Credit can be earned for only one among ECON 251, ECON 300 or ECON 301. BS majors must take ECON 301. ECON 300 cannot be used to satisfy economics BS major requirements.</td>
</tr>
<tr>
<td>ECON 301</td>
<td>Quantitative Microeconomic Theory</td>
<td>3</td>
<td>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: ECON 251 and MATH 221. Restrictions: Credit can be earned for only one among ECON 251, ECON 300 or ECON 301.</td>
</tr>
<tr>
<td>ECON 302</td>
<td>Banking and Monetary Policy</td>
<td>3</td>
<td>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: ECON 152.</td>
</tr>
<tr>
<td>ECON 303</td>
<td>Intermediate Macroeconomic Theory</td>
<td>3</td>
<td>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: ECON 302.</td>
</tr>
<tr>
<td>ECON 305</td>
<td>Comparative Economic Systems</td>
<td>3</td>
<td>Theoretical and empirical comparison of economic systems’ use of the market mechanism to allocate resources. Emphasis on the consequences of industrial democracy and government efforts to improve the decisions of corporations in Western and Eastern Europe, Russia and Japan. Prereq: ECON 151.</td>
</tr>
<tr>
<td>ECON 306</td>
<td>Economic Theory of Politics</td>
<td>3</td>
<td>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 POLS 306. Prereq: ECON 151 and POLS 105.</td>
</tr>
<tr>
<td>ECON 311</td>
<td>Economics of Developing Countries</td>
<td>3</td>
<td>Surveys policy issues related to economic growth and development. Special emphasis on problems facing contemporary third-world countries. Prereq: ECON 151 and ECON 152. Restrictions: ECON 311 and ECON 411 cannot both count for degree credit.</td>
</tr>
<tr>
<td>ECON 315</td>
<td>Economic History of Colonial America</td>
<td>3</td>
<td>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: ECON 151 and ECON 152.</td>
</tr>
<tr>
<td>ECON 316</td>
<td>Economic History of the United States</td>
<td>3</td>
<td>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: ECON 151 and ECON 152.</td>
</tr>
<tr>
<td>ECON 318</td>
<td>Economic History of France</td>
<td>3</td>
<td>Development of French economic policy from Roman to modern times. Emphasis on origins and influence of the Catholic Church, Colbert, the French Revolution and centralization of economic policy in France. Prereq: ECON 151. Restrictions: Requires permission of instructor. Offered only during Winter Session in France.</td>
</tr>
<tr>
<td>ECON 340</td>
<td>International Economics</td>
<td>3</td>
<td>Theory, problems and policy in international trade and finance with emphasis on developments since World War II. Prereq: ECON 151 and ECON 152. Restrictions: ECON 340 cannot be taken for credit after ECON 441 and/or ECON 443.</td>
</tr>
<tr>
<td>ECON 341</td>
<td>Environment of Multinational Corporations</td>
<td>3</td>
<td>See BUAD 341 for course description.</td>
</tr>
<tr>
<td>ECON 344</td>
<td>The Making of the European Economy</td>
<td>3</td>
<td>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: ECON 151 and ECON 152. Restrictions: Credit toward degree may not be earned in both ECON 344 and ECON 444.</td>
</tr>
<tr>
<td>ECON 348</td>
<td>Industrial Policies of France</td>
<td>3</td>
<td>Comparison of economic policies in France and the U.S. Emphasis on merger, antitrust, regulation and international trade policies. Includes a review of the economic theory of the firm. Prereq: ECON 151. Restrictions: Requires permission of instructor. Offered only during Winter Session in France.</td>
</tr>
<tr>
<td>ECON 360</td>
<td>Government Regulation of Business</td>
<td>3</td>
<td>Normative, economic and legal foundations of government intervention in business, particularly antitrust and regulation; and the process and the effects of government policies. Prereq: ECON 151.</td>
</tr>
<tr>
<td>ECON 366</td>
<td>Independent Study</td>
<td>1-6</td>
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</tr>
<tr>
<td>ECON 381</td>
<td>Economics of Human Resources</td>
<td>3</td>
<td>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: ECON 151. Restrictions: ECON 381 and ECON 483 cannot both count for degree credit.</td>
</tr>
<tr>
<td>ECON 393</td>
<td>Urban Economics</td>
<td>3</td>
<td>Economic problems and issues affecting modern urban society, including land policies, housing, transportation, labor and public activities. Prereq: ECON 151.</td>
</tr>
<tr>
<td>ECON 403</td>
<td>History of Economic Thought</td>
<td>3</td>
<td>Development of economic analysis as a systematic discipline from mercantilist writers forward. Topics include theory of the firm, price theory, welfare, distributive justice and public goods. Prereq: ECON 300 or ECON 301.</td>
</tr>
<tr>
<td>ECON 405</td>
<td>The Planned Economies</td>
<td>3</td>
<td>Theoretical and empirical comparison of market and centrally planned economic systems. The United States and the Soviet Union are studied. Prereq: ECON 300 or ECON 301, and MATH 230.</td>
</tr>
<tr>
<td>ECON 406</td>
<td>Markets: Information and Uncertainty</td>
<td>3</td>
<td>Investigates impact of cost 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: ECON 300 or ECON 301, and MATH 230 and STAT 202.</td>
</tr>
</tbody>
</table>
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.
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 underdeveloped countries.
PREREQ: ECON300 or ECON301, and ECON303
RESTRICTIONS: ECON 311 and ECON 411 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 STAT202

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, STAT202 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静态s, 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 the energy environmental problems, the negative income tax, urban finances and the national debt.
PREREQ: ECON300 or ECON301
RESTRICTIONS: ECON 332 and ECON 433 cannot both count for degree credit

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 STAT202 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: ECON460 and ECON463 cannot both count for degree credit

ECON 466 Independent Study 1-6

ECON 475 Economics of Natural Resources 3
Studies the allocation of natural resources. Applies theory to the problem of misallocations caused by open-access, common property and multiple use, under both free and controlled economies.
PREREQ: ECON300 or ECON301

ECON 477 Benefit-Cost Analysis 3
Studies the proper way to plan, undertake and interpret a benefit-cost analysis. Emphasizes methods of choosing a proper discount rate and handling such problems of income distribution, unemployment, risk and uncertainty, externalities and measurement of nonmarket benefits and costs.
PREREQ: ECON300 or ECON301

ECON 483 Economics of Labor Markets 3
Analyzes economic models of labor market topics such as 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 511 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 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 income, employment and the price level; the behavior of these variables within both the neoclassical and income-expenditure framework; and the fiscal and monetary policy implications of these alternative theoretical approaches

ECON 808 U.S. 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 labor; the economics of slavery; the impact of railroads; gender discrimination; the postbellum Southern economic failure
PREREQ: STAT202 or equivalent
COREQ: ECON801

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: ECON802

ECON 812 Advanced Macroeconomic Analysis 3
This course examines recent research and literature in macroeconomics. Among the topics treated are 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. This course is 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: STAT202 or STAT555

ECON 819 Economics of Information 3
This course 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: STAT202 or STAT371

ECON 823 Seminar in Econometrics 3
Class discussion and research in advanced econometric statistics and applied econometrics
PREREQ: ECON822

ECON 824 Topics in Advanced Econometrics 3
This course will cover limited dependent variables, panel data and time series techniques. Additional or substitute topics may also be covered. This course is intended for doctoral students.
PREREQ: ECON822 and ECON823 or Equivalent

ECON 827 Advanced Production Economics 3
See FREC827 for course description

ECON 832 Public Finance 3
This course examines recent research and literature in public finance. Among the topics treated are public goods, public choice, externalities and environmental policy, expenditure programs for the poor, social insurance, social security, health insurance, unemployment insurance, cost-benefit analysis, tax incidence, optimal taxation
COREQ: ECON801

ECON 841 International Trade and Development 3
Covers 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

ECON 842 International Finance and Development 3
Continues ECON841. Covers foreign exchange markets, balance of payments, exchange rate systems and international economic policy
PREREQ: ECON552 or ECON802 or equivalent

ECON 846 Topics in Economic Development 3
The course will include topics of current interest to economists. Such topics will include labor markets, populations, human capital and income distribution in less developed countries. Additional or substitute topics may also be covered
COREQ: ECON801 [ECON822 is recommended]

ECON 852 Monetary Economics 3
Course covers 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

ECON 861 Industrial Organization and Antitrust Policies 3
Analyzes industrial markets in terms of structure, competition and performance, with concentration on oligopolistic and differentiated competition, statistical relationships between profits and concentration, entrepreneurship and hierarchy, and innovation. Also discusses government antitrust policies to promote competition
PREREQ: ECON551 or ECON801 or equivalent

ECON 862 Economics of Regulation 3
Economic rationale for government regulation of industries. Regulatory mechanisms to induce optimal behavior. Case studies of transportation, telecommunications and electric utility industries with empirical applications
COREQ: ECON801, ECON822 or equivalent

ECON 868 Research 1-9

ECON 869 Master's Thesis 1-6

ECON 875 Advanced Fishery Economics 3
See NAST875 for course description.

ECON 877 Advanced Benefit-Cost Analysis 3
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

ECON 880 Labor Economics 3
Covers topics in labor economics, including labor demand, labor supply, investment in human capital, wage determination, and labor market discrimination. Applications to public policy issues will be stressed throughout
COREQ: ECON801, ECON822 or equivalent

ECON 890 Colloquium: Economics Seminar Series 0 PF
Regularly-scheduled lectures by faculty and visiting researchers providing exposure to current research in economics

ECON 894 Applied Regional Modeling 3
Uses quantitative methods to forecast regional economic phenomena. Methods include regional export base, shift-share, input-output and econometric models. Emphasizes policy simulations
PREREQ: ECON822

ECON 896 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 coursework.
RESTRICTIONS: Not open to students who have been admitted to candidacy

ECON 899 Doctoral Dissertation 1-12 PF

COUNSELOR EDUCATION

EDCE 640 Professional Seminar in Counseling and Student Affairs 3
Introduction to the history, philosophy, roles, organizational structure, professional structures, professional standards, and research in counseling and student affairs practice in higher education
RESTRICTIONS: Open only to majors in Counselor Education

EDCE 641 Student Personnel Management 3
Study of the theories and principles of management in student affairs practice in higher education. Managerial, leadership, program development, supervision, and organizational issues involved in professional practice

EDCE 642 Seminar in Higher Education Administration 3
Overview of administrative and management issues faced by leaders in higher education

EDCE 643 The Law and Student Affairs 3
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
EDCE 644  THE AMERICAN COLLEGE STUDENT  3
Survey of the attitudes, values, and demographic characteristics of American college students. Examines theories of personal-environment interaction and methodologies for identifying student needs and assessing developmental change.

EDCE 645  GROUP COUNSELING  3
Examination of group work and group counseling in the higher education as well as the school setting. Emphasis on theoretical foundations of group work and group skill training. RESTRICTIONS: Open only to majors in Counselor Education.

EDCE 646  THEORIES OF COUNSELING  3
Theories and techniques used in counseling of individuals with personal, social, vocational, and educational problems. RESTRICTIONS: Open only to majors in counselor education.

EDCE 647  MULTICULTURAL ISSUES IN COUNSELING  3
Examines the influence of cultural background, including ethnicity, gender, sexual orientation, socio-economic factors, religious orientation and age on the counseling relationship. Introduction to non-traditional theories and techniques useful with special populations. Emphasis on increased sensitivity towards cultural influences.

EDCE 649  ASSESSMENT IN COUNSELING  3
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.

EDCE 650  STUDENT DEVELOPMENT IN HIGHER EDUCATION  3
Studies in development of motivation and personality traits in late adolescence and young 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.

EDCE 651  CAREER DEVELOPMENT: THEORIES AND PRACTICE  3
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.

EDCE 659  PRACTICUM IN COLLEGE COUNSELING  3
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.

EDCE 664  INTERNSHIP  3
Supervised experiences in counseling or student affairs practice in higher education. Minimum of 240 clock hours of direct service time. RESTRICTIONS: Open only to major in Counselor Education.

EDCE 666  SPECIAL PROBLEM 1-6

EDCE 671  PROFESSIONAL SEMINAR IN COUNSELING AND STUDENT AFFAIRS  0-6

EDV 205  CHILDREN'S LITERATURE  3

EDV 220  INTRODUCTION TO THE TEACHING OF READING  3
Explores dimensions of reading, approaches to, and materials for teaching and testing reading; and reading instruction of diverse learners.

EDV 305  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: EDDV220.

EDV 306  EMERGING LITERACY: YOUNG CHILDREN LEARN TO READ AND WRITE  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: EDDV220, JST222 and JST224.

EDV 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: EDDV305.

EDV 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. Practice included. PREREQ: MATH252.

EDV 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: MATH251, MATH221 and MATH230.

EDV 341  ELEMENTARY CURRICULUM: SCIENCE  3
An 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. Practice included.

EDV 346  ELEMENTARY CURRICULUM: SOCIAL STUDIES  3
An 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. Practice included.

EDV 370  HELPING RELATIONSHIPS  1-6
Small, semi-structured, discussion-oriented seminar. Participants explore their own motivations, values and feelings and share these feelings and perceptions with other seminar members. An educational, growth-oriented experience, not to be confused with group therapy, which is usually problem-oriented. RESTRICTIONS: Requires permission of instructor. May be repeated for credit when topics vary.

EDV 372  COUNSELING THEORIES  3
Examination of selected counseling theories from a theoretical, personal, functional and philosophical point of view.

EDV 373  PSYCHOLOGY OF HUMAN RELATIONSHIPS  3
Psychological 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.

EDV 374  EXPERIENTIAL EDUCATION  3
Fifty hours of field experience (internship) required combined with a seminar emphasizing career development and personal learning skills. Internship must be arranged and Learning Contract signed prior to first class meeting. RESTRICTIONS: Requires permission of instructor.

EDV 400  STUDENT TEACHING  3-12 PF
Full-time extended student teaching experience in public elementary and secondary schools. Students are under the guidance and supervision of the cooperating teacher in the classroom and a University of Delaware supervisor.

EDV 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.

EDV 422  LITERACY IN CONTENT AREAS  3
Provides a framework for simultaneously developing content area objectives and literacy through instructional attention to text analysis, activating prior knowledge, developing vocabulary and comprehension and organization of text information. Instructional strategies are focused on developing students' independence in learning through utilization of all communication processes: reading, writing, speaking and listening. PREREQ: EDDV305 and EDDV320.

EDV 429  METHODS OF TEACHING FOREIGN/SECOND LANGUAGES IN ELEMENTARY SCHOOLS  3
An introduction to curriculum and appropriate methods for teaching science concepts to middle school students (grades 6-8). Activities include review and evaluation of current middle school programs, research on student thinking, instructional materials, teaching strategies and appraisal of student learning.

EDV 443  TEACHING SCIENCE IN MIDDLE SCHOOL  3
An introduction to curriculum and appropriate methods for teaching science concepts to middle school students (grades 5-8). Activities include review and evaluation of current middle school programs, research on student thinking, instructional materials, teaching strategies and appraisal of student learning.

EDV 466  INDEPENDENT STUDY  1-6
EDDV 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. Emphasizes the importance of being 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.

EDDV 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 in their classroom problems and guides them to teacher and student behavior and assessment.

EDDV 601 LANGUAGE DEVELOPMENT IN THE CLASSROOM 3
Focuses on applying knowledge about language development in schools to children's development of language processes and the assessment of language performance. Explores language processes that provide a foundation for reading, speaking and listening.

EDDV 602 CHILDHOOD LITERATURE 3

EDDV 603 LITERATURE FOR ADOLESCENTS 3
Evaluation of classic and contemporary reading materials and their application to the junior and senior high school curriculum. Study of criteria, methods and tools for selection of books. Techniques for developing and promoting reading.

EDDV 605 SCHOOL CURRICULUM: LANGUAGE ARTS 3
Focuses on the nature, acquisition and development of oral and written language. Examines curriculum materials and instructional strategies appropriate for use with elementary and middle school students.

EDDV 607 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.

EDDV 612 ETHNIC STUDIES AND MULTICULTURAL EDUCATION 3
Content, strategies, concept 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.

EDDV 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.

EDDV 621 DEVELOPMENTAL READING INSTRUCTION 3
Presentation of reading theories and research as a basis for understanding and evaluating prevalent and newly proposed techniques for developmental reading instruction and assessment. Practical application of that knowledge in generating successful classroom implementation of reading practices critically selected as appropriate for pupils, curriculum and school setting.
PREREQ: EDDV620

EDDV 622 TEACHING READING IN CONTENT AREAS 3
Focuses on instructional strategies to help students learn from content area texts. Includes attention to assessment, text analysis, classroom organization and developing students' independence in reading and remembering text information through improving their vocabularies, text comprehension and study processes.

EDDV 624 DEVELOPMENTAL READING AND THE ROLE OF THE READING CONSULTANT 3
Laboratory course to prepare students to serve as reading consultants. Teaching experience in the Reading Center is required along with visits to different schools to see firsthand how reading consultants operate. The course provides opportunity to study and compare remedial and developmental reading programs.
PREREQ: EDDV620 or EDDV621, and EDDV626

EDDV 625 INTRODUCTION TO THE DIAGNOSIS AND CORRECTION OF READING DISABILITIES 3
A basic course for teachers and related professionals. Measurement of reading; factors related to reading disability; methods and materials for correction of problems.
PREREQ: EDDV620 or EDDV621

EDDV 626 ANALYSIS OF READING: PRACTICUM 3
A practicum, diagnostic course which reviews recent theories of reading and research related to assessment of reading skills and measures of reading achievement. Emphasis on informal approaches to evaluating reading, particularly informal reading inventories. Requires supervised administration of reading measures and preparation of diagnostic reports.
PREREQ: EDDV625

EDDV 627 ADVANCED ANALYSIS OF READING: PRACTICUM 3
A practicum, diagnostic course which reviews recent theories and developments related to correlates of reading disabilities including intelligence, cognition, perception, linguistic development and social/emotional adjustment. Requires supervised administration of measures of reading and related areas and preparation of diagnostic reports.
PREREQ: EDDV626.

EDDV 628 REMEDIAL READING TECHNIQUES 3
A laboratory course demonstrating corrective and remedial procedures. Opportunity provided for practice in application of specific psychological, pedagogical and psychotherapeutic techniques used with typical problem cases. Often requires practicum work with children at off-campus sites.
PREREQ: EDDV626.

EDDV 629 METHODS OF TEACHING FOREIGN/SECOND LANGUAGES IN ELEMENTARY SCHOOLS 3

EDDV 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.

EDDV 635 TEACHING MATHEMATICS IN LOWER ELEMENTARY SCHOOL 3
Acquaints students with historical 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: EDDV634 or MATH1252
RESTRICTED TO: Grade of C or better in EDDV634 or MATH1252

EDDV 636 TEACHING MATHEMATICS IN UPPER ELEMENTARY SCHOOL 3
Acquaints students with historical 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: EDDV634 or MATH1252
RESTRICTED TO: Grade of C or better in EDDV634 or MATH1252

EDDV 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.

EDDV 641 SCIENCE CURRICULUM AND INSTRUCTION 3
Examination of the goals of science education and their relation to science curricula. Focuses on strategies for curriculum development and evaluation.

EDDV 642 TOPICS IN SCIENCE EDUCATION 3
In-depth study of a major problem in science education. Problems to be studied will vary with each offering.
RESTRICTIONS: May be repeated for credit when topics vary.

EDDV 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.

EDDV 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.

EDDV 645 TOPICS: SOCIAL EDUCATION ISSUES 3
Examines selected topics and practices in social education. Reviews research findings, theoretical bases, resources and instructional strategies. Conceptual frameworks and/or curriculum models designed with appropriate provisions for implementation and evaluation of student achievement.
RESTRICTIONS: May be repeated for credit when topics vary.

EDDV 654 INDIVIDUAL INSTRUCTIONAL SYSTEMS 3
Concepts of individualized instruction emphasizing techniques for determining student differences, prescribing and utilizing instructional strategies with computer applications.

EDDV 657 CHILDREN, TELEVISION, AND EDUCATION 3
See COMM657 for course description.

EDDV 660 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.

EDDV 664 FIELD STUDY IN VOCATIONAL EDUCATION 3
Supervised investigations in the field of vocational education pursued on a small group basis. Experimental work, follow-up and case studies, surveys and other projects selected for their contribution to the local and/or state levels.

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EDDV 670 Student Development in Higher Education 3
Studies in development of motivation and personality trends in late adolescence and young adulthood in the context of higher education institutions. Designed for college counselors and student personnel administrators who deal with student development/institutional impact on students. RESTRICTIONS: Requires permission of instructor.

EDDV 672 Issues in Higher Education 3
Study of the purposes and problems of American higher education. Current issues ana-
yzed, particularly with regard to the influence of college on the student.

EDDV 681 Program Design for Adults 3
Program planning, development and evaluation for adult and continuing education pro-
grams. Including diagnosis of client needs; effective system of planning; development and evaluation for adult education programs; program scheduling; and budget and resource planning.

EDDV 683 School Business Management 3
A study of the financial and business aspects of school administration.

EDDV 684 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.

EDDV 686 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.

EDDV 687 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.

EDDV 689 Administration of Elementary and Middle Schools 3
Study of administrative practices and procedures in the elementary schools with empha-
sis on the role of the elementary school principal.

EDDV 690 Administration of Secondary Schools 3
A study of administrative practices and procedures in secondary school with emphasis on the senior high school administrator.

EDDV 691 Administration of Middle Schools 3
Studies administrative practices and procedures in the middle school with emphasis on the middle school principal.

EDDV 692 Introduction to Leadership Theory 3
Studies current research and applications of leadership research to educational administra-
tion. Includes some history of leadership studies. Focuses on the application of research in instructional leadership, leadership styles and the development of leadership skills.

EDDV 693 Supervision: Purposes and Effects 3
Investigates research in teaching/learning, the teaching occupation and school structures which shape the purposes and effects of supervision and evaluation in school settings. Particular attention given to the Delaware appraisal process.

EDDV 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.

EDDV 697 Design and Development of School Curriculum 3
Theory and practice of curriculum design and development. Specific areas include nature and structure of theory, role of theory in designing and developing school curricula, principles and procedures essential to analysis and solution of curriculum problems.

EDDV 698 Instructional Strategies for Adults 3
Examines forms of instruction suited to teaching adults. Attention will be given to the con-
cepts and principles relevant to the selection, application and evaluation of instructional strategies. Topics include characteristics of the adult learner; motivation, socioeconomic, cultural, and psychological factors complicating the educational process; meeting student needs through outside-class resources; counseling strategies; and integrating adults’ interests and needs into the curriculum.

EDDV 699 Foundations of Adult and Postsecondary Education 3
Overview of the historical and philosophical foundations of postsecondary education with particular references to the United States. Attention will be given to key people, issues, institutions, movements, public policy and programs within the context of the gen-
eral intellectual, social, economic, and political environment. The influence of postsec-
ondary education's historical evolution and philosophical roots on contemporary theory and practice will be examined.

EDDV 800 Research Colloquium in Education Development 1-3
Analysis of research in education currently underway at the University of Delaware and at other institutions, including doctoral dissertations. RESTRICTIONS: Open only to Ph.D. and advanced master's students. May be repeated for a total of three credit hours when topics vary.

EDDV 801 Seminar: Child Discourse and Education 3
Examination of child discourse, such as children's narrative and conversational skills, from the earliest period of language development through the middle school years. Investiga-
tion of the literature on oral language development among children from different socio-
cultural backgrounds. Focus on the relationship between discourse development and child-
ren's abilities to engage in oral language and literacy activities in the classroom. RESTRICTIONS: Open only to Ph.D. and advanced master's students.

EDDV 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, struc-
tures, evaluation and instruction in elementary and middle grades. RESTRICTIONS: Open only to Ph.D. and advanced master's students.

EDDV 821 Seminar: Reading 3
Studies significant research in reading, to train and supervise students in the methodolo-
gy of reading research and to plan needed research in reading. PREREQ: EDDV620 and EDDV621. RESTRICTIONS: May be repeated for credit when topics vary. Open only to Ph.D. and advanced master's students.

EDDV 822 Social Foundations of Literacy 3
Explores social and cultural factors which influence children's acquisition and use of liter-
acy. Issues relating to variations in expectations for literacy behavior in community and school contexts are considered. Relations between discourse patterns and literacy learn-
ing will be addressed. RESTRICTIONS: Open only to Ph.D. and advanced master's students.

EDDV 826 Research Theory Applied to Reading Curricula 3
Reviews selected theories/models of the reading processes along with research related to major areas of reading such as decoding, comprehension and study skills. Examines representative curriculum materials in reading to determine how well they reflect recent developments. Implications drawn for developing improved curricula. RESTRICTIONS: Open to Ph.D. and advanced master's students.

EDDV 834 Development of Mathematical Thinking 3
Study of how mathematical thinking develops in children. Consideration of major research paradigms and research findings on mathematical thinking in children ages 3-
15. Focuses on naturally emerging mathematics reasoning abilities and their relation-
ships to school expectations and acquisitions.

EDDV 835 Past and Current Issues in Mathematics Education 3
Identifies and discusses continuing issues in mathematics education. Examines major his-
torical themes that have shaped current theories and research. Analyzes past and current instructional programs.

EDDV 836 Problem Solving in Mathematics 3
A study of problem solving heuristics as they might be applied to the learning of mathe-
atical concepts. Includes a review of the literature and examination of kindergarten through grade 12. Examines curriculum materials that might be employed to develop productive student problem-solving skills.

EDDV 843 Seminar in Science Education 3
Covers critical issues in curriculum, research on learning or research on teaching. RESTRICTIONS: Topics vary and may be repeated for credit.

EDDV 844 Seminar in Social Studies Education 3
Covers 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.

EDDV 850 Qualitative Research and Evaluation Designs in Educational Settings 3
Considers a variety of descriptive, non-experimental research and evaluation designs appropriate for investigating questions in educational settings. Discusses theoretical bases for using these designs; procedures for implementation and data analysis; and issues of reliability, validity and generalizability.

EDDV 851 Practicum in Qualitative Research 3
Provides practical information and 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, and ethnics and style in qualitative research reporting. PREREQ: EDDV850.

EDDV 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 deci-
sions and conflicting views of curriculum.

EDDV 861 Curriculum Development and Evaluation 3
Major curriculum theories and their relationships to planning, and improvement and eval-
uation of school programs. Consideration of strategies for effecting curriculum change.
EDST 104 SKILMOD: CRITICAL THINKING 1 PF
Teaches strategies of good reasoning in humanities, social sciences and other liberal arts areas. Students learn how to become independent, well-informed thinkers and how to make persuasive arguments, using their own course materials.

EDST 105 SKILMOD: PROBLEM SOLVING 1 PF
Teaches problem-solving strategies for college courses in chemistry, physics, economics, engineering, etc. Students learn methods for decomposing problems into manageable components and for using example problems to strategize. Students apply these techniques to courses they are currently taking.

EDST 201 EDUCATION IN A MULTICULTURAL SOCIETY 3
Examines the current and historical debates over the proper role of schools in a democratic, multicultural society. Topics include educational reform, equal opportunity, demographic change, and multicultural education. Attention to the limits and possibilities of transforming schools and, conversely, of using schools to transform society.

EDST 202 HUMAN DEVELOPMENT AND EDUCATIONAL PRACTICE 3
The implications of the psychology of human development for educational practice in the elementary school. Lectures, discussions, tutoring, laboratory exercises and classroom observations. May be cross-listed with PSYC202.

EDST 230 INTRODUCTION TO EXCEPTIONAL CHILDREN 3
Historical and philosophical bases 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.

EDST 240 ETHICAL ISSUES IN TEACHING 3
Introduction to ethical thinking and decision making for the teacher in today's schools. Focus on ethical dilemmas encountered in planning for classroom management, maintaining intellectual freedom, treating students equally, planning for moral or character education, and other professional concerns.

EDST 242 TOPICS: PHILOSOPHY OF EDUCATION 3
See PHIL242 for course description.

EDST 247 HISTORICAL FOUNDATIONS OF EDUCATION 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 sociocultural context.

EDST 258 CULTURAL DIVERSITY, SCHOOLING AND THE TEACHER 3
Examines roles and responsibilities of the classroom teacher vis-a-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.

EDST 290 HISTORY OF WOMEN AND EDUCATION 3
The development of women's formal schooling and informal educative influences, consequences of male dominance upon women's ability to gain equality in American society, and women's progress towards career enhancement in a society ambivalent about the role of women. May be cross-listed with HIST290 and/or WOMS290.

EDST 304 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, psychological processes underlying classroom management, and student variability and exceptional students. May be cross-listed with PSYC304.

EDST 305 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. In addition assessment and measurement of instructional outcomes are stressed. May be cross-listed with PSYC305.

EDST 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 ENGLISH and/or LING155.

EDST 366 INDEPENDENT STUDY 1-6

EDST 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. RESTRICTIONS: For first and second year students.

EDST 390 INSTRUCTIONAL STRATEGIES AND INividual DIFFERENCES 3
Strategies for elementary school teaching, including classroom management and models of teaching. Emphasis on provisions for students with special needs.
EDST 391  Honors Colloquium  3
See ARSC390 for course description.

EDST 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.

EDST 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 exploration 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: EDST230
COREQ: EDST432.

EDST 432  Curriculum for School-Age Exceptional Children  3
Examination of instructional techniques, curricular materials, and progress monitoring for school-aged children with mild disabilities including mental retardation, learning disabilities and social/behavioral disturbances.
PREREQ: EDST435; EDST230
COREQ: EDST431.

EDST 433  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.
COREQ: EDST230.

EDST 461  Measurement Theory and Techniques for Classroom Teachers  3
Principles and techniques appropriate for norm- and criterion-referenced measurement including test construction, evaluation and interpretation.

EDST 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 ongoing language acquisition projects. May be cross-listed with LING462 and/or PSYC462.

EDST 465  Model OAS  3
See POSC465 for course description.

EDST 466  Independent Study  1-6
Research and/or field experience under supervision.

EDST 469  Research Project/Internship  3
Research and/or field experience under supervision.

EDST 475  Senior Seminar in Education  3
Examination of current problems in education, drawing on newspaper and magazine articles, observation, interviews with local and national educational leaders, and research and policy studies. Students will have an opportunity to apply the knowledge they have acquired about education to selected current educational issues.
PREREQ: EDST469.

EDST 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 LING476.
PREREQ: LING101.

EDST 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 ENGL477 and/or LING477.
PREREQ: LING101.

EDST 521  Manual Communication I  3
A brief overview of deafness for those who may be considering professional careers in serving the hearing impaired and for others who may be interested in a general knowledge of deafness. The course includes basic signs commonly used by the hearing impaired.
PREREQ: EDST521.

EDST 522  Manual Communication II  3
A brief overview of deafness for those who may be considering professional careers in serving the hearing impaired and for others who may be interested in a general knowledge of deafness. The course includes advanced and diagnostic signs commonly used by the hearing impaired.
PREREQ: EDST522.

EDST 523  Manual Communication III  3
In-depth use of manual communication for interpreting and translating for hearing impaired people in various situations of life. Orientation to deafness, finger spelling, basic signs, and a visit to the Steck School (Delaware's state school for the deaf).
PREREQ: EDST522.

EDST 524  Intensive Literacy Instruction  3
Training in the methods of teaching reading, writing and spelling developed in the Reading Study Center, College of Education. The program is called Intensive Literacy, and is useful for beginners, remedials and students learning English as a second language.

EDST 607  Educational Research Procedures  3
An introduction to quantitative methods in education through study of educational research procedures; for example, measurement, evaluation, experimental and quasi-experimental design, internal and external validity.

EDST 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.

EDST 623  Applied Human Development in the Schools  3
Research and theory in child and 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: EDST202 or EDST304.

EDST 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: EDST678, EDST681.

EDST 625  Methods and Curriculum for Individuals with Autism and Severe Disabilities  3
Reviews appropriately 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: EDST678, EDST681, EDST624.

EDST 626  Functional Communication for Individuals with Autism and Severe Disabilities  3
Reviews appropriately 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. Requires at least two other special education courses in addition to Pre-requisites.

EDST 627  Models of Instruction  3
Study of alternative models of instruction as applied to differing instructional objectives, content and settings.

EDST 629  Psychology of Teaching  3
A study of the research on teacher characteristics, teaching style and method, and teaching effectiveness.

EDST 630  The Psychology of Curriculum  3
Review of research literature in the developmental psychology of logical, mathematical, physical, biological and social concepts found in elementary and secondary curricula.
PREREQ: EDST607.

EDST 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 CISC533.

EDST 634  Instructional Design of Computer-Based Education  3
Relates concepts and research in educational psychology to the development of instructional materials using the computer medium. Includes strengths and limitations of computer in meeting certain instructional needs and techniques for effective computer-based educational delivery.
PREREQ: Introductory course in Instructional Design.
EDST 636 Educational Psychology 3
Study of research and theory in educational psychology and their application to instruction and schooling.
RESTRICTIONS: Not open to students with credit in EDST304 or EDST305. Requires permission of instructor or enrollment in a Master’s Degree Program.

EDST 640 Philosophy of Education 3
Study of the philosophical assumptions basic to, and expressed in, American education; application of philosophy to the clarification of professional problems; and construction of a personal philosophy of education.
RESTRICTIONS: Not open to students with credit in EDST340.

EDST 641 Social Philosophy and Education 3
Study of the ideological assumptions of Conservatism, Liberalism, Marxism and the New Left and their expression in American education; and application of social philosophy to the clarification of professional problems.

EDST 642 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: EDST230 or EDST697.
RESTRICTIONS: Designed for students in the Special Education Technology specialization.

EDST 643 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: EDST642, EDST679.
RESTRICTIONS: Designed for students in the Special Education Technology specialization.

EDST 644 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: EDST642.
RESTRICTIONS: Designed for students in the Special Education Technology specialization.

EDST 645 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.
PREREQ: EDST642.
RESTRICTIONS: Designed for students in the Special Education Technology specialization.

EDST 646 Technology in Vocational Preparation and Rehabilitation 3
Focuses on the use of technology to improve the employability and vocational productivity of individuals with disabilities. Topics include assessment of an individual's vocational strengths and weaknesses in relation to job demands, vocational technology applications including assistive technology and workplace modifications.
PREREQ: EDST642.
RESTRICTIONS: Designed for students in the Special Education Technology specialization.

EDST 647 History of Education in American Culture 3
Historical foundations upon which to base judgments about American education.

EDST 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, implications of ethnicity for the family/school interface, special families in special circumstances and models of intervention.

EDST 656 School Counseling Services 3
Deals with the family as a system, differing family shapes in contemporary society, implications of ethnicity for the family/school interface, special families in special circumstances and models of intervention.

EDST 655 School Counseling Services 3
Deals with the family as a system, differing family shapes in contemporary society, implications of ethnicity for the family/school interface, special families in special circumstances and models of intervention.

EDST 659 Advanced Counseling Techniques 3
Practical computer and statistical skills which will enable the student to answer research questions. Topics include descriptive statistics, regression, exploratory data analysis and hypothesis testing.

EDST 660 Applied Educational Measurement 3
Examines elementary statistical methods commonly used in educational measurement and evaluation, measurement principles (reliability, validity) and procedures for test selection. Students receive practice in administering vocational and/or psychosocial assessment tests, applying computer-assisted interpretation programs and report writing. Assessment instruments for handicapped students critiqued.

EDST 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.

EDST 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 be able to answer research questions. Topics include descriptive statistics, regression, exploratory data analysis and hypothesis testing.

EDST 668 Social Perspectives on Careers and Counseling 3
Examines major theories of career development within the context of research about human development, occupational requirements and opportunities, and changing work and family roles. Examines both psychological and socioeconomic factors affecting career development as well as particular problems facing the handicapped, women, minorities and other special groups.

EDST 669 Practicum in School Counseling 1-3
Supervised counseling and guidance experiences in a school setting.
PREREQ: EDST618, EDST660, EDST663, EDST656, EDST651, EDVD674 and EDST677.
RESTRICTIONS: Requires contractual arrangement with University and on-site supervisor.

EDST 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.

EDST 672 Consultation and Intervention 3
Surveys major theoretical approaches and research related to consultation and intervention involving the school-age child. Provides skills in consultation and intervention techniques employed by school psychologists, counselors, and other professionals working with teachers, parents and administrators.
PREREQ: EDST618.

EDST 673 Seminar in Transitional Issues 3
Provides an in-depth overview of research and practices related to transition for youth with mild/moderate/severe disabilities. Adult service systems, model secondary programs, the transitional planning process and current issues related to effective transitional practices will be examined.

EDST 674 Secondary and Vocational Practices in Special Education 3
Introduction and review of current issues and practices in secondary and vocational education as they relate to the education of the handicapped. Focuses on secondary level special education programs and practices, including career preparation, curriculum development and vocational training.

EDST 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 LNG/PSY.

EDST 676 Bilingualism and Language 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 LNG/PSY.

EDST 677 The Structure of English 3
Examines 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 ENG/PSY.

EDST 678 Theories of the Exceptional Child 3
Review and discussion of major models and theories that attempt to explain the etiology of, and variations in, behavior such as the three mildly handicapping conditions: mental retardation, learning disabilities and behavior disorders. Emphasis on the grouping of the three in such a way to deemphasize a categorical position in special education.
PREREQ: EDST230 or EDST697.
EDST 679 METHODS OF INSTRUCTING LEARNERS WITH MILD DISABILITIES 3
Presents techniques and materials associated with effective instruction for students with mild disabilities. Emphasis is placed on generic principles of instruction and evaluation of their efficacy. 
PREREQ: EDST620 or EDST697 and EDST435 or EDST680

EDST 680 EDUCATIONAL DIAGNOSIS 3
Current 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.

EDST 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.

EDST 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. The course assists students to become informed consumers of findings in the special education literature, and to design and interpret action research projects in classroom settings.
PREREQ: EDST681
COREQ: EDST607

EDST 683 CURRICULUM AND METHODS FOR TEACHING THE GIFTED CHILD 3
Focuses on the development of appropriate activities for gifted children. Acquaints students with the theoretical models in use to guide the development of selection of curriculum and methodology for use with gifted and talented children. Practicum experiences included. 
PREREQ: EDST679

EDST 684 EDUCATIONAL DIAGNOSIS II 3
Continuation of EDST680 Educational Diagnosis. Tests used by teachers and educational diagnosticians with exceptional children; the latest aptitude, achievement, and specialty tests are discussed, with students administering the latter two types of instruments.

EDST 685 COUNSELING PARENTS OF THE EXCEPTIONAL CHILD 3
Examination of a number of strategies, techniques, and methods for teachers to employ in parent-teacher interactions with the ultimate goal of involving parents in the education of their exceptional child, including those handicapped and gifted.

EDST 686 PROGRAMMING FOR GIFTED CHILDREN 3
Focuses on the identification of gifted and talented children and the development of programs to meet their needs.

EDST 687 INTERPRETATION AND TESTING OF THE EXCEPTIONAL CHILD 3
Testing procedures include the more esoteric tests that are administered in educational settings. Tests from areas such as the gifted and learning disabilities would be discussed and administered. Major emphasis on interpretation of test protocol for placement and programming purposes.
PREREQ: EDST680

EDST 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.

EDST 690 VOCATIONAL ASSESSMENT OF EXCEPTIONAL STUDENTS 3

EDST 691 INTERNSHIP IN SCHOOL COUNSELING 3-6
Onsite experiences in school counseling and guidance. 
RESTRICTIONS: Requires completion of all coursework for School Counseling Masters Program. Requires contractual arrangement with University and on-site supervisor.

EDST 692 SOCIAL SKILLS TRAINING FOR CHILDREN 3
Presents a critical examination of methods that have been proposed 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.

EDST 697 EDUCATION OF EXCEPTIONAL CHILDREN 3
Historical and philosophical bases 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 and discussion of past and emerging educational practices for exceptional children with emphasis on pedagogical commonalities.

EDST 808 INTERNSHIP IN EDUCATION 3-9
On-the-job experience in one specific area of education (i.e., administration, counseling, media center, etc.) in which such internships are required as a part of graduate degree programs and/or approved certification programs. 
RESTRICTIONS: Requires permission of department. Credit during any semester varies according to the percentage of time spent in internship. May be repeated for up to nine credits.

EDST 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, WISC-R, WPPSI, WAIS-R, and K-ABC. May be cross-listed with PSYC817
RESTRICTIONS: Requires permission of instructor.

EDST 820 COGNITION AND INSTRUCTION I 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: Requires Ph.D. status in Educational Studies or permission of instructor.

EDST 821 COGNITION AND INSTRUCTION II 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 school, and theories of school-based learning. 
RESTRICTIONS: Requires Ph.D. status in Educational Studies or permission of instructor.

EDST 823 APPLIED HUMAN 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

EDST 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.

EDST 832 NATURE OF HUMAN INTELLIGENCE 3
Definition and measurement of human intelligence; common variables related to intelligence (heredity, culture, creativity, achievement and problem solving); psychometric structure; development; artificial intelligence; and manipulation of intelligence.

EDST 836 INSTRUCTION AND LEARNING 3
In-depth study of theories of learning and instruction. Emphasis on review of experimental research relevant to the theories and the applications of these theories to educational practice.
RESTRICTIONS: Requires permission of instructor.

EDST 837 SEMINAR IN HUMAN DEVELOPMENT 3
See PSYC804 for course description.

EDST 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.

EDST 843 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 EDST185, Introduction to Educational Policy.

EDST 845 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.

EDST 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 withLING848.

EDST 849 SEMINAR IN LANGUAGE COMPREHENSION AND THE ACQUISITION OF KNOWLEDGE 3
Theory and research on the acquisition of knowledge through written instruction and their implications for a technology of written instruction.

EDST 850 CHILDHOOD PSYCHOPATHOLOGY 3
Survey of various developmental and behavioral disorders in childhood. Seminar will examine the issues of diagnosis and treatment from theoretical perspectives. Special emphasis on current major psychological research. May be cross-listed with PSYC845
RESTRICTIONS: Requires permission of instructor.

EDST 851 PSYCHOLOGICAL ASSESSMENT OF CHILDREN 3
Intellectual and personality assessment of children. Offers extensive experience in administering, interpreting, and integrating psychological test scales, as well as training in report writing and the development of treatment prescriptions.
RESTRICTIONS: Requires permission of instructor.
EDST 861 INTRODUCTION TO STATISTICAL INFERENCE 3
Quantitative analysis topics include describing univariate and bivariate data distributions, calculating and interpreting useful 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.

RESTRICTIONS: Requires admission to doctoral program

EDST 862 PRINCIPLES OF EXPERIMENTAL DESIGN AND EDUCATIONAL MEASUREMENT 3
Continuation of EDST 861. Topics include planned and post-hoc comparisons, multivariate analysis of variance, internal and external validity, quasi-experimental designs, analysis of covariance, Latin squares and incomplete designs.

RESTRICTIONS: Requires admission to doctoral program

EDST 863 PRINCIPLES OF EDUCATIONAL EVALUATION 3
Introduction to the major concepts in educational evaluation as well as its logic, politics, economics, history and future. Focus on both quantitative and qualitative models.

EDST 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 non-referenced and criterion-referenced assessment frameworks.

EDST 868 RESEARCH 1-6

EDST 869 MASTER'S THESIS 1-6

EDST 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.

EDST 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 a conceptual overview of generalizability theory. The remaining class sessions will emphasize item response theory.

EDST 874 INTRODUCTION TO MULTIVARIATE DATA ANALYSIS IN EDUCATION 3
Topics covered are factor analysis, discriminant analysis and multivariate analysis of variance. Emphasis on applications and the use of computer packages.

PREREQ: EDST 861

EDST 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 in fact happens when innovations take hold; and how do we explain the frequent discrepancies between intentions and results?

EDST 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.

EDST 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: EDST 878, EDST 679, EDST 680 and EDST 681

EDST 880 SEMINAR IN SPECIAL EDUCATION 3
Sources, results of research and a critical examination of selected investigations in special education. Guided practice in summarizing and conducting research in the education of exceptional children.

PREREQ: EDST 607, EDST 678, EDST 679, EDST 680, EDST 681 and EDST 682

EDST 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

EDST 968 RESEARCH 3-9
To be used by doctoral students engaged in completing requirements for the doctoral portfolio.

EDST 969 DOCTORAL DISSERTATION 1-12 PF

EDUC 621 REFERENCE SERVICES AND RESOURCES 3
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.

EDUC 622 INTRODUCTION TO CATALOGING AND CLASSIFICATION 3
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, Sears Subject Headings, and Dewey Decimal Classification.

EDUC 623 ADVANCED CATALOGING AND CLASSIFICATION 3
Continues study of concepts introduced in EDUC 622 but focuses on organizing non-book materials and cataloging in the online environment. Special emphasis given to the organization of the school library media center. Topics include library automation, USMARC format, electronic bibliographic databases.

PREREQ: EDUC 622

EDUC 624 LIBRARY COLLECTION DEVELOPMENT 3
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.

EDUC 625 SCHOOL LIBRARY MEDIA PROGRAM ADMINISTRATION 3
Explores and evaluates the administration and management of the school library media center. Topics include planning and evaluation, policy making, personnel, budget, facilities, standards, services, trends in research in this area.

EDUC 626 DEVELOPMENT OF LIBRARIES IN SOCIETY 3
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.

EDUC 627 FOLK LITERATURE IN THE SCHOOLS 3
Explores and evaluates the art of storytelling, the place of folk literature in understanding of world cultures, the role of stories in education, and the use of storytelling in teaching and book talks. Special emphasis will be on folk literature and its uses in the school library media center.

ENGINEERING GRAPHICS AND GENERAL

EGGG 132 ENGINEERING GRAPHICS AND ANALYSIS 2
Fundamental concepts of multiview projection drawing and application of drawing conventions includes sectional views, dimensioning, pictorial representation, fasterer specifications and drawings for various engineering disciplines. Computer applications include data structure for computer modeling, plotting routines for computer drawing and an introduction to CAD principles.

COREQ: MATH 241

RESTRICTIONS: Additional coreq: a programming language

EGGG 300 DEAN'S SCHOLAR SEMINAR 1 PF
Seminar examines ideas that are not regular course work and that are not closely related to students' disciplines. Topics reflect values that civic and community leaders should know.

RESTRICTIONS: Requires an invitation to participate

EGGG 352 MICROCOMPUTER CAD FOR DESIGN AND MODELING 3
Microcomputer methods for development of design concepts. Modeling fundamentals including shading (rendering), hidden lines, unary and binary (Boolean) operations are included.

PREREQ: EGGG 132

RESTRICTIONS: Requires a moderate proficiency in CAD software. Not open to freshmen.

EGGG 361 HOW TECHNOLOGY WORKS IN SOCIETY 1 PF
See CSCI 361 for course description.

EGGG 392 GRAPHIC SIMULATION AND ANALYSIS 3
Advanced topics in applied descriptive geometry as related to mining, drainage and surveying. Development of nomographs, analysis for empirical functions, graphic Fourier analysis of typical transient disturbances and graphic solutions of ordinary differential equations.

PREREQ: MATH 302

EGGG 432 PRINCIPLES OF COMPUTER-AIDED DRAWING 3
Concepts of computer graphics as related to CAD systems. Underlying procedure and algorithms for hidden line/surface treatment, animation, rendering and graphics standards. Modeling transformations for projection drawings and definition of curves, surfaces and solids. Emphasis on implementation of concepts through application programming.

PREREQ: MATH 243 and CSCI 106

RESTRICTIONS: Requires knowledge of FORTRAN

ENGINEERING GRAPHICS AND GENERAL

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
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 105 POWER AND MACHINERY 4
Principles of operation, selection and management of power and machinery units used in agricultural crop production
RESTRICTIONS: Open to non-majors only

EGTE 107 WELDING AND METALS 2
Arc welding, gas welding, soldering, sheet metal layout and fabrication, and properties of metals
RESTRICTIONS: Taught during first half of Fall semester

EGTE 108 UTILITIES 2
Domestic water supply and waste disposal, house wiring, heating systems, and carpentry and masonry practices
RESTRICTIONS: Taught during second half of Fall semester

EGTE 109 TECHNICAL DRAFTING 2
Basic principles of technical drawing, including sketching, use of drafting equipment, orthographic projection, pictorial drawing and architectural plans

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, software packages such as spreadsheets and word processing, Statistical and numerical analysis techniques will be applied to production problems in Engineering Technology

EGTE 113 LAND SURVEYING 2
Principles and application of distance measurement, leveling, mapping, area measurement and earth volume measurement to soil and water conservation, landscaping and construction

EGTE 165 FRESHMAN SEMINAR 1 PF
Career opportunities in agricultural engineering, AE curriculum information, undergraduate research opportunities, professional concepts and organizations, and faculty and student presentations

EGTE 209 INTRODUCTION TO COMPUTER-AIDED DRAFTING 3
Use of AutoCad software for computer drafting, design layout, two dimensional and isometric drafting, creation and modification of entities and attributes and linking with external software for data management and plan presentation
PREQ: EGTE109

EGTE 218 FUNDAMENTALS OF HYDRAULIC SYSTEMS 4
Fluid properties, fluids at rest, fundamentals of fluid flow, distribution systems, fluid power systems in agricultural and industrial machines
PREQ: EGTE111

EGTE 244 ELECTRICITY FOR ENGINEERING TECHNOLOGY 4
Electrical power systems for buildings, including distribution equipment, motor selection and lighting planning. Laboratory emphasizes control logic and electromechanical devices

EGTE 306 COST ESTIMATING 2
Building components, billing of materials and cost estimating using cost of materials plus labor system
PREQ: EGTE112
RESTRICTIONS: Offered only in Winter Session

EGTE 307 BUILDING CONSTRUCTION 1
Practical building experience with emphasis on light frame construction
RESTRICTIONS: Offered only in Winter Session

EGTE 309 THREE DIMENSIONAL COMPUTER AIDED DRAFTING 2
The creation and modification of three dimensional models for use in computer aided drafting. Allows student to create a visual solid model of an object to be drafted and then create two dimensional take-offs for plotting. Covers methods of rotation, sectioning and coloring for best viewing angles and output
PREQ: 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
PREQ: EGTE218
COREQ: MATH222 or MATH242

EGTE 321 STORM WATER MANAGEMENT 4
Hydrology for small (urban/suburban/rural) watersheds. Fundamentals of open channel hydraulics; design of culverts, spillways, vegetated waterways and detention basins
PREQ: EGTE111, EGTE112 and EGTE218

EGTE 328 WASTE MANAGEMENT SYSTEMS 3
Properties of agricultural, food processing and industrial wastes. Wastewater treatment, sludge management and waste utilization
PREQ: CHEM104, EGTE111 or EGTE112

EGTE 331 MECHANICAL POWER UNITS 4
Theory and operation of internal combustion engines. Analysis of engine power and power transmission components. Design of power units and components. Design and selection of mechanical and hydraulic power transmission systems using computer techniques
PREQ: EGTE111, EGTE218 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/V conversion and data communications
PREQ: EGTE244

EGTE 354 RURAL AND LIGHT INDUSTRIAL BUILDINGS 4
Analysis, design, materials and construction of rural and light industrial buildings
PREQ: EGTE111, EGTE112 and EGTE209

EGTE 365 JUNIOR SEMINAR 1
Invited speakers, faculty presentations, and oral and written reports required for enrolled students on selected topics in agricultural engineering

EGTE 366 INDEPENDENT STUDY 1-3

EGTE 402 QUALITY CONTROL APPLICATIONS 2
Lot by lot acceptance, sampling plan, systems, reliability, quality costs, software, total quality management, design of experiments, ISO 9000, international quality study, CQE prep, MilSpec 105E
PREQ: EGTE401, STAT201 or equivalent

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
PREQ: MATH221 or equivalent

EGTE 417 PROJECT MANAGEMENT 2
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
PREQ: EGTE111 or EGTE112
RESTRICTIONS: Only offered in Winter Session

EGTE 421 SOIL AND WATER MANAGEMENT SYSTEMS 4
Saturated and unsaturated flow, evapotranspiration, groundwater, soil compaction, theory and design of irrigation system, theory and design of surface and subsurface drainage systems, soil erosion, design of runoff and erosion control systems
PREQ: EGTE321, PLC204 or permission of instructor

EGTE 431 MACHINE SYSTEMS FOR AGRICULTURE 4
PREQ: PLC204

EGTE 435 MACHINERY DESIGN AND DEVELOPMENT 3
Fundamental requirements and relationships of agricultural machinery components, analysis of forces involved, design of machines and components, and field testing procedures
PREQ: EGTE218, General Physics and EGTE454

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
PREQ: EGTE111 and EGTE209

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
PREQ: PHYS202, EGTE244 or EGTE344

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ELEG 312 Electronic Circuit Analysis II 4
Low-frequency and high-frequency response of R-C coupled amplifiers, Class A tuned amplifiers, tuned power amplifiers, frequency response and stability of feedback amplifiers, oscillators, modulation and demodulation circuits
PREREQ: ELEG309

ELEG 314 Electronics and Instrumentation 4
Steady state circuit analysis, diode, power supplies and filters. Rotating machinery integrated circuits, operational amplifiers, A to D converters and digital building blocks with applications to information handling
PREREQ: PHYS208 and MATH302

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 323 Digital System Design I 3
Languages for the description, simulation and design of digital systems. Laboratory activities center on the realization of minicomputers or microcomputers and the application and support of such computers as constructs in digital systems
PREREQ: ELEG221

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
PREREQ: PHYS208, MATH342 and ELEG309

ELEG 346 Independent Study 1-3

ELECTRICAL ENGINEERING

ELEG 202 Introduction to Digital Systems 4
A unified overview of the interrelationship among the digital representation and processing of information, the analysis and design of combinational and sequential digital networks and the application of stored program information processors
PREREQ: MATH242

ELEG 205 Linear Circuit Theory I 4
Laws of the electric circuit, analysis of DC and AC circuits, network equations and network theorems
PREREQ: MATH242 and PHYS207

ELEG 210 Introduction to Combinational Logic 2
Boolean algebra and its application to logic gates. Simplification of switching functions. Gate level logic design and design with MSI and MSI

ELEG 211 Introduction to Sequential Circuits 2
Analysis and design of asynchronous sequential logics, synchronous sequential machines and algorithmic state machines
PREREQ: ELEG210

ELEG 220 Microprocessor-Based Systems I 2
Introduction to small computing machines, architecture organization and programming
PREREQ: ELEG211 and CIS261

ELEG 221 Microprocessor-Based Systems II 2
Extension of the concepts of ELEG220 with emphasis on I/O, interrupt systems and interfacing
PREREQ: ELEG220

ELEG 302 Material Science for Electrical Engineering Students 4
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
Covers continuous and discrete time signals and systems at the introductory level. Treats Z, Laplace and Fourier transform and uses these to solve difference and differential equations arising from circuit theory and signal processing. Presents theory of linear and causal systems
PREREQ: ELEG205 and MATH342

ELEG 306 Signal Processing II 4
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. Laboratory experiments test theory on actual signals, such as speech, music and images
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 the statistical and spectral representations of random signals used in statistical communication theory. The mathematical techniques of probability theory and generalized harmonic analysis developed and applied to electrical noise and the design of optimum systems
PREREQ: ELEG305
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 623 Electrical Properties of Matter I 3
Covers certain concepts of ELEG 340 at a more advanced level while expanding on material aspects of the solid state. Emphasis on the structure, properties and preparation of solids useful in electronic as well as magnetic applications. May be cross-listed with ELEG 340.
PREREQ: ELEG 620 and ELEG 630.

ELEG 626 Integrated Circuits 3

ELEG 629 Digital Structures 3
Boolean algebra and propositional calculus as applied to combinational and sequential systems, register transfer and arithmetic operations, finite-state automata and other theoretical concepts of information processing. Examples from structural and logical organization of general and special-purpose computers.
RESTRICTIONS: Primarily for non-majors. Requires programming experience.

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, transform, digital filter design, relationship to analog signal processing.
PREREQ: ELEG 630.

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. May be cross-listed with MAST 633.
RESTRICTIONS: Requires permission of instructor.

ELEG 640 Opto-electronics 3
Study of the generation, transformation and applications of coherent optical waves. Introduction to engineering optics. Laser theory; optical wave propagation, modulation and detection; holography; optoelectronic systems and related engineering applications. May be cross-listed with MAST 640.

ELEG 644 Special Topics in Electrooptics 3
Optical storage system, laser beam scanning systems, optical fiber transmission characteristics. Optical communication and other advanced systems.
PREREQ: ELEG 640.

ELEG 650 Semiconductor Device Design and Fabrication 3
Instruction in design and fabrication of simple bipolar and MOS integrated circuits. Specific topics include semiconductor device and integrated circuit design, photolithographic mask design and fabrication, photolithography, N-diffusion and P-diffusion, PMOS, metalization, and device and integrated circuit testing.
PREREQ: ELEG 640.

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.

ELEG 664 VLSI Systems 3
Study of VLSI devices, systems built with VLSI, MOS design rules and limitations of VLSI systems. Project required.
PREREQ: ELEG 621 and ELEG 630.

ELEG 681 Remote Sensing of Environment 3
See MAST 681 for course description.

ELEG 687 Advanced Topics in Communications 3
Topics discussed from the following areas vary from year to year: information theory; estimation and detection; nonlinear systems with random inputs; optimum modulation and demodulation; and digital communications systems.

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 interconnections.
PREREQ: ELEG 330 and ELEG 340.

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: ELEG 620 and ELEG 630.

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 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

ENGLISH

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 ENGL 110. 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 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: ENGL 110.

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 CMGT 202 and/or FLIT 202.
PREREQ: ENGL 110.

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: ENGL 110.

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: ENGL 110.

ENGL 206 British Literature II 3
Study of representative eighteenth- through twentieth-century British works, set in their historical and cultural contexts, introducing appropriate critical concepts.
PREREQ: ENGL 110.

ENGL 207 Introduction to Poetry 3
Representative masterworks of English, American and world verse.
PREREQ: ENGL 110.

ENGL 208 Introduction to Drama 3
Representative masterworks from the classical era to the present. May be cross-listed with CMGT 219 and/or WOMS 209.
PREREQ: ENGL 110.

ENGL 209 Introduction to the Novel 3
Representative masterworks of fiction, emphasizing those of Europe and America. May be cross-listed with CMGT 219 and/or WOMS 209.
PREREQ: ENGL 110.

ENGL 210 Short Story 3
Study of the short story as a narrative form, with readings from American and foreign short story traditions.
PREREQ: ENGL 110.

RESTRICTIONS: Not for major credit.
ENGL 211  GREAT WRITERS OF THE WESTERN WORLD I: 1100-1700  3
See CMIT207 for course description

ENGL 212  GREAT WRITERS OF THE WESTERN WORLD II: 1650-1950  3
See CMIT208 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. May be cross-listed with WOMS214
PREREQ: ENGL110

ENGL 217  INTRODUCTION TO FILM  3
Focuses on different techniques of acting, mise-en-scene, cinematography, editing,
sound, color, movies used to encourage audiences to respond in the ways they do. May
be cross-listed with CMIT217
PREREQ: ENGL110

ENGL 260  HUMANITIES COLLOQUIUM  3
See ARSC260 for description
PREREQ: ENGL110

ENGL 300  TEXTS AND CONTEXTS  3
Explores fundamental questions such as why read literature, what is the relation between
literary and everyday language, and whether readers make or discover meanings in
texts. Examinas 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 accepted

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 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, scriptwriting). Variable content
PREREQ: ENGL110
RESTRICTIONS: Final enrollment set after first class and submission of appropriate writ-
ten 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, inter-
viewing, 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 expe-
rience. 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 busi-
ness and technical writing.

ENGL 314  INTRODUCTION TO FOLKLORE AND FOLKLIFE  3
Traditional forms of folklore with emphasis on modern folklore as it functions in contem-
porary societies. May be cross-listed with CMIT314
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 Afro-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. Content varies from year to
year. May be cross-listed with CMIT317
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. Variable content
May be cross-listed with CMIT318, 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 translation. Emphasis on medieval culture as a Euro-
pean phenomenon. Variable content. May be cross-listed with CMIT321
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 cen-
turies, 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, Morrell and Milton
PREREQ: ENGL110

ENGL 326  TOPICS IN RENAISSANCE LITERATURE  3
Studies in single writers or groups of writers (More and Erasmus; Shakespeare and Car-
vantes; John Donne), or of particular themes (kingship; the family; the sense of self), or of
one of the literary genres (e.g. tragedy; the lyric poem; comedy and satire; narrative
poetry and prose)
PREREQ: ENGL110

ENGL 328  MILTON  3
Milton's major poetry and selected prose
PREREQ: ENGL110

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 eigh-
teenth-century literature. Variable content
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, Bronte, 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 WOMS333.
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 343 STUDIES IN AMERICAN LITERATURE II 3
Special topics in a poet or poets, a type or movement, a period or theme Variable content
RESTRICTIONS: May be repeated once for credit when topics vary

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 BAAE313.
PREREQ: ENGL110

ENGL 345 AFRICAN AMERICAN LITERATURE II 3
Literature by African American writers from the Harlem Renaissance to the present
PREREQ: ENGL110

ENGL 346 CULTURAL ISSUES IN AMERICAN LITERATURE 3
Studies of broad cultural issues as reflected in American literature
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.
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
This course 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 350 INTRODUCTION TO IRISH LITERATURE 3
Survey emphasizing modern and contemporary writers of various genres such as Yeats, Synge, Joyce, Beckett, Heaney and Boland. Critical reading set in mythic, historic and cultural contexts.
PREREQ: ENGL110

ENGL 351 INTRODUCTION TO IRISH LITERATURE II 3
Special topics in an author or authors, a genre, literary movement, or an idea Variable content
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 WOMS333.
PREREQ: ENGL110

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 postcolonial writing. May be cross-listed with WOMS333.
PREREQ: ENGL110

ENGL 354 MODERNISM 3
Studies the experimental forms and the politics of a literary movement that involved such writers as T. S. Eliot, Virginia Woolf, James Joyce, and Gertrude Stein
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, postcolonial writing and politics
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 EDST358 for course description.

ENGL 360 HUMANITIES COLLOQUIUM 3
See ARSC360 for course description. May be cross-listed with PHIL360.

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 CMIT361.
PREREQ: ENGL110

ENGL 365 STUDIES IN LITERARY GENRES, TYPES AND MOVEMENTS 3
Study of a variable set of women writers. Addresses such topics as the idea of women's.
PREREQ: ENGL110
RESTRICTIONS: Not for major credit

ENGL 366 INDEPENDENT STUDY 1-6

ENGL 367 INTRODUCTION TO LITERARY CRITICISM 3
Comparative examination of literature and science in several important philosophical, methodological, cultural, and social aspects, including the study of elementary philosophy and history of science and theory and history of literature and the analysis of individual scientific and literary texts. May be cross-listed with SCSC568.
PREREQ: ENGL110

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 and history of science and theory of literature and the analysis of individual scientific and literary texts. May be cross-listed with CSCC368.
PREREQ: ENGL110

ENGL 369 LITERATURE AND MEDICINE 3
May be cross-listed with CMIT361.

ENGL 370 INTRODUCTION TO AMERICAN LITERATURE 3
Focuses on representations of ethnicity, social class, race, gender, and other constructions of identity in literature, art, and folk culture. Required for concentrators in English: Ethnic and Cultural Studies.
PREREQ: Any two of the following: ENGL202, ENGL205, ENGL206, ENGL324.
RESTRICTIONS: Requires permission of instructor. Required for concentrations in English, Ethnic and Cultural Studies.

ENGL 371 STUDIES IN FICTION 3
Special topics in the novel and short story. Topics may emphasize an author or authors, a genre or movement Variable content
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 genre or movement, a period or theme Variable content
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 genre or movement, a period or theme Variable content
PREREQ: ENGL110
RESTRICTIONS: May be repeated for credit when topics vary.

ENGL 374 INTRODUCTION TO IRISH LITERATURE 3
Survey emphasizing modern and contemporary writers of various genres such as Yeats, Synge, Joyce, Beckett, Heaney and Boland. Critical reading set in mythic, historic and cultural contexts.
PREREQ: ENGL110

ENGL 375 INTRODUCTION TO IRISH LITERATURE II 3
Special topics in an author or authors, a genre, literary movement, or an idea Variable content
PREREQ: ENGL110

ENGL 376 LITERATURE OF LONDON 3
The interaction between London and a variety of literary works.
RESTRICTIONS: Offered only through the Semester in London Program.

ENGL 377 INTRODUCTION TO ETHNIC AND CULTURAL STUDIES 3
Focuses on representations of ethnicity, social class, race, gender, and other constructions of identity in literature, art, and folk culture. Required for concentrators in English: Ethnic and Cultural Studies.
PREREQ: Any two of the following: ENGL202, ENGL205, ENGL206, ENGL324.
RESTRICTIONS: Requires permission of instructor. Required for concentrations in English, Ethnic and Cultural Studies.

ENGL 378 WOMEN WRITERS 3
Study of a variable set of women writers. Addresses such topics as the idea of women’s tradition, formation of the canon, use of genre, language, and form. May be cross-listed with JWST380 and/or WOMS380.
PREREQ: ENGL110

ENGL 379 LINGUISTICS AND LANGUAGE ARTS 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 380 LINGUISTICS AND LANGUAGE ARTS 3
See EDST358 for course description.

ENGL 381 WOMEN IN LITERATURE 3
See ARSC360 for course description. May be cross-listed with PHIL360.
ENGL 382 STUDIES IN MULTICULTURAL LITERATURE IN ENGLISH  
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 JWST382 and/or WOMS382. 
PREREQ: ENGL110 
RESTRICTIONS: May be repeated once for credit when topics vary

ENGL 383 TEACHING COMPOSITION IN SECONDARY SCHOOLS  
Study of current composition theory, with emphasis on the relationship between theory and classroom practices in the secondary schools. 
PREREQ: ENGL110

ENGL 384 TEACHING ENGLISH IN SECONDARY SCHOOL  
Approaches to the teaching of grammar, composition and literature. Includes treatment of aims, materials, unit organization, evaluation and teaching techniques. 
PREREQ: ENGL110

ENGL 385 STUDIES IN LITERARY CRITICISM AND THEORY  
Studies in selected topics in literary criticism and theory. 
PREREQ: ENGL10 
RESTRICTIONS: May be repeated for credit when topics vary

ENGL 390 ENGLISH LINGUISTICS  
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  
See ARSC390 for description. May be cross-listed with JWST390. 
PREREQ: ENGL110

ENGL 398 FILM AND MODERN AMERICAN CULTURE  
Survey of the main themes in American culture from the Jazz Age through the Cold War as reflected in feature film and popular literature. May be cross-listed with HIST398. 
PREREQ: ENGL110 
RESTRICTIONS: Cannot be counted toward film studies concentration.

ENGL 404 ADVANCED POETRY WRITING  
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 free 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  
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  
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  
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 
RESTRICTIONS: Counts toward English major only as part of journalism concentration.

ENGL 409 TOPICS IN JOURNALISM  
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. Does not count as part of the journalism concentration.

ENGL 410 TECHNICAL WRITING  
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  
Study of rhetorical theories and strategies within the context of business and technical skills. 
PREREQ: ENGL312, ENGL410, or ENGL415 
RESTRICTIONS: Open only to English majors. Counts toward English major only as part of the concentration in business and technical writing.

ENGL 412 BUSINESS AND TECHNICAL PUBLICATION  
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: ENGL411 
RESTRICTIONS: Counts toward English major only as part of the concentration in business and technical writing.

ENGL 413 TOPICS IN TECHNICAL WRITING  
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). Variable content. 
PREREQ: ENGL112, 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  
Practical work and study of the editorial procedures essential in editing technical publications and documentation. 
PREREQ: ENGL312, ENGL410, or ENGL415

ENGL 415 WRITING IN THE PROFESSIONS  
Designed to improve the communications skills of students aiming toward careers in any of the professions. 
PREREQ: ENGL110 
RESTRICTIONS: Counts toward English major only as part of the concentration in business and technical writing

ENGL 416 LITERATURE OF FACT  
How great and near-great writers have approached the craft of journalism and sometimes turned it into an art. 
PREREQ: ENGL110 
RESTRICTIONS: Does not count as part of the journalism concentration.

ENGL 417 FILM THEORY AND CRITICISM  
Survey of major theories of film. 
PREREQ: ENGL217 
RESTRICTIONS: For film concentrators and advanced film students

ENGL 460 HUMANITIES COLLOQUIUM  
See ARSC460 for description. 
PREREQ: ENGL110

ENGL 464 INTERNSHIP IN BUSINESS/TECHNICAL WRITING  
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 at work a week. 
PREREQ: ENGL441 and ENGL412 
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  
Particular areas or writers to be announced. May be cross-listed with CMIT465 and/or WOMS465. 
PREREQ: ENGL110

ENGL 466 INDEPENDENT STUDY  
1-6

ENGL 471 STUDIES IN FICTION  
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. Variable content. 
PREREQ: ENGL110 
RESTRICTIONS: May be repeated for credit when topics vary.

ENGL 472 STUDIES IN THE DRAMA  
Special topics in an author or authors, a type or types of drama, a period or theme. Variable content. 
PREREQ: ENGL110 
RESTRICTIONS: May be repeated for credit when topics vary.

ENGL 473 STUDIES IN POETRY  
Special topics in a poet or poets, a type or movement, a period or theme. Variable content. 
PREREQ: ENGL110 
RESTRICTIONS: May be repeated for credit when topics vary.

ENGL 477 THE STRUCTURE OF ENGLISH  
See EDST477 for course description.

ENGL 480 SEMINAR  
Intensive 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 CMIT480 and/or WOMS480

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ENGL 481 Seminar in Teaching English 3 PF
Seminar to accompany student teaching in secondary school English. Deals with classroom management, teaching techniques and other professional issues.
PREREQ: ENGL 110
RESTRICTIONS: Open only to student teachers in English.

ENGL 485 Studies in Literary Criticism and Theory 3
Study of selected topics in literary criticism and critical theory, e.g., narrative theory and the novel, semiotics and literary criticism, and feminist criticism. Variable content.
PREREQ: ENGL 110
RESTRICTIONS: May be repeated once for credit when topics vary.

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: ENGL 110

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 exploring free forms.
RESTRICTIONS: May be repeated once for credit when topics vary.

ENGL 621 Medieval Literature and Culture 3
Survey course will study 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., cradle of the city, epic and romance, genres).
RESTRICTIONS: For graduate students with little or no medieval literature and culture background.

ENGL 625 Studies in the Renaissance 3
Survey course, intended primarily for students with no previous experience of the period. A wide selection of authors will be studied (e.g., More, Wyatt, Sidney, Spenser, Marlowe, Donne, Herbert, Marvell, Jonson, Webster, Middlelott, 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
This survey course covers 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 sources 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
Variable content. Course 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 the 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
Variable content. 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 period or the Realist 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
Variable content. 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 on author or authors, a type or types of fiction, a period or theme. Variable content.
RESTRICTIONS: May be repeated for credit when topics vary.

ENGL 672 Studies in the Drama 3
Special topics in an author or authors, a type or types of drama, a period or theme. Variable content.
RESTRICTIONS: May be repeated for credit when topics vary.

ENGL 677 The Structure of English 3
See EDST 677 for course description.

ENGL 680 Seminar 3

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 in different terms 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.
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 prose and verse.
RESTRICTIONS: May be repeated once for credit when topics vary.

ENGL 804 Studies in Medieval Literature and Culture 3
Variable content. 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), on genres (e.g., narrative verse and prose, the lyric, drama) or on specific periods (Elizabethan, Jacobean, the Civil War).

ENGL 815 Studies in Seventeenth-Century Literature 3
Research seminar 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 course topics include: The 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 focii: 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.
ENTOMOLOGY AND APPLIED ECOLOGY

ENTO 105 *Insects in Our World* 3
Insects and their relatives. Principles of insect control as interrelated with ecology and behavior. Recognition of the various insect orders stressed. Small insect collection may be required.

ENTO 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.

ENTO 201 *Wildlife Conservation and Ecology* 3
Natural history of North American wildlife; general principles of ecology; ecological and sociological problems and solutions in wildlife conservation.

ENTO 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.

ENTO 214 *Aphiology and Apiculture* 2
Scientific study of the life of honey bees, including their biology, behavior and communication; and introduction to techniques of culturing and managing honey bees for honey production and crop pollination.

ENTO 224 *Aphiology and Apiculture Laboratory* 1
Laboratory and field course to complement topics in ENTO214. See identification and culture; and hive management. Work with bees in an apiary to develop confidence in keeping bee colonies.

ENTO 300 *Principles of Animal and Plant Genetics* 3
See PISC300 for course description.

ENTO 305 *Entomology Laboratory* 2
Insect structure, physiology, behavior, taxonomy, evolution and ecology studied through field trips, dissection and experiments. Insect collection (with identification to order) required.

ENTO 310 *Animal and Plant Genetics Laboratory* 1
See PISC310 for course description.

ENTO 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 and field trips.

ENTO 325 *Wildlife Management* 3
Introduction to solving wildlife management problems. Development of management plans with consideration of habitat, human and animal population components.

ENTO 366 *Independent Study* 1-6

ENTO 405 *Insect Structure and Function* 4
Comparative functional anatomy and evolution of arthropods, especially insects. Emphasis on structures and their functions as adaptive responses to selective pressures. Laboratory dissections emphasizing anatomical variation within external and internal systems.

ENTO 406 *Insect Identification - Taxonomy* 3
Lecture and laboratory course in the collection, preservation and classification of common insect families.

ENTO 408 *Field Taxonomy* 2
The collection, classification, preservation and curation of insects. An insect collection is required.

ENTO 410 *Ecology of Arthropod Vectors and Parasites* 2
Introduction to the ecological relationships among arthropod vector species, disease-causing organisms they transmit and plant or animal species affected by vectorial organisms. Effects of direct parasitism and various types of vectored parasitism in epidemiology of plant and animal diseases.

ENTO 411 *Economic Entomology* 3
Principles of managing insect populations to reduce losses caused by insects attacking our food, fiber, buildings, domestic animals and human populations. Diagnostic recognition, control and habits of major economic pest species.

ENTO 418 *Avian Biology* 2
Birds as adaptive complexes. Anatomy, physiology and behavior associated with feeding, thermoregulation, flight, migration, communication and reproduction.

ENTO 425 *Mammalogy* 3

ENTO 426 *Aquatic Insects* 2
Biological and systematic of aquatic insects with emphasis on the fauna of North America. Collection of immature aquatic insects required.

ENTO 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.

ENTO 464 *Entomology Field Experience* 1-3 PF
Career-related work experience and exploration of potential occupations related to entomology or ecology. Student works with a faculty member to arrange for supervised (usually part-time) employment at a discipline-related site such as a research laboratory, pest control firm, museum, pesticide company or nature center.

ENTO 530 *Entomology and Applied Ecology* 3
Variable content. Possible course topics include: Existential literature, The Avant-Garde, and literature and aesthetics.

ENTO 580 *Studies in Colonial American Literature* 3
Variable content: e.g., New England Puritanism, Southern Colonial Literature, and Major Early American Authors.

ENTO 592 *Seminar: American Realism and Naturalism* 3
Classic works by Clemens, James, Crane, Chapin, Dreiser, Stein, and Wharton, with focus (1) on the practice of theory and aesthetic assumptions of current criticism and (2) on labels for the period (Realism, Naturalism) as formulations from specific literary texts (including some expurgated texts).

ENTO 593 *Modern/Postmodern American Literature* 3
Modern and postmodern 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.

ENTO 868 *Research* 3

ENTO 869 *Master's Thesis* 1-6

ENTO 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.

ENTO 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.

ENTO 969 *Doctoral Dissertation* 1-12 PF
ENTO 465 Seminar 1
Development and presentation of a talk on an aspect of a student-selected topic. Presentation in the format of a scientific symposium and written conference report. Proper selection, design, production and use of computer-generated visual aids.
PREREQ: Requires Senior status

ENTO 466 Independent Study 1-6

ENTO 468 Research 1-6

ENTO 501 Natural History for Teachers 3
Background knowledge, methods and materials for teaching basic concepts of ecology, environmental problems and field natural history, particularly as applicable to Delaware. Includes outdoor studies in field, forest, stream and estuarine environments.
PREREQ: ENTO305

ENTO 601 Insect Physiology 4
Physiology and biochemistry of major organs and tissues of insects. Laboratory demonstrates basic tools of insect physiology through original and classical experiments.
PREREQ: ENTO305

ENTO 602 Larval Taxonomy 3
Lecture-laboratory course treating the collection, preservation and classification of the immature stages of common holometabolous insect families.
PREREQ: ENTO305

ENTO 605 Insect Structure and Function 4
Comparative functional anatomy and evolution of arthropods, especially insects. Emphasis on structures and their functions as adaptive responses to selective pressures. Laboratory dissections emphasizing anatomical variation within and between insect orders.
PREREQ: ENTO305

ENTO 606 Insect Identification - Taxonomy 3
Lecture and laboratory course in the collection, preservation and classification of common insect families.
PREREQ: ENTO305

ENTO 608 Field Taxonomy 2
The collection, classification, preservation and curation of insects. An insect collection is required.
PREREQ: ENTO606

ENTO 611 Economic Entomology 3
Principles of managing insect populations to reduce losses caused by insects attacking our food, fiber, buildings, domestic animals and human populations. Diagnostic recognition, control and habits of major economic pest species.
PREREQ: ENTO605

ENTO 614 Insect Ecology 3
The interaction of insects with their environment as it influences their distribution, abundance, life history and evolution. Emphasis on primary research literature.
PREREQ: BISC302 and ENTO305, or BISC637

ENTO 615 Research Techniques in Ecology 3
Design and execution of ecological research using insects and plants as models. Execution of class and individually designed field projects.
PREREQ: BISC302

ENTO 617 Field Natural History 1-3
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.

ENTO 618 Avian Biology 2
Birds as adaptive complexes. Anatomy, physiology and behavior associated with feeding, thermoregulation, flight, migration, communication and reproduction.
PREREQ: BISC200

ENTO 619 Principles of Biological Control of Insects 3
Historical, ecological and biological bases of biological control of pest insects and weeds. Consideration given to procedures and techniques (e.g., foreign exploration) and related aspects (e.g., insect pathology and insect resistance in crop plants).
PREREQ: ENTO305

ENTO 620 Behavioral Ecology of Insects 3
Advanced treatment of selected topics in the ecology of insect behavior. Original research project required.
PREREQ: BISC302 and ENTO406 or ENTO606

ENTO 622 Toxicology of Insecticides 3
Principles of insecticide toxicology. Classification, biochemical and physiological bases of toxic action, animal and plant metabolism, and environmental dynamics of insecticides.
PREREQ: ENTO305

FINC 201 Introduction to Investments 3
RESTRICTIONS: Not open to Business Administration or Accounting degree candidates

FINC 311 Business Finance 3
Management techniques and information related to the financial function of business firms covering capital budgeting, working capital management, cost of capital, capital structure analysis, and short- and long-term financing.
PREREQ: ACCCT208

FINC 312 Problems in Financial Management 3
The role of the financial manager in the business firm. Analytical methods and procedures of financial management. Text and cases.
PREREQ: 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

FINC 407 Security Analysis 3
An analysis of components of security evaluation and the establishment of investment standards and policies.
PREREQ: FINC311

FINC 412 The American Financial System 3
Analysis of financial institutions and economic impact of changing money flows upon the savings-investment process.
PREREQ: FINC311 and ECON302

FINC 413 Finance Seminar: Special Topics 3
Topics vary by semester. Typically examines such areas as financial theory and practice, financial systems, markets and individual inquiry.
PREREQ: Six hours of finance courses.
RESTRICTIONS: May be repeated for credit when topics vary by non-finance majors.

FINC 414 Finance Seminar: Banking 3
Consider formation of banking policy and financial management of a commercial bank and similar institutions. Topics include funds management, liquidity and credit standards, lending operations, capital adequacy and the changing regulatory environment.
PREREQ: Six hours of finance including FINC412.
FLLT 100  ESSENTIAL FOREIGN LANGUAGE: LANGUAGE  1  PF
Basic, practical vocabulary and idiomatic expressions for beginners in the Foreign Lan-
guage (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 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, read-
ing and writing skills through the use of basic texts. Language laboratory work as needed

FLLT 106  MODERN LANGUAGE II - ELEMENTARY/INTERMEDIATE  4
Completion of the basic modern language. Increasing mastery of the basic skills (speak-
ing, listening, reading and writing)
PREREQ: FLLT105

FLLT 107  MODERN LANGUAGE II - ELEMENTARY/INTERMEDIATE  4
Review of grammar, continued practice in speaking and writing, and reading texts of
average difficulty
PREREQ: FLLT106
RESTRICTIONS: Satisfies the foreign language requirement.
FLT 403  ROMANCE LANGUAGE LEXICOGRAPHY  3
See LING403 for course description.

FLT 421  METHODS OF TEACHING FOREIGN LANGUAGES  3
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 practicum and 25 hours of observation in high school classrooms for future student teachers. May be cross-listed with LING421.

FLT 422  LANGUAGE SYLLABUS DESIGN  3
Study of approaches to language syllabus design and materials development including grammatically sequenced, situational, national-functional and verbal strategy approaches. Simplification, standardization, textbook evaluation and adoption, and design and implementation of learning units for second language, special purpose and bilingual learners. May be cross-listed with LING422.

FLT 424  SECOND LANGUAGE TESTING  3
See LING424 for course description.

FLT 429  METHODS OF TEACHING FOREIGN/SECOND LANGUAGES IN ELEMENTARY SCHOOLS  3
This course familiarizes students with appropriate teaching methods and techniques for the elementary foreign language classroom. It includes demonstrations by experienced FLES teachers, peer-analysis of videotaped model lessons prepared by participants, and an introduction to testing, materials and course design. May be cross-listed with EDDV429.

RESTRICTIONS: May be dual listed with FLT629.

FLT 455  TOPICS IN FOREIGN LANGUAGE PEDAGOGY  3
Strategies and approaches to various aspects of foreign language teaching. Topics may include, among others, proficiency-oriented approaches; communicative approaches; community approaches to language learning; teaching reading, writing, culture; applications of technologies to foreign-language classrooms.

RESTRICTIONS: May be dual listed with FLT655. May be repeated for credit when topic differs.

FLT 460  HUMANITIES COLLOQUIUM  3
See ARSC660 for description.

FLT 466  INDEPENDENT STUDY  1-6

FLT 620  INTERACTIVE LANGUAGE TEACHING  3
See LING620 for course description.

FLT 621  METHODS OF TEACHING FOREIGN LANGUAGES  3
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.

FLT 622  LANGUAGE SYLLABUS DESIGN  3
Study of approaches to language syllabus design and materials development, including grammatically sequenced, situational, national-functional and verbal strategy approaches. Simplification, standardization, textbook evaluation and adoption, and design and implementation of learning units for second-language, special purpose and bilingual learners. May be cross-listed with LING622.

FLT 623  THEORETICAL AND PRACTICAL ISSUES IN FOREIGN LANGUAGE PEDAGOGY  3
Graduate assistants enrolled in this course will study current perspectives on foreign language instruction and have extensive hands-on experience with the implementation of effective language teaching strategies. Emphasis will be given to the enhancement of students' proficiency in class planning, syllabus design and materials preparation.

RESTRICTIONS: Graduate students only.

FLT 624  SECOND LANGUAGE TESTING  3
See LING624 for course description.

FLT 629  METHODS OF TEACHING FOREIGN/SECOND LANGUAGES IN ELEMENTARY SCHOOLS  3
This course familiarizes students with appropriate teaching methods and techniques for the elementary foreign language classroom. It includes demonstrations by experienced FLES teachers, peer-analysis of videotaped model lessons prepared by participants, and an introduction to testing, materials, and course design. May be cross-listed with EDDV629.

RESTRICTIONS: May be dual listed with FLT429.

FLT 655  TOPICS IN FOREIGN LANGUAGE PEDAGOGY  3
Strategies and approaches to various aspects of foreign language teaching. Topics may include, among others, proficiency-oriented approaches; communicative approaches; community approaches to language learning; teaching reading, writing, culture; applications of technologies to foreign-language classrooms.

RESTRICTIONS: May be dual listed with FLT655. May be repeated for credit when topic differs.

FLT 660  HUMANITIES COLLOQUIUM  3
See ARSC660 for description.

FLT 692  WEEKEND SHORT COURSE  1
Short weekend course in language, literature and/or civilization, or in professional studies. Topics vary.

RESTRICTIONS: May be repeated for credit when topics vary.

FLT 693  WEEKEND SHORT COURSE  2
Short weekend course in language, literature and/or civilization, or in professional studies. Topics vary.

RESTRICTIONS: May be repeated for credit when topics vary.

FLT 801  PROFESSIONAL ORIENTATION  3
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.

FOOD SCIENCE

FOSC 201  FOOD PRINCIPLES  2
Principles of food selection and preparation as related to the chemical and physical properties of food. Includes the composition and structure of foods, functional properties of ingredients, and methods to maintain desirable quality (sensory and nutritional) attributes of food.

COREQ: FOSC211.

FOSC 211  FOOD PRINCIPLES LABORATORY  1
Chemical and physical composition of food and preparation studied in selected laboratory experiments. Food components examined include the sensory, nutritional and functional aspects of proteins, lipids and carbohydrates.

COREQ: FOSC201.

FOSC 265  SEMINAR ON FOOD SCIENCE  1
Overview of world food supplies, sources of raw materials, broad compositional components of foods, overview of food safety and food processing methods. Introduction to career opportunities and orientation to the profession.

FOSC 305  FOOD SCIENCE  2
Composition, structure and functional properties of food and fundamentals of commercial food processing, including thermal processing, freezing, dehydrogenation and ionizing radiation. May be cross-listed with ANSC305.

PREREQ: FOSC201, FOSC211 and CHEM213.

FOSC 306  FOOD SCIENCE LABORATORY  1
Laboratory study of ingredient manipulation, food processing and preservation techniques including introductory food analytical quality measurements. May be cross-listed with ANSC306.

COREQ: FOSC305.

FOSC 359  TOPICS IN FOOD SCIENCE  1-3
Bridges prerequisite science courses and applications in food science. Utilization of fundamental sciences linked with food applications of the scientific method will be stressed. Demonstrates basic concepts used to quantitatively solve everyday problems in the food industry. Uses mathematical principles as tools for problem solving. Develops awareness of the intimate relationship between mathematical principles and physical phenomenon.

PREREQ: Math221 and MATH222 or MATH241 and MATH242.

FOSC 365  SEMINAR ON FOOD SCIENCE  1
Focuses on food supplies in meeting specialized needs, new processing methods, introduction to analytical methods and computer application in food processing.

FOSC 366  INDEPENDENT STUDY  1-6

FOSC 409  FOOD PROCESSING I  4
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.

PREREQ: FOSC428.

FOSC 410  FOOD PROCESSING II  4
Incorporates and unifies the principles of food chemistry, microbiology, engineering and processing; nutrition, sensory analysis and statistics in a product development project using problem solving and critical thinking skills. Discussions on processing include drying, additions, asepsis, modified atmosphere, fermentation, irradiation, emulsification, and extraction. Food safety including laws, regulations, and GMPs, are incorporated. May be cross-listed with ANSC410.

May be cross-listed with ANSC410.

PREREQ: FOSC409 and FOSC428.

FOSC 428  FOOD CHEMISTRY  4
Composition of food materials, reaction mechanisms leading to deterioration; and interaction of food components to form desirable and undesirable products, pigments, characteristics of food polymers. Effect of physical and chemical factors on the structure and functionality of food. May be cross-listed with ANSC428.

PREREQ: CHEM214 and CHEM321.
FOSC 429 Food Analysis 4
The application of instrumentation: UV/Vis, FTIR and Fluorescence Spectrophotometry, Chromatography (TLC, LC, GC and HPLC), Electrophoresis, and Enzyme Assays for the determination of food constituents and additives. Official AOAC and AAC methods utilized. May be cross-listed with ANSC429.
PREREQ: CHEM216

FOSC 439 Food Microbiology 4
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: BISC371

FOSC 445 Food Engineering Technology 4
Engineering fundamentals for processing of food materials, including applied thermodynamics and heat transfer principles and operations. May be cross-listed with EGTE445.
PREREQ: EGE311, MATH 222, and PHYS202
RESTRICTIONS: Not open to majors in chemical or mechanical engineering

FOSC 446 Food Processing Engineering Technology 4
Selected unit operations of importance to the food processing industry including evaporation, dehydration and distillation. Emphasizes the role that properties of food take in controlling the application of classical unit operations analyses.
PREREQ: FOSC445
RESTRICTIONS: Not open to majors in chemical or mechanical engineering

FOSC 449 Food Biotechnology 4
Processes used in industrial fermentations and biotechnology: essential biochemical background of commercial microorganisms, use and genetics of starter cultures, design and control of fermentor systems, kinetics of growth and product recovery. Biotechnological production of alcohols and alcoholic beverages, organic acids, cultured dairy, vegetable and meat products, enzymes, vitamins and therapeutic compounds.
PREREQ: BISC371 or FOSC439

FOSC 450 Topics in Food Science 3
In-depth studies on specific aspects of current food science research and application.

FOSC 464 Practicum in the Food Industry 2
Provides hands-on supervised field experience in research, processing equipment and methodology, product development and testing, and other activities in the food industry.
RESTRICTIONS: Offered Winter/Spring sessions only

FOSC 466 Independent Study 1-6
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 and screening, mixing, filtration, centrifugation and crystallization; and preservation methods including food storage, low temperature and high temperature methods.

FOSC 610 Food Processing II 4
This capstone course incorporates and unifies the principles of food chemistry, microbiology, engineering and processing; nutrition, sensory analysis, and statistics in a product development project using problem solving and critical thinking skills. Discussions on processing include drying, additives, aspex, modified atmosphere, fermentation, irradiation, emulsification, and extraction. Food safety including laws, regulations and GMPs is incorporated.
PREREQ: FOSC609 and FOSC628

FOSC 628 Food Chemistry 3
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.
PREREQ: CHEM21 and CHEM214

FOSC 629 Food Analysis 4
The application of instrumentation: UV/Vis, FTIR and Fluorescence Spectrophotometry, Chromatography (TLC, LC, GC and HPLC), Electrophoresis, and Enzyme Assays for the determination of food constituents and additives. Official AOAC and AAC methods utilized. May be cross-listed with ANSC629.
PREREQ: CHEM216

FOSC 630 Food Carbohydrates 3
Examination of simple and complex carbohydrates in food systems. Examines both the chemistry and structural implications of each carbohydrate class, as well as discussing their industrial and nutritional aspects. Special emphasis on simple sugars, artificial sweeteners, starch, pectin, gums and mucilages.

FOSC 639 Food Microbiology 4
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: BISC371

FOSC 645 Food Engineering Technology 4
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

FOSC 646 Food Processing Engineering Technology 4
Selected unit operations of importance to the food processing industry including evaporation, dehydration and distillation. Emphasizes the role that properties of food take in controlling the application of classical unit operations analyses.
PREREQ: FOSC645
RESTRICTIONS: Not open to majors in mechanical or chemical engineering

FOSC 649 Food Biotechnology 4
Processes used in industrial fermentations and biotechnology: essential biochemical background of commercial microorganisms, use and genetics of starter cultures, design and control of fermentor systems, kinetics of growth and product recovery. Biotechnological production of alcohols and alcoholic beverages, organic acids, cultured dairy, vegetable and meat products, enzymes, vitamins and therapeutic compounds.
PREREQ: BISC371 or FOSC439

FOSC 659 Topics in Food Science 2-6
In-depth studies on specific aspects of current food science research and application.

FOSC 665 Seminar 1-3

FOSC 668 Research 1-6

FOSC 670 Modern Food Packaging 3
Covers modern techniques of food packaging, including critical issues associated with new food processing techniques and their packaging requirements. Typical topics are aseptic, modified-atmosphere and retort pouch packaging, as well as the relationship of the food chemistry to the packaging material.

FOSC 671 Package Product Interactions 3
Fundamentals of permeation along with the effect of structural order on permeation and the physicochemical nature of the penetrant. Principles and prediction of flavor sorption. Factors affecting shelf-life of packaged foods, shelf-life prediction and the extension of shelf-life by modified atmosphere techniques.
RESTRICTIONS: Requires permission of instructor

FOSC 686 Research 1-6

FOSC 689 Master's Thesis 1-6

FOOD AND RESOURCE ECONOMICS

FREC 125 Elementary Agricultural Economics: Applications 1
Analysis of producer behavior, output, profits and input demands, and evaluation of alternative capital investments.
PREREQ: FREC235
COREQ: FREC150 and FREC235

FREC 135 Introduction to Data Analysis 3
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.

FREC 150 Economics of Agriculture and Natural Resources 3
Introduction to economic and management principles and their applications to agriculture, including agribusiness, natural resources and the environment.
RESTRICTIONS: Not open to juniors and seniors.

FREC 153 Agricultural Salesmanship 3
Principles and techniques of effective personal selling of agricultural products and services. Development of skills necessary to organize, deliver and refine sales presentations.

FREC 201 Records and Accounts 3
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

FREC 240 Quantitative Methods in Agricultural Economics 3
Basic quantitative applications of agricultural economics principles and theory. Determination of market equilibria and optimization of static models.
PREREQ: MATH115; and FREC150 or ECON151

FREC 270 Biotech: Science and Socioeconomic Issues 3
See ANSC270 for course description.

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FREC 302 Management of Agribusiness Firms 3
Principles and practical problems of firm management (decision-making) and planning
PREREQ: FREC150 or ECON151
RESTRICTIONS: Not open to Freshmen or Sophomores except by permission of instructor.

FREC 312 Food Retailing and Product Management 3
Major topics include: consumer market environment, population characteristics, food retail marketing and financial strategies, product merchandising planning, new product development strategies, site location analysis, managerial and human resource development

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 403 Agricultural Production Economics 3
Economic principles applied to the operation of the firm with emphasis on resource allocation and production efficiency. Analysis of analytical procedures and programming models used in the analysis and planning of a business
PREREQ: FREC150 or ECON151

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 405 Management and Leadership Development 3
Exposes students to 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

FREC 406 Agricultural Policy 3
Agricultural policy formation, effects of policy on resource allocation and economics of alternative programs Analysis of effects of various programs on producers, consumers and taxpayers.
PREREQ: FREC150 or ECON151.

FREC 408 Research Methods 3
Descriptive and inferential statistics in agribusiness and biological applications focusing on hypothesis testing, multiple regression, and analysis of variance techniques

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 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: Theory and Policy 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 Rural Economic Development Theory and Policy 3
Rural economic development in the United States; rural socioeconomic conditions; survey of economic principles regarding industrial location, economic growth, land use and public service provision; and rural development policies and programs
PREREQ: FREC150 or ECON151

FREC 435 Microcomputer Use in Agricultural Economics 3
Microcomputer systems and their use and application in contemporary agricultural economic problems
PREREQ: FREC235

FREC 441 Futures and Options Markets 4
Analysis of futures and options 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
PREREQ: FREC150 or ECON151

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 464 Agricultural Economics Field Experience 1-3
Supervised field work in farm management, food retailing management, agricultural wholesaling or processing management, natural resource analysis, rural development, agricultural policy analysis or related areas.
RESTRICTIONS: A maximum of three credits may be applied to the B.S. in Agriculture with a major in Agricultural Business Management or Agricultural Economics.

FREC 465 Seminar 1
Oral and written reports in the subdisciplines of food and resource economics

FREC 466 Independent Study 1-6

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 Research Methods 3
Experimental design and plot plans, collection, analysis and presentation of data in agricultural and biological research

FREC 615 Advanced Prices and Statistics 3
Statistical tools used in agricultural economics research. Introduction to econometric specifications, estimation and interpretation
PREREQ: FREC408

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: FREC408

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 803 Production Economics 3
Economic theory applied to operation and planning of an enterprise, including factor demand and product supply aspects. Discussion of LP and production function models
PREREQ: FREC408

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 ORES810
PREREQ: FREC408

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 marketing 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 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. Language laboratory as needed

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. Language laboratory as needed

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. Course satisfies Arts and Science foreign 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. Course satisfies Arts and Science 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 201 FRENCH READING AND COMPOSITION: SHORT STORY 3
Reading and discussion of French short story. 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 202 FRENCH READING AND COMPOSITION: THEATRE 3
Reading and discussion of some major works in French theatre. 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 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 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: One 200-level course taught in the French language.

FREN 255 FRENCH POLITICS IN THE PRESS 3
Explores topics in contemporary French politics as expressed in the news media. Emphasis on current events related to the internal and external politics 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.

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: FREN201 or FREN202, 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 analyses, of the various genres of poetry (lyrical, epic, narrative) and theatre (comedy, tragedy, drama) from the middle ages to the present. PREREQ: FREN201 or FREN202, and any 200-level course taught in the French language.

FREN 305 ADVANCED FRENCH CONVERSATION 3
Focus on current issues and is based primarily on French video cassettes. PREREQ: FREN205 and any other 200-level course.

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: Course taught abroad only. Taught in French.

FREN 313 INTENSIVE FRENCH COMPOSITION 3
Exercises and practice in composing correct and idiomatic French. PREREQ: Any two 200-level French courses.

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 401 ADVANCED FRENCH GRAMMAR 3
Selected problems in French grammar. Analysis of the French verb system. PREREQ: Any two 300-level French courses.

FREN 402 ADVANCED FRENCH COMPOSITION 3
PREREQ: Any two 300-level French courses.

FREN 403 HISTORY AND EVOLUTION OF THE FRENCH LANGUAGE 3
The development of the French language from Vulgar Latin through Old and Middle French to Modern French. Phonology, morphology and syntax, illustrated through selected texts. PREREQ: Any two 300-level French courses.
FRENCH

FREN 406 ADVANCED FRENCH 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 French course.
RESTRICTIONS: Course 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, Molière, 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, Sarraute, 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 Pléiade, 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 Molière.
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, Marmoult, 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 Chenier.
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 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, Camus and Malraux to Camus, Sarraute 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, Péric, 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 455 SELECTED AUTHORS, WORKS AND THEMES 3
Works of one or more outstanding authors or on a special theme.
PREREQ: Two 300-level French literature courses.
RESTRICTIONS: May be repeated for credit when topics vary.

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 603 HISTORY AND EVOLUTION OF THE FRENCH LANGUAGE 3
The development of the French language from Vulgar Latin through Old and Middle French to Modern French. Phonology, morphology and syntax, illustrated through selected texts.

FREN 611 GREAT FRENCH AUTHORS II: 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, Molière, 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, Sarraute, 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 Pléiade, 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 Molière.

FREN 638 SEVENTEENTH-CENTURY FRENCH POETRY AND PROSE 3
Representative novelists, poets, critics and moralists from Descartes and Pascal to La Fontaine, Boileau, Mme. de La Fayette and others.

FREN 641 THE EIGHTEENTH-CENTURY: THE AGE OF VOLTAIRE 3
Novels, plays, essays and poetry of such authors as Montesquieu, Marmoult, Prevost and Voltaire.

FREN 642 THE EIGHTEENTH-CENTURY: THE AGE OF ROUSSEAU 3
Novels, plays, essays and poetry of such authors as Diderot, Rousseau, Beaumarchais and Chenier.

FREN 645 NINETEENTH-CENTURY FRENCH NOVEL 3
The novel from Romanticism to Naturalism. Chateaubriand, Balzac, Stendhal, Flaubert, Zola and others.

FREN 646 NINETEENTH-CENTURY FRENCH POETRY AND THEATRE 3
Poets and dramatists representative of Romanticism, Realism and the Symbolist movement.

FREN 651 TWENTIETH-CENTURY FRENCH LITERATURE: THE AGE OF ANXIETY AND THE ABSURD 3
Main trends from Gide, Camus and Malraux to Camus, Sarraute and Beckett, including Surrealism, Existentialism and the Theatre of the Absurd.

FREN 652 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, Péric, Tournier, Duras, Ponge, Bonnefoy, Jacottet and Barthes.

FREN 655 SELECTED AUTHORS, WORKS AND THEMES 3
Works of one or more outstanding authors or on a special theme.
RESTRICTIONS: May be repeated for credit when topics vary.

FREN 869 MASTER'S THESIS 1-6

FREN 875 TOPICS: FRENCH LITERATURE 3
Study of selected topics, authors and works in the various fields of French literature. Variable content. Emphasizes preparation of seminar presentations and term paper.
RESTRICTIONS: May be repeated for credit when topics vary.

GEOGRAPHY

GEOG 101 PHYSICAL GEOGRAPHY 3
Influence of atmospheric processes and boundary conditions on the spatial distributions of climate, soils and vegetation, as well as on human activities at the surface of the earth.

GEOG 102 HUMAN GEOGRAPHY 3
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.

GEOG 120 WORLD REGIONAL GEOGRAPHY 3
An introduction to the geography of the Industrial World (the United States, the European Common Market and the Former Soviet Union), and the Third World (the Middle East, and South and East Asia). Emphasis on the economic relationships between industrial and developing nations.
GEOG 152 Climate and Life 4
Introduction to those physical and biological processes that shape our climatic environ-
ment. Important themes include the exchanges of energy and mass between the atmo-
sphere and both vegetation and built environments; and the influence of climate on
humans and humans on climate

GEOG 203 Introduction to Cultural Geography 3
Introductory study of people, landscapes and cultures through time. Emphasis is on cul-
ture, ethics and aesthetics as contexts for human perceptions and the creation of varied
human habitats

GEOG 206 Physical Geography: Topography-Soils 3
Basic processes responsible for the development, modification, distribution and variety of
landforms and soils

GEOG 210 Economic Geography 3
Areal variation on the earth’s surface of human activities related to producing, exchanging
and consuming wealth. World distributional patterns of the major economic activities

GEOG 220 Meteorology 3
Analysis of the atmosphere, weather elements, air masses, fronts and storms. Principles
of weather forecasting. Special problems of micrometeorology

GEOG 225 Historical Geography of the United States 3
 Persistence and change of settlements, economic activities and social/cultural behavior
in development of different geographical regions of the United States

GEOG 226 Geography of Latin America 3
Physical, historical and cultural geography of Latin America

GEOG 227 Historical Geography of Europe 3
Cultural and historical factors that have shaped the geographic patterns of modern
Europe

GEOG 230 Humans and the Earth Ecosystem 3
An examination of the historical and contemporary role of humans as major agents of
biological change in the earth’s ecosystem

GEOG 235 Conservation of Natural Resources 3
 Physical, social and economic problems involved in integrating resource management
and maintaining environmental quality.

GEOG 236 Conservation: Global Issues 3
Introduces the global nature of resources management and discusses the relationships
between population growth, the market economy, agricultural production and mineral
and energy exploitation, worldwide

GEOG 240 Environment and Behavior 3
An interdisciplinary introduction to individual and group behavior in relation to devel-
oped and natural environments. The implications of such human environment interactions
for planning

GEOG 250 Computer Methods in Geography 4
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

GEOG 255 Applied Climatology 3
Application of climatic information to practical problems of agriculture, irrigation and
crop scheduling, health, clothing, water resources, architecture and industry

GEOG 270 Map Communication and Design 3
History, design and use of maps as tools for effective communication of geographic
ideas

GEOG 272 Map and Air Photo Interpretation 3
Analysis of maps, aerial photos and selected remote sensing techniques to interpret phys-
cal and cultural environments. Includes measurement of phenomena on air photos, pho-
togrammetry and maps, and cartometrics

GEOG 310 Social Geography 3
The environment is defined, arranged and experienced differently by different social
groups. Examines the geographical settings of minorities - ethnic groups, women, chil-
dren, elderly and the homeless - and the ways institutions, media and political processes
affect the spatial location and place experiences of these groups

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 manage-
ment 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 transporta-
tion innovations on spatial patterns of settlement and regional growth

GEOG 330 Biogeography 3
Interactions among environmental, biological and cultural processes that have led to pre-
sent landscapes. Field trip required

GEOG 340 Behavioral Geography 3
Human behavior in large-scale environments. The psychological, physiological and cul-
tural variables that mediate in human-environment relationships

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: GEOG206, GEOI105 or GEOI107

GEOG 345 Cultural Geography 3
Broad principles of the field. Human mobility and stability. Material and symbolic land-
scapes. 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 351 Urban Climatology 3
Emphasis on the modification of climate produced by cities. Discusses both theoretical
and empirical approaches to the study of urban climates
PREREQ: GEOG250 and GEOG235

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 370 Production Cartography 3
Design and construction of professional-quality maps using computer and photograp-
hic darkroom techniques. Emphasis on multicolor maps for publication
PREREQ: GEOG220

GEOG 372 Geographic Information Systems 3
Geographic Information Systems (GIS) are a rapidly growing computer-based technolo-
gy 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 histo-
ry, uses, technology and implementation issues associated with GIS

GEOG 380 Western Landscapes of America 3
Major themes in the exploration, settlement and evolution of western cultural landscapes
Impact of the West upon landscape styles and culture of America

GEOG 390 Honors Colloquium 3
See ARSC390 for description

GEOG 412 Physical Climatology 4
Energy and moisture exchange between the atmosphere and land surface for character-
nistic natural and human-modified environments
PREREQ: MATH241 and GEOG250

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 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 vortic-
ity and circulation. Discusses atmospheric wave motion and general circulation
PREREQ: MATH242 and GEOG220. COREQ: MATH243

GEOG 425 Internal Structure of the City 3
Theoretical and practical approaches to an understanding of changing land use within
urban areas
PREREQ: GEOG325
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 430 Conservation Forest Ecosystems 3
Evaluation of human impact upon North American forests, concentrating on physical and biotic features that should be considered to maximize forest productivity
PREREQ: GEOG230

GEOG 440 Visual Landscapes 3
Social and behavioral science approaches to the study of human responsiveness to natural and urban visual environments Implications for design, impact assessment and planning
PREREQ: GEOG240 or GEOG340

GEOG 441 The Ecology of Crime 3
See CRJU455 for course description

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 448 Culture and Environment 3
Importance of attitudes toward nature in several cultural traditions. Processes in the formation of cultural landscapes, urban and rural. The city as a cultural-geographic environment

GEOG 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. May be crosslisted with BISC450 and/or GEOG450
RESTRICTIONS: Open to senior Environmental Science majors only, or requires permission of instructor

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 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 460 Women in International Development 3
See SOCI460 for course description

GEOG 464 Internship in Geography 3-6
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 472 Advanced Geographic Information Systems 4
Commercial geographical information systems (GIS) are introduced and used to analyze a wide variety of spatial data bases. Georeferenced data are acquired, restructured, and manipulated in a GIS environment. GIS methods are applied to local-scale geographical, environmental, and land planning problems
PREREQ: GEOG250 and GEOG270 or GEOG372 or GEOG470

GEOG 505 Atmospheric and Oceanic Environments 3
Survey of atmospheric and oceanic environments. Includes the physical background, from composition and solar forcing, through the distributions of energy and moisture fluxes on the planet. Human modifications and responses to atmospheric and oceanic environments also are considered
PREREQ: MATH242 and PHYS201
RESTRICTIONS: Open to Environmental Science graduate students

GEOG 612 Physical Climatology 4
Energy and moisture exchange between the atmosphere and land surface for characteristic natural and human-modified environments. See URAF614 for course description
PREREQ: MATH241 and GEOG250

GEOG 615 Urban and Regional Planning 3
See URAF615 for course description

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 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 625 The Internal Structure of the City 3
Theoretical and practical approaches to an understanding of the changing land uses within urban areas
PREREQ: GEOG325

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 crosslisted with URAF628

GEOG 630 Conservation Forest Ecosystems 3
Evaluation of the human impact upon North American forests, concentrating upon the physical and biotic features that should be considered to maximize forest productivity
PREREQ: GEOG230

GEOG 635 The Evolution of the American Urban Landscape 3
See URAF655 for course description

GEOG 636 Research Topics in Historic Preservation 3
See URAF636 for course description

GEOG 640 Visual Landscapes 3
Social and behavioral science approaches to the study of human responsiveness to natural and urban visual environments. Implications for design, impact assessment and planning
PREREQ: GEOG240 or GEOG340

GEOG 645 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 647 History of Environmental Ideas 3
Key environmental ideas are examined as expressions of culture, from Classical Antiquity to the present. Particular emphasis is placed on expressed culture-nature relationships (e.g., Grand Design, environmental and/or cultural determinism, nature-culture dichotomies, humanism versus ecologism)
RESTRICTIONS: Open to graduate students in Environmental Science

GEOG 648 Culture and Environment 3
Importance of attitudes toward nature in several cultural traditions. Processes in the formation of cultural landscapes, urban and rural. The city as a cultural-geographic environment

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
RESTRICTIONS: Open to graduate students in Environmental Science

GEOG 651 Microclimatology 3
Introduction to instrumentation and techniques involved in microclimatic monitoring and sampling. Field observations carried out in varying environmental situations
PREREQ: GEOG412 or GEOG412

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
GEOL 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.

GEOL 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: GEOLG250 and MATH302.

GEOL 670 Computer Cartography 4
Introduction to cartographic theory and computational methods necessary for drawing maps with the aid of a digital computer.
PREREQ: GEOLG250.

GEOL 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 GEOG472.

GEOL 681 Remote Sensing of Environment 3
See MAST681 for course description.

GEOL 820 Environmental Research 3
Planning and carrying out a research project with an emphasis on collecting and analyzing environmental data, or modeling and simulating an environmental system or process. Findings will be presented in form of a grant proposal (following NSF guidelines), or as a refereed journal article. Oral presentation(s) will be expected as well. May be cross-listed with AGEG820 and/or BISC820.
RESTRICTIONS: Open to Ph.D. students in Environmental Science or by consent of instructor.

GEOL 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.

GEOL 868 Thesis Research 1-9 PF

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

GEOL 105 General Geology 4
Principles and concepts of physical and historical geology and their importance and application in interpreting earth processes and events. Laboratory includes identification of earth materials and use and application of topographic and geologic maps.

GEOL 106 General Geology 4
Application of classical geologic principles in light of recent discoveries, the study of significant geologic processes that provide new bases for the interpretation of earth history. Laboratory includes study of earth history as interpreted from rocks, fossils and geologic maps.

GEOL 107 General Geology 4
Principles of physical and historical geology and their application in interpreting earth processes and the history of the earth. Laboratory covers identification of earth materials including fossils and the interpretation of topographic and geologic maps.
RESTRICTIONS: For majors in geology, other sciences and engineering. Only one course, GEOL105 or GEOL107, can count towards graduation.

GEOL 109 Planets, Asteroids, and Impacts 3
Composition, structure, surface features, origin, and evolution of the planets, satellites, asteroids, and comets. The course will also explore the possible connection between meteorite impacts and mass extinctions. Did an asteroid kill off the dinosaurs?

GEOL 110 Evolution and Extinction 3
Origins, evolution and extinction of major groups of organisms as reflected by the earth's fossil record. Mass extinctions, both ancient and modern (anthropogenic). Humans' role in the global ecosystem.

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: For College of Education students only.

GEOL 144 Evolution and Earth History 3
History of the Earth and its biota: origin and extinction of major groups of organisms during the Earth's history.

GEOL 203 Mineralogy and Crystallography 3
Principles of crystallography and crystal growth, the properties of minerals, mineral occurrence and association, and systematic mineralogy. Identification including X-ray diffraction.

GEOL 204 Properties of Rocks and Minerals 4
Principles of crystal symmetry, techniques of polarized light microscopy, including mineral identification, and examination of thin sections. Petrography covering the acoustic, electrical and magnetic properties of rocks and minerals.
PREREQ: GEOL203.

GEOL 233 The Ice Ages and Human Chronology 3
Quaternary climatic fluctuations and the effects of continental glaciation. Evidences on theories of origin of the ice ages; major geometric forms produced, evolutionary crisis and extinction of the major mammals and the ascendency of humans.

GEOL 234 Earth Resources and Ecology 3
The geologic origin and occurrence of fuels, metals, building and industrial minerals, and water; the geology, economics and politics of resource extraction and utilization; the disposal of wastes; mineral pollution; and the bearing capacity of the environment.

GEOL 243 Rocks and Minerals 3
The major types of rocks and minerals, including their origin, distribution, crystalline form, chemistry, occurrence and identification. Mineral aesthetics. Gems and gemstones.

GEOL 245 Volcanoes and Earthquakes 3
Violent geologic activity, as illustrated by volcanoes and earthquakes. Nature, causes and origins of volcanic and earthquake activity, their interactions with man and their potential control.

GEOL 301 Systematic and Evolutionary Paleontology 3
Classification of fossils, organic evolution, paleoecology; and application to geologic principles.
PREREQ: GEOL107.
COREQ: GEOL303.

GEOL 303 Sedimentology 3
Texture, composition and provenance of sedimentary rocks. Sediment transport and deposition; major types of sedimentary environments.Paleoecology and biologic influences on sediment distribution and production.
PREREQ: GEOL203.

GEOL 304 Stratigraphy 3
PREREQ: GEOL203, GEOL301 and GEOL303.

GEOL 305 Structural Geology 3
Major classes of rock structures and their origins. Descriptive, kinematic, and dynamic examination of rock structures. Geologic stress, strain and mechanisms of strain. Large-scale structural features of the crust. Orogenic belts.
PREREQ: GEOL107, GEOL203 and mathematics through trigonometry.

GEOL 366 Independent Study 1-3

GEOL 402 History of the Earth 3
Integrative study of the history of the earth and its inhabitants. Evolution and interaction of the lithosphere, biosphere, oceans and atmosphere. Examination of the geologic record as a test for hypotheses about earth processes, including climatic change, paleoceanography and tectonics.
PREREQ: GEOL301, GEOL303 and GEOL304.

GEOL 403 Regional Geology of North America 3
Stratigraphic, structural and petrologic features of the geologic provinces of North America. Generalized geologic evolution of each region. Major geologic features of selected other continents.
PREREQ: GEOL304.

GEOL 405 Introduction to Research 2
Undergraduate research carried out under the supervision of the staff. Written report required.
RESTRICTIONS: May be repeated once if project warrants it.
GEOL 407  **INEOUS AND METAMORPHIC PETROLOGY**  3
Mineralogic, textural, and structural characteristics of igneous and metamorphic rock types. Principles of intrusional and subvolcanic processes. Major variables governing generation and evolution of igneous and metamorphic conditions. Petrographic examination of representative rock suites
PREREQ: GEO107

GEOL 411  **QUANTITATIVE GEOMORPHOLOGY**  3
Application of geomorphologic principles to the analysis of landforms and landscapes. Field techniques in the study of surface and subsurface processes; measurement and interpretation of topographic data. Geostatistics and geologic mapping techniques. Quantitative field methods and computer applications. Geomorphology of selected environments
PREREQ: GEO107 or GEO103

GEOL 412  **GEOLICAL 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

GEOL 413  **FUNDAMENTALS OF WELL LOGGING**  3
Introduction to well logging techniques. Logging tools, their uses and limitations. Emphasis on ground water exploration and well development. Calculation and use of formation factor in determining water quality
PREREQ: GEO107

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: GEO107

GEOL 415  **GENERAL GEOMORPHOLOGY**  3
Description and classification of landforms, their relationships to geologic structures and processes, and their histories and rates of change
PREREQ: GEO107

GEOL 420  **PETROLEUM GEOLOGY**  3
The origin and distribution of the world’s petroleum resources. Geological and geophysical techniques applied to the search for oil
PREREQ: GEO107

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 the geologist and the educated citizen
PREREQ: GEO103, GEO104, and GEO105

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: GEO107 AND GEO103

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: GEO103

GEOL 432  **RECENT SEDIMENTARY ENVIRONMENTS**  3
Recent environments of deposition in the Delaware coastal area. Emphasis on field and laboratory techniques applied to sedimentation processes, the classification of sediments and their structures and sediment facies patterns
PREREQ: GEO103

RESTRICTIONS: Course taught at Lewes

GEOL 434  **THE GEOLOGY OF COASTS**  3
Erosional, depositional and tectonic processes; morphology and classification, and geologic history of the coastal areas of the world
PREREQ: GEO103

GEOL 446  **GENERAL GEOCHEMISTRY**  3
Chemical principles applied to geologic processes and environments. Thermochemistry of mineral equilibria; mineral stabilities at high temperature and pressure; radiosotope methods and dating. The geochemical history of the earth
PREREQ: GEO107 and CHEM103

GEOL 450  **PROSEMINAR IN ENVIRONMENTAL SCIENCE**  3
See GEOG450 for course description

GEOL 451  **GEOPHYSICAL FIELD METHODS**  3
Application of seismic exploration techniques and interpretations. Heat flow measurements and data, and interpretations of the thermal history of the earth
PREREQ: GEO453 and GEO454

RESTRICTIONS: Three- and six-credit options require summary report

GEOL 452  **PLATE TECTONICS AND GEOPHYSICS**  3
Study of the fundamental theory of plate tectonics including historical development, kinematics and the morphology and structure of the major types of plate boundaries. Examination of the structure and processes occurring within the earth’s interior

GEOL 453  **ELEMENTARY GEOPHYSICS I**  3
Fundamental theory of seismology, ray theory, reflection and refraction of seismic waves. Seismic exploration techniques and interpretations. Heat flow measurements and data, and interpretations of the thermal history of the earth
PREREQ: MATH242, PHYS201 and PHYS202

GEOL 454  **ELEMENTARY GEOPHYSICS II**  3
Gravity and the shape of the earth, and theories of isostasy. Geomagnetism, magnetics. Gravimetric and magnetic surveys and interpretations. Electrical and radiochemical surveys and well logging
PREREQ: MATH242, PHYS201 and PHYS202

GEOL 460  **FIELD GEOLOGY IN THE WESTERN STATES**  3
Introduction to the study of geologic mapmaking and field methods. Map construction and interpretation; traverse, pace-and-compass, plane-table and aerial-photograph mapping in sedimentary and crystalline rocks. Rock description, stratigraphic analysis and correlation, structural methods, and Cordilleran geology
PREREQ: GEO107, GEO203 and GEO304

RESTRICTIONS: Three- and six-credit options require summary report

GEOL 466  **INDEPENDENT STUDY**  1-3

GEOL 501  **ENVIRONMENTAL GEOLOGY**  3
Fundamental geological concepts and principles. Earth materials, natural processes, and geologic hazards. Human interaction with the environment. Global change, land use, and decision making
PREREQ: GEO107

RESTRICTIONS: Open only to environmental science graduate students

GEOL 603  **REGIONAL GEOLOGY OF NORTH AMERICA**  3
Stratigraphic, structural, and petrologic features of the geologic provinces of North America. Generalized geological evolution of each region. Major geologic features of other selected continents

GEOL 607  **INEOUS AND METAMORPHIC PETROLOGY**  3
Mineralogic, textural and genetic principles of interpretation of crystalline rocks. Major variables governing generation and evolution of igneous and metamorphic conditions. Petrographic examination of representative rock suites

GEOL 609  **DYNAMIC PROCESSES IN SEDIMENTATION**  3
Introduction to the study of geologic history and sedimentary processes. Emphasis on depositional processes, reworking, and transport of sediments
PREREQ: GEO107

GEOL 610  **INTRODUCTION TO GROUNDWATER MODELING**  3
Principles of numerical modeling of groundwater flow and contaminant transport. Applications and limitations of commonly used computer models
PREREQ: GEOG428 or GEOG429

GEOL 611  **QUANTITATIVE GEOMORPHOLOGY**  3
An analysis of geomorphic processes and landforms using a quantitative approach. Topics include fluvial processes and morphology, evolution and morphology of drainage basins, slope development, coastal landforms and beach processes

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 use of geology for interpretations of history

GEOL 613  **FUNDAMENTALS OF WELL LOGGING**  3
Theory and interpretation of most commonly used geophysical logs; description of logging tools; and their uses and limitations. Emphasis on groundwater exploration and well development; calculation and use of formation factor in determining water quality

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 615  **GENERAL GEOMORPHOLOGY**  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

GEOL 620  **PETROLEUM GEOLOGY**  3
Seismic exploration techniques and interpretations. Emphasis on ground water exploration and well development; calculation and use of formation factor in determining water quality

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

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**GEOL 628** Hydrogeology 3

**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. May be cross-listed with MAST631.

**GEOL 632** Recent Sedimentary Environments 3
Recent environments of deposition in the Delaware coastal area; emphasis on field and laboratory techniques applied to sedimentation processes, the classification of sediments and their structures, and sediment facies patterns. May be cross-listed with MAST625.

**GEOL 633** 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 Geochmistry 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

**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 radioaactive surveys and well logging.

**GEOL 657** Statistics for Earth Sciences 3
See STAT657 for course description.

**GEOL 819** Tectonic Framework of North America 1
Major theories of the evolution of North America, and examination of the evidence for and against them.

**GEOL 820** Topics in Geomorphology 1
Detailed analysis of the origin of specific landforms.

**GEOL 821** Geology and Public Policy 1
Roles of geology and geologists in matters of public policy. Case histories and current events illustrating interactions of science and government.

**GEOL 831** Tectonics of the World's Ocean Basins 3
Geologic evolution of the ocean basins; study of the geophysical parameters, dimension and processes of mid-ocean ridges, deep-reef trenches and continental margins; and deduction as to origin of ocean basin features.

**GEOL 832** Coastal Seminar 1
Analysis of modern concepts of coastal research and their applications to the study of the evolution of coastal sedimentary environmental systems.

**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 872** Advanced Micropaleontology 3
Taxonomy, morphology and biostratigraphy of selected phyla of microfossils. PREREQ: GEOL606.

**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 core work.

**GEOL 969** Doctoral Dissertation 1-12 PF

**GREEK**

**GREK 101** Elementary Greek I 3
Course for beginners.

**GREK 102** Elementary Greek II 3
Completion of basic Greek. PREREQ: GREK101.

**GREK 213** Plato 3

**GREK 214** Homer 3

**GREK 366** Independent Study 1-3

**GREK 466** Independent Study 1-3

**GERMAN**

**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. Language laboratory as needed.

**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.

**GRMN 107** German III - Intermediate 4
Review of grammar, continued practice in speaking and writing, and reading texts of average difficulty. PREREQ: GRMN106.

**GRMN 200** German Grammar Review 3

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

GRMN 207 Contemporary Austria I 3
An introduction to contemporary Austria, 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 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 Composition: Short Fiction 3
Reading and discussion of 20th-century German short stories and novels. Several short compositions. Grammar review where appropriate.
PREREQ: GRMN200, GRMN205 or GRMN206
RESTRICTIONS: Not intended for students who have already taken a 300 or 400 level course in German

GRMN 212 German Reading and Composition: Drama 3
Reading and discussion of some major 20th-century German plays. Several short compositions. Grammar review where appropriate.
PREREQ: GRMN200, GRMN205 or GRMN206
RESTRICTIONS: Not intended for students who have already taken a 300 or 400 level course in German

GRMN 240 German Culture and Technology 3
Introduction to the language and conventions of technology, including a survey of the history, organization and social context of science and technology in Germany.
PREREQ: GRMN107

GRMN 250 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: GRMN107

GRMN 255 German Politics in the Press 3
Explores topics in contemporary German politics as expressed in the news media. Emphasis on current events related to the internal and external politics of Germany. Focus is the German press: newspapers and magazines printed in the German language.
PREREQ: Any two 200-level courses in German

GRMN 305 German Conversation and Composition 3
Discussion of current cultural, social and political topics in German-speaking countries. Vocabulary building, grammar exercises and frequent compositions.
PREREQ: One of GRMN200, GRMN205, GRMN206, GRMN211, GRMN212 or GRMN250

GRMN 306 Practical Oral/Written Expression 3
Strengthens grammar and vocabulary skills in preparation for advanced courses. Class exercises include oral exposure, discussion of articles and videos, textual analysis and compositions.
PREREQ: Any two 200-level German courses conducted in German
RESTRICTIONS: Taught abroad only

GRMN 308 Contemporary Germany II 3
Discussion and study of topics 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 taught in the German language
RESTRICTIONS: Taught abroad only. Taught in German

GRMN 311 Introduction to German Literature I 3
Masterpieces of poetry, narrative prose and drama from the 18th to the mid-19th century.
PREREQ: GRMN211 or GRMN212

GRMN 312 Introduction to German Literature II 3
Masterpieces of poetry, narrative prose and drama from the mid-19th century to the present.
PREREQ: GRMN211 or GRMN212

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.
RESTRICTIONS: GRMN211 or GRMN212

GRMN 340 Focus on Genre: German Drama, Prose or Poetry 3
Introduces one of three major genres by examining a specific theme. The subject matter varies and will be announced in the registration booklet.
PREREQ: GRMN211 or GRMN212
RESTRICTIONS: May be repeated for credit when topics vary

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: GRMN211 or GRMN212
RESTRICTIONS: May be repeated for credit when topics vary

GRMN 366 Independent Study 1-3

GRMN 403 History of the German Language 3
Evolution of the German language from its Indo-European origins through Old and Middle High German to New High German. Phonology, morphology and syntax, illustrated through selected texts.
PREREQ: Any two 300-level German courses.

GRMN 406 Advanced German Language 3
Grammar and syntax 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 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: Any two 300-level German courses.

GRMN 433 Nineteenth-Century German Literature 3
Studies major literary trends and figures (Heine, Buechner, Droysen, Hebbel, Keller, Stifter, Storm and Nietzsche) from the end of Romanticism to Naturalism.
PREREQ: Any two 300-level German courses.

GRMN 442 From Naturalism to Expressionism 3
Main literary currents from the 1880's to the 1920's. The drama from Hauptmann to Kroetz; the poetry of Hofmannsthal, Rilke, Wedekind, Schnitzler, and others; narrative prose including Thomas Mann and Kafka.
PREREQ: Any two 300-level German courses.

GRMN 453 Contemporary German Literature 3
Major authors and literary movements from 1945 to the present. Works by Baedeker, Grass, Fruh, Duerrenmatt, Bachmann, Handke and Christof 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 300-level German literature courses.
RESTRICTIONS: May be repeated for credit when topics vary.

GRMN 462 Early German Literature 3
Representative authors and themes: 12th-17th centuries. "Countly love" and "knighthood" (Minnesang, Das Nibelungenlied); "bourgeoisie vs. peasantry" during the Reformation (Sachs' Fastnachtspiele, Eulenspiegel); and the Baroque themes of "carpe diem" and "memento mori" (Grimmelshausen's Simplicissimus, Gryphius' plays, Baroque poetry).
PREREQ: Any 400-level German literature course.

GRMN 466 Independent Study 1-3

GRMN 533 German Readings for Ph.D. Candidates 3
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 603 History of the German Language 3
Evolution of the German language from its Indo-European origins through Old and Middle High German to New High German. Phonology, morphology and syntax, illustrated through selected texts.

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, Droysen, 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 Ibsen, the poetry of Hofmannsthal, Rilke, Lackner, and others, and narrative prose including Thomas Mann and Kafka

GRMN 653 Contemporary German Literature 3
Major authors and literary movements from 1945 to the present. Works by Boell, Grass, Frisch, Duerrenmatt, Bachmann, 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 662 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' Fastnachtspiele, Eulenspiegel]; the Baroque themes of "carpe diem" and "memento mori" [Grimmelschmidt's Simplicissimus, Gryphius' plays, Baroque poetry]

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 language and development of speaking, listening, reading and writing skills through the use of basic texts. Language laboratory as needed. May be crosslisted with JWST105

HEBR 106 Hebrew II - Elementary/Intermediate 4
Completion of basic Hebrew. Increasing mastery of the basic skills of speaking, listening, reading and writing. May be crosslisted with JWST106
PREREQ: HEBR105

HEBR 107 Hebrew III - Intermediate 4
Review of grammar, continued practice in speaking and writing and reading texts of average difficulty. May be crosslisted with JWST107
PREREQ: HEBR106
RESTRICTIONS: Four years of high school Hebrew acceptable in lieu of HEBR107. Satisfies Arts and Science foreign language requirement

HISTORY

HIST 101 Western Civilization to 1648 3
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

HIST 102 Western Civilization: 1648 to the Present 3
The principal political, social, economic and cultural developments in Western civilization since the middle of the 17th century

HIST 103 World History to 1648 3
Principal political, economic, cultural and social developments in world history from origins to 1648, relating the past to the present. Course gives equal weight to the history of Asia, Africa, the Americas and Europe

HIST 104 World History: 1648 to the Present 3
Principal political, economic, cultural and social developments in world history from 1648 to the present, relating the past to the present. Course gives equal weight to the history of Asia, Africa, the Americas and Europe

HIST 130 Islamic Near East: 600-1500 3
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

HIST 131 Islamic Near East: 1500-Present 3
Considers the traditional makeup of the Middle East and charts the emergence of the region in its present form through the nineteenth and twentieth centuries

HIST 134 History of Africa 3
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 crosslisted with AMS134

HIST 135 Introduction to Latin American History 3
Introduction to Latin American history from the preconquest period to the present

HIST 137 East Asian Civilization: China 3
A survey of major aspects of Chinese civilization, relating the past to the present

HIST 138 East Asian Civilization: Japan 3
A survey of major aspects of Japanese civilization, relating the past to the present

HIST 200 History and Government of Delaware 3
A survey of the history of Delaware and its present government, with special attention to the needs of social studies teachers

HIST 205 United States History 3
An introductory survey of 17th-, 18th-, and 19th-century American history. Themes and approach vary with the instructor

HIST 206 United States History 3
An introductory survey of American history since 1865. Themes and approach vary with the instructor

HIST 210 War and Society 3
Relationship between warfare, with its constantly mutating technology, and social change. Survey from replacement of the professional by the mass army to the contemporary substitution of machinery for soldiers

HIST 220 The American Civil Rights Movement 3
This is a team-taught, interdisciplinary, large-enrollment course on the history of the American Civil Rights Movement. In addition to dealing with the crucial years from about 1954 to 1970, the course goes backward and forwards into the larger history of American race relations. May be crosslisted with BAM5220

HIST 241 History of Christianity to 1300 3
An introductory survey of Christianity from its origins to 1300

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 260 Humanities Colloquium 3

HIST 264 The Jewish Holocaust: 1933-1945 3
Focuses on the infamous "Final Solution," with particular emphasis on the roots of Antisemitism, 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 crosslisted with JWST264

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, nationalism 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 conceptions of the Universe and of humanity's place within it, as seen in ideas and institutions of science from ancient to modern times

HIST 290 History of Women and Education 3
See EDST290 for course description

HIST 291 Women's History Through Film 1
See WOMS291 for course description

HIST 293 Honors Short Course 1
See ARSC293 for course description. May be crosslisted with WOMS293

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 crosslisted with WOMS300.
HIST 301  THE WORKER IN AMERICAN LIFE  
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 view and the nature of work have evolved over the course of American history.

HIST 302  THE WORLD IN OUR TIME  
An examination of current events within the context of historical forces. May be cross-listed with WOMS302.

HIST 303  AMERICAN INTELLECTUAL HISTORY  
The development of principal patterns of American religious, social and scientific thought before 1865.

HIST 304  AMERICAN INTELLECTUAL HISTORY  
The development of principal patterns of American religious, social and scientific thought after 1865.

HIST 305  IMAGES OF RACE AND ETHNICITY IN AMERICAN CULTURE  
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 WOMS305.

HIST 306  HISTORY OF AMERICAN FOREIGN POLICY  
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  
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  
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 a decision.

HIST 309  U.S. BUSINESS AND POLITICAL ECONOMY  
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 the U.S. political economy.

HIST 313  EARLY TWENTIETH-CENTURY AMERICA  
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  
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 315  POSTWAR AMERICA: THE UNITED STATES SINCE 1945  
A social, intellectual and political history of the United States from the death of Franklin D. Roosevelt to the resignation of Richard M. Nixon. Topics covered are the origins of the cold war, Truman-mania, McCarthyism, the 1950's, JFK and LBJ, and Nixon and Watergate.

HIST 316  INTRODUCTION TO MATERIAL CULTURE STUDIES  
See ANTH316 for course description.

HIST 318  COLONIAL AMERICA  
The transit of culture from England to America and its modification there during the seventeenth century. The development of major colonial societies to 1760.

HIST 319  REVOLUTIONARY AMERICA  
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 320  THE NEW NATION: 1787 TO 1800  
Study of the Constitutional Convention, its goals, compromises and opponents. Explores the political discussion over ratification of the Constitution, the continued presence of unresolved economic and social crises, and the rise of an opposition to the Federalists from the ranks of American society.

HIST 321  CIVIL WAR AND RECONSTRUCTION  
Secession conflict and the struggle between rival nationalisms in mid-19th-century United States.

HIST 322  THE CITY IN AMERICAN CULTURE  
See ANTH322 for course description.

HIST 323  THE OLD SOUTH  
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.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIST 344</td>
<td>Renaissance Europe</td>
<td>3</td>
<td>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</td>
</tr>
<tr>
<td>HIST 345</td>
<td>Europe in the Reformation Era: 1517-1648</td>
<td>3</td>
<td>Religion in the realms of thought and action during the rise of &quot;modern&quot; Western civilization: the scientific revolution, the Reformation, the Counter-Reformation and their impact on the behavior and perceptions of man by 1650.</td>
</tr>
<tr>
<td>HIST 346</td>
<td>Age of Louis XIV</td>
<td>3</td>
<td>The culture, society and politics of 17th-century France, centered upon the biography of Louis XIV. Emphasis on absolute monarchy in France and the implications for all of Europe.</td>
</tr>
<tr>
<td>HIST 347</td>
<td>The French Revolution and Napoleon</td>
<td>3</td>
<td>Emphasis on personalities in the Revolution - Louis XIV, Robespierre and Napoleon - and the clash of social forces.</td>
</tr>
<tr>
<td>HIST 348</td>
<td>History of Spain: 1479-Present</td>
<td>3</td>
<td>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.</td>
</tr>
<tr>
<td>HIST 349</td>
<td>Hispanic Societies: 1492-Present</td>
<td>3</td>
<td>None A comparative social history of the Hispanic world. Topics include the social and cultural developments in Medieval and Renaissance Spain, the formation of Latin American colonial society, and the struggle for modernization in contemporary Spain and Latin America.</td>
</tr>
<tr>
<td>HIST 350</td>
<td>Europe in the Nineteenth Century</td>
<td>3</td>
<td>History of European civilization from the end of the Napoleonic wars to World War I. Topics include Romanticism and realism; the Industrial Revolution; the clash of religion and science; the development of nationalism, socialism, and imperialism; and the coming of World War I.</td>
</tr>
<tr>
<td>HIST 351</td>
<td>Europe in Crisis: 1919-1945</td>
<td>3</td>
<td>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.</td>
</tr>
<tr>
<td>HIST 352</td>
<td>Contemporary European Society</td>
<td>3</td>
<td>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.</td>
</tr>
<tr>
<td>HIST 353</td>
<td>Early Modern Intellectual History</td>
<td>3</td>
<td>Examines the major developments 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 in Milton, Locke, Voltaire, Rousseau and others.</td>
</tr>
<tr>
<td>HIST 354</td>
<td>Modern European Intellectual History</td>
<td>3</td>
<td>Philosophical and political thought from English Romanticism and German Classicism through Existentialism. Reading from Hegel, Marx, Kierkegaard, Nietzsche and Thomas Mann.</td>
</tr>
<tr>
<td>HIST 355</td>
<td>Russian History to 1801</td>
<td>3</td>
<td>Political, socioeconomic and cultural developments in Russia to 1801. Russian trends and developments.</td>
</tr>
<tr>
<td>HIST 356</td>
<td>Russian History: 1801-1917</td>
<td>3</td>
<td>Political, socioeconomic and cultural developments in Russia in the 19th century.</td>
</tr>
<tr>
<td>HIST 360</td>
<td>Humanities Colloquium</td>
<td>3</td>
<td>See ARSC 360 for course description.</td>
</tr>
<tr>
<td>HIST 361</td>
<td>European Business History: 1850-Present</td>
<td>3</td>
<td>Topics include the rise of the modern corporation; the relationships between business and government and business and labor; the role of business overseas; expansion of the colonies and the present Third World; and comparison with the way business has operated in America, Japan, and the Soviet Union.</td>
</tr>
<tr>
<td>HIST 363</td>
<td>Modern Germany: 1770-1919</td>
<td>3</td>
<td>German political, socioeconomic, and cultural history from 1770 to the end of the First World War.</td>
</tr>
<tr>
<td>HIST 364</td>
<td>Germany in the Twentieth Century</td>
<td>3</td>
<td>German political, socioeconomic, and cultural history from Bismarck to Hitler.</td>
</tr>
<tr>
<td>HIST 366</td>
<td>Independent Study</td>
<td>1-6</td>
<td></td>
</tr>
</tbody>
</table>
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, colonialization, nationalism and communism, the Indochina Wars (among them the "Vietnam Conflict"), the Kampuchean Crisis, and life under the Socialist Republic of Vietnam since 1975.

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 the 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, Africans in power since 1948, and African struggles for freedom.

HIST 398  Film and Modern American Culture  3
See ENGL398 for course description.

HIST 403  History, Philosophy, Functions and Future of Museums  3
See MAST403 for course description.

HIST 409  Varieties of Modern Feminism  3
A reading and research seminar on selected aspects of the history of modern feminist thought and activity, with particular emphasis on the 20th-century United States. May be cross-listed with WOMS409.

HIST 411  Seminar in American History  3
Topics vary. May include topics such as "History of the West," "History of the South," or "Ethnicity in American History." May be cross-listed with CSCC411 and/or WOMS411.

HIST 430  Twentieth-Century Latin American Revolutions  3
Focuses on four 20th-century Latin American revolutions. Concentrates on the historical background and events of the Mexican, Guatemalan, Cuban and Nicaraguan revolutions.

HIST 440  Africa Under Colonial Rule  3
Introduces various Colonial policies of the European powers in Africa, emphasizing the comparisons and contrasts between these policies. Attention paid to the effect of Colonialism on Africa's economic, social and political development.

HIST 446  Industrial Revolution in Europe  3
The origins and spread of rapid, sustained economic growth since 1750.

HIST 449  Studies in Science, Technology and Medicine  3
Topics vary. May include topics such as "The American System," "History of Chemistry," or "History of Engineering."

HIST 453  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 repositories.

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 regional differences and individual craftsmanship. May be cross-listed with ARTH454.

HIST 459  United States Urban History  3
The process of urbanization in America with special emphasis on the Philadelphia-Wilmington area.

HIST 460  Humanities Colloquium  3

HIST 463  Historical Archaeology and the Public  3
See ARTH463 for course description.

HIST 464  Fieldwork in History  3
Selected students serve as interns on a few carefully chosen historical projects with organizations outside the University.

HIST 466  Independent Study  1-6

HIST 470  Studies in Ancient History  3
Topics vary. May include topics such as "Slavery in Antiquity," "The Archaeology of the Ancient World" or "The Greek City State."

HIST 471  Studies in Medieval History  3
Topics vary. May include topics such as "The Church in the Early Middle Ages," "The Church in the Central Middle Ages," and "Anglo-Norman England and Capetian France." May be cross-listed with WOMS472.

HIST 473  Studies in Early Modern European History  3
Topics vary. May include topics such as "Renaissance Humanism," or "Women in Europe, 1100-1600." May be cross-listed with WOMS473.

HIST 474  Studies in English History  3

HIST 475  Seminar in Modern European History  3
Topics vary. May include topics such as "The Holocaust," "The Cold War" or "Hitler's Germany." May be cross-listed with WOMS475.

HIST 477  Studies in Latin American History  3
Topics vary. May include topics such as "History of Mexico," "History of the Caribbean" or "Slavery in the New World."

HIST 479  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 481  Studies in Military History  3
Selected topics in military history: Civil-military relations, the interrelationship of strategy and politics, the development of strategic theory, the impact of new weapons on military institutions.

HIST 483  Studies in Comparative History  3
Topics vary, but all compare some aspect of American with European history or Western with non-Western history.

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.

HIST 493  Seminar: 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 611  Seminar in American History  3
Topics vary. May include topics such as "History of the West," "History of the South" or "Ethnicity in American History."

HIST 614  The American Suburb  3
See UURAF614 for course description.

HIST 616  The American Family 1608-1900  3
Seminar on the changing shape and function of the American family and its relationship to Old World structure.

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  U.S. 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  U.S. Social and Cultural History: 1850-1929  3
Reading seminar on social and cultural developments in the United States in the period during which it became a mature industrial nation, from 1850-1929.

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  U.S. Political, Cultural and Economic History: 1860-Present  3
Reading seminar on major works of interpretation that illustrate the changing modes by which historians have viewed American political, economic and cultural past from the Civil War to present.

HIST 632  Making the American City  3
See URAF 632 for course description

HIST 633  The U.S. in the Twentieth Century  3
Reading seminar on 20th-century U.S. history

HIST 635  The Evolution of the American Urban Landscape  3
See URAF 635 for course description

HIST 636  Research Topics in Historic Preservation  3
See URAF 636 for course description

HIST 641  Technology and Civilization I  3
The religious, aesthetic, military, political and economic origins of Western technology from prehistoric times to the Renaissance and the interplay of technology and culture

HIST 642  Technology and Civilization II  3
Technology and society from the Renaissance to 1950. An exploration of the impact of technology on culture while at the same time examining how culture shapes technology

HIST 643  History of Science and Medicine  3
Scientific thought and practice from antiquity to 1650, with emphasis on relation of science to the cultures in which it is pursued: Egypt and Mesopotamia, Greece and Rome, the Islamic countries, the Middle Ages in Europe and the Renaissance

HIST 644  History of Science and Medicine  3
Science in the West 1650-1950, beginning with the Scientific Revolution. The ties of science to culture, particularly technology, medicine and institutional configurations. Development of the major biological and physical sciences

HIST 645  Things in History  3
The world of things made by humans forms the basis for a seminar in the historical interpretation of artifacts. Each session of the class devoted to the handling, use, analysis and interpretation of a representative artifact. May be cross-listed with MSST 645

HIST 646  Industrial Revolution of Europe  3
The origins and spread of rapid, sustained economic growth since 1750

HIST 647  Social History of Medicine  3
The relationships of medicine and its allied health sciences to key social and political issues in the West over the last two hundred years

HIST 648  American Science and Technology  3
The development of science and technology in America, from the Colonial Period to the 1950's

HIST 649  Studies in Science, Technology and Medicine  3
Topics vary. May include topics such as "The American System," "History of Chemistry" or "History of Engineering"

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 URAF 629 for course description.

HIST 653  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.

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 ARTH 654 and/or URAF 654

HIST 655  Archival Management I  3
Survey of the various types of archival institutions and practices, the principles of manuscript curatorial, the problems associated with huge archives generated by modern bureaucracies. May be cross-listed with MSST 655

HIST 656  Archival Management II  3
Internship and paper. May be cross-listed with MSST 656

HIST 658  Historical Editing  3
Background and principles of historical editing with emphasis on student projects in primary source material

HIST 659  United States Urban History  3
The process of urbanization in America with special emphasis on the Philadelphia-Wilmington area.

HIST 660  Humanities Colloquium  3

HIST 663  Historical Archaeology and the Public  3
See ANTH 663 for course description

HIST 671  Studies in Medieval History  3
Topics include the Church in the early Middle Ages, the Church in the Central Middle Ages, Anglo-Norman England and Copean France

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 681  Studies in Military History  3
Selected topics in military history. Civil-military relations, the relationship of strategy and politics, the development of strategic theories and the impact of new weapons on military institutions.

HIST 686  Seminars 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 686  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 693  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 684  Museum Internship  3
See MSST 684 for course description

HIST 685  Research and Writing Seminar: America to 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 689  Research and Writing Seminar: Studies in Comparative History  3
Topics vary, but all compare some aspect of American with European history or Western with non-Western history.

HIST 868  Research  1-9 PF

HIST 869  Master's Thesis  1-6

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HIST 964 Pre-Candidacy Study 1-12 PF
Research and readings in preparation of dissertation topic and/or qualifying examination 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, PHYSICAL EDUCATION & RECREATION

HPER 105 Foundations of Recreation and Leisure Study 3
Study of the history, theory and philosophy of recreation and leisure services. Nature of the play experience, influence of leisure on society and a survey of the range of leisure services in the public, private, voluntary, military and commercial sectors

HPER 120 Physical Education 1
Introduces knowledge and skills in physical activity. The program is geared toward life sports and allows for selection

HPER 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 life-saving skills, first aid, artificial resuscitation, teaching techniques, lesson plans, unit plans and practical teaching experience
RESTRICTIONS: Requires current Red Cross Advanced Lifesaving Certificate

HPER 124 Aerobic Instructor Training Certification 2
Provides the potential teacher with pertinent, current knowledge on aerobic dance, to allow them to design safe and effective programs. Emphasis on effective leadership skills
RESTRICTIONS: Requires aerobic dance experience and permission of instructor

HPER 132 Scuba 2
Prepares students with the skills and knowledge necessary to continue their training for open water Scuba certification

HPER 135 Freshman Seminar 2
Teaches 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 physical education majors

HPER 138 Lifeguard Training Instructor 2
RESTRICTIONS: Current certification in First Aid, CPR and Lifeguard Training

HPER 140 Fundamental Skills Analysis 2
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. Health and Physical Education majors only.

HPER 141 Skills, Techniques and Knowledge of Outdoor Education and Flag Football 1
Provides the opportunity to develop skill and techniques, learn methods and acquire knowledge of designated outdoor recreation skills and flag football. Emphasis on developing readiness for presenting such activities in group settings

HPER 142 Skills, Techniques and Knowledge of Beginning Swimming/Diving 1
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
RESTRICTIONS: Open to majors only in Spring and Fall

HPER 143 Skills, Techniques and Knowledge of Stunts, Tumbling and Gymnastics 1
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

HPER 144 Skills, Techniques and Knowledge of Volleyball and Self Defense 1
Provides the opportunity to develop skills and learn methods and techniques. Emphasis on developing readiness for presenting such activities in public school settings
RESTRICTIONS: Open to majors only

HPER 150 Movement Education for Children 3
Introduction to the elements of movement; understanding and appreciation of basic movement as it applies to skillful use and development of the individual's body. Provides the opportunity for individual and group creativity
RESTRICTIONS: Open to majors only in Fall and Spring

HPER 164 Practicum in Recreation and Parks 3 PF
Offers an opportunity to gain initial experience with a leisure service agency. Much of the laboratory time is devoted to observing and/or assisting in leisure programs, and visiting other leisure service agencies
RESTRICTIONS: For Freshmen or Sophomores

HPER 206 Educational Games/Activities 3
Introduction to the development, analysis and modification of games/activities for elementary and middle school. Special emphasis on utilizing creative thinking, principles of transfer and basic movement education. Students learn to adapt games/activities for a varied population

HPER 214 Wellness: A Way of Life 3
Principles of personal and public health including present and future problems of environmental control. Includes health services, health education and healthy school environment
RESTRICTIONS: Open to majors only in Fall

HPER 215 Observation and Assisting in School 2 PF
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

HPER 216 Practicum in Teaching 1 PF
Practical teaching experience. Student is assigned to lifetime sports activity courses and assists in conducting the course
RESTRICTIONS: Requires permission of department

HPER 220 Anatomy and Physiology 3
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.

HPER 225 Officiating Recreational Sports 1
Introduction to officiating recreational competitive sports as a lifetime activity, with certification and employment options available. Provides a pool of trained, motivated officials to supplement the intramural program, thereby improving services to students. Fall sports will be flag football and volleyball; spring sports will be basketball and softball

HPER 242 Skills, Techniques and Knowledge of Lacrosse and Field Hockey 1
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
RESTRICTIONS: Open to PEH and PES majors only

HPER 243 Skills, Techniques and Knowledge of Softball and Track and Field 1
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
RESTRICTIONS: Open to PEH and PES majors only

HPER 244 Skills, Techniques and Knowledge of Soccer and Basketball 1
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
RESTRICTIONS: Open to majors only

HPER 245 Introduction to Commercial Recreation Services 3
Focuses on the establishment, organization, management and marketing of various commercial recreation services. Areas addressed include travel and tourism, entertainment services, leisure services in the outdoor environment, hospitality/food services and retail outlets

HPER 246 Techniques for Men's Lacrosse 1
Practical experience in advanced techniques and strategies of men's lacrosse
RESTRICTIONS: Offered in Winter only

HPER 247 Techniques for Women's Lacrosse 1
Practical experience in advanced techniques and strategies of women's lacrosse
RESTRICTIONS: Offered in Winter only

HPER 250 Motor Development 3
Pattern of motor development from infancy through adolescence. Motor performance, prenatal-placental development in children, assessment for motor problems, remedial activities, principles of motor learning and conditions that improve motor learning
RESTRICTIONS: Open to PEH majors only.
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: HPER220

HPER 310 Safety, First Aid and Emergency Care 3

Practical approach to first aid, safety, family health and prevention. Topics include basic concepts, needs, purposes, individual skills and legal implications.

RESTRICTIONS: Requires permission of instructor. Open to PEH, PES, and RPAD majors only.
RESTRICTIONS: Requires interscholastic or intercollegiate experience, and/or the study of methods and skill techniques involved with coaching participants in the sport of soccer. Emphasis on organizing and administering this activity in a school program.

HPER 361 Coaching Volleyball 1
Study of the methods and skill techniques involved with coaching participants in the sport of volleyball. Emphasis on organizing and administering this activity in a school program.

RESTRICTIONS: Requires interscholastic or intercollegiate experience, and/or the skills/technique course.

HPER 362 Coaching Baseball 1
Study of the methods and skill techniques involved with coaching the sport of baseball. Emphasis on organizing and administering this activity in a school program.

RESTRICTIONS: Requires interscholastic or intercollegiate experience, and/or the skills/technique course.

HPER 363 Coaching Tennis 1
Study of the methods and skill techniques involved with coaching participants in the sport of tennis. Emphasis on organizing and administering this activity in a school program.

RESTRICTIONS: Requires interscholastic or intercollegiate experience, and/or the skills/technique course.

HPER 365 Coaching Basketball 1
Study of the methods and skill techniques involved with coaching participants in the sport of basketball. Emphasis on organizing and administering this activity in a school program.

RESTRICTIONS: Requires interscholastic or intercollegiate experience, and/or the skills/technique course.

HPER 368 Coaching Track and Field 1
Study of the methods and skill techniques involved with coaching participants in the sport of track and field. Emphasis on organizing and administering this activity in a school program.

RESTRICTIONS: Requires interscholastic or intercollegiate experience, and/or the skills/technique course.

HPER 370 Practicum in Methods of Elementary Physical Education 3
Emphasis on clinical experience activity in the public school setting. Consider organization and supervision of elementary physical education programs and includes curriculum planning, selection of materials and related teaching techniques.

COREQ: HPER 380

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

HPER 371 Outdoor Adventure Leadership 3
Introduces recreation leadership in outdoor adventure activities. Attention directed toward conceptual and technical aspects of adventure programs.

HPER 372 Coaching Swimming and Diving 1
Study of the methods and skill techniques involved with coaching participants in the sport of swimming and diving. Emphasis on organizing and administering this activity in a school program.

RESTRICTIONS: Requires interscholastic or intercollegiate experience, and/or the skills/technique course.

HPER 373 Coaching Football 1
Study of the methods and skill techniques involved with coaching participants in the sport of football. Emphasis on organizing and administering this activity in a school program.

RESTRICTIONS: Requires interscholastic or intercollegiate experience, and/or the skills/technique course.

HPER 374 Coaching Women's Lacrosse 1
Study of the methods and skill techniques involved with coaching participants in the sport of women's lacrosse. Emphasis on organizing and administering this activity in a school program.

RESTRICTIONS: Requires interscholastic or intercollegiate experience, and/or the skills/technique course.

HPER 375 Coaching Wrestling 1
Study of the methods and skill techniques involved with coaching participants in the sport of wrestling. Emphasis on organizing and administering this activity in a school program.

RESTRICTIONS: Requires interscholastic or intercollegiate experience, and/or the skills/technique course.

HPER 376 Coaching Soccer 1
Study of the methods and skill techniques involved with coaching participants in the sport of soccer. Emphasis on organizing and administering this activity in a school program.

RESTRICTIONS: Requires interscholastic or intercollegiate experience, and/or the skills/technique course.

HPER 377 Coaching Field Hockey 1
Study of the methods and skill techniques involved with coaching participants in the sport of field hockey. Emphasis on organizing and administering this activity in a school program.

RESTRICTIONS: Requires interscholastic or intercollegiate experience, and/or the skills/technique course.

HPER 378 Coaching Softball 1
Study of the methods and skill techniques involved with coaching participants in the sport of softball. Emphasis on organizing and administering this activity in a school program.

RESTRICTIONS: Requires interscholastic or intercollegiate experience, and/or the skills/technique course.

HPER 379 Coaching Men's Lacrosse 1
Study of the methods and skill techniques involved with coaching participants in the sport of men's lacrosse. Emphasis on organizing and administering this activity in a school program.

HPER 380 Practicum in Methods of Secondary Physical Education 3
Emphasis on clinical experience activity in the public school setting. Consider organization and supervision of secondary physical education programs and includes curriculum planning, selection of materials and related teaching techniques.

COREQ: HPER 370

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

HPER 390 Principles of Coaching 3
Introduction to the general philosophy and methods of coaching. To recognize and use communication skills, teaching skills, sport psychology and manage team related responsibilities and relationships including risk management.

HPER 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 covered will include pharmacokinetics, indications, contraindications, adverse reactions, management of overdose, phosphonosterase, iontophoresis, drugs affecting skeletal muscle, pain and inflammation.

RESTRICTIONS: Admission to the B.S. in Athletic Training or permission of instructor.

HPER 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.

PREQ: HPER 342

RESTRICTIONS: Open to physical education majors only.

HPER 404 Organization, Administration, Recreation and Leisure Service 3
Study of administrative practices in recreation and parks including legal aspects, principles of planning and operation of parks and facilities, financial and business procedures, public relations, personnel practices and evaluations.

PREQ: HPER 105, HPER 240, and HPER 270.

HPER 405 Program Development in Athletic Injury Rehabilitation 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: For students in the athletic training curriculum.

HPER 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.

PREQ: HPER 480 and HPER 481 or HPER 420.

HPER 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: For students in athletic training education curriculum.

HPER 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 preserved human specimens, models, x-rays, dry biological materials and other aids.

PREQ: HPER 220.

HPER 424 Sport Sociology 3
Studies the issues surrounding sport and its impact on society. Provokes thought and argument on critical issues in sport sociology relative to the interrelationship between sport and society.

HPER 425 Athletics and Sport Psychology 3
Introduces topics relevant to sport psychology and coaching. Material covered is applicable to specific situations that occur between athletes, coaches and sport-related incidents. Presents a survey of recent sport psychological techniques and experiments.
HPER 426 Biomechanics of Sport 4
Studies the scientific principles of biomechanics. Develops fundamental understanding of the mechanics of the human body at rest or in motion. Includes basic principles of statics and dynamics as applied to the quantitative analysis of selected activities in sport.
RESTRICTIONS: Open to PHE and PES majors only.

HPER 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: HPER220
COREQ: HPER431

HPER 431 Physiology of Activity Laboratory 1
Laboratory experiences include the measurement of physiological parameters under exercise conditions.
COREQ: HPER430.

HPER 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: HPER430
RESTRICTIONS: Open to PHE and PES majors only.

HPER 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 preparation, program considerations and facilities development.
RESTRICTIONS: Open to PHE and PES majors only.

HPER 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.

HPER 445 Concepts of Physical Fitness Testing 3
Combines both practical and theoretical aspects of physical fitness training. Special reference made to agarne youth sports, disease, allergies, and obesity individuals.
PREREQ: HPER265, HPER430, HPER431 and HPER432

HPER 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 policies and procedures for the operation of an athletic training program.

HPER 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 orthopedics, neurology, cardiology, pediatrics, internal medicine, ophthalmology and physical medicine.
RESTRICTIONS: Admission to the B.S. in Athletic Training.

HPER 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 parks and recreation areas, facilities and equipment.
PREREQ: HPER105 and HPER270

HPER 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.

HPER 452 Principles of Fitness Management 3
Concepts in general management principles including organizational structure, personal management and budgeting. Specific reference made to the Health Fitness Industry addressing promotion and marketing, facility development and risk management.
PREREQ: HPER265

HPER 453 Aquatic Management 3
Equips individuals with the knowledge, techniques and skills required to operate an aquatic facility as manager or director.

HPER 455 Figure Skating Practicum III 3
Concentration on advanced teaching/coaching techniques related to the skill required in ISU-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.

HPER 456 Figure Skating Practicum IV 3
Direct involvement in the teaching/coaching of beginner elite national and world competitors. Under the supervision of the Ice Skating Development Center professional staff.
RESTRICTIONS: Open only to majors in the figure skating science degree program.

HPER 460 Coaching/Performance Practicum 2 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 and appropriate project. Observations will be made by the minor coordinator and the cooperating supervisor.
PREREQ: HPER390, HPER220, HPER310 and HPER320
RESTRICTIONS: Junior status or higher.

HPER 464 Internship 9 PF

HPER 468 Teaching Seminar in Health and Physical Education 3 PF
Provides an avenue of discussion for analyzing the student teaching experience. Focuses on contemporary topics of interest to preprofessionals.
COREQ: EDDV400
RESTRICTIONS: Open to PEH majors only. Conducted in public school setting.

HPER 480 Practicum in Athletic Training I 3
Supervised work in athletic training to be conducted in the training room facilities. Three hours per week spent discussing detailed anatomy, mechanics, diagnosis, treatment, prevention and rehabilitation of specific injuries. Other emphasis on supervised practical work.
PREREQ: One course in each of the following areas: physiological anatomy, first aid and athletic injuries, biomechanics or kinesiology.
RESTRICTIONS: Requires permission of instructor.

HPER 481 Practicum in Athletic Training II 3
Extensive application of training methods in a setting of practical work supervised by the athletic training staff and University physicians.
PREREQ: HPER480
RESTRICTIONS: Requires permission of instructor.

HPER 485 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 WOMS454. May be cross-listed with WOMS454.

HPER 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.

HPER 490 Development of Health Promotion Programs 3
Reviews the pathophysiology of cardiovascular disease, including the theory and principles of major risk factor development. Prepares students to plan, create and implement health promotion programs in the workplace, focusing on program selection, promotion, evaluation and expansion.
PREREQ: HPER265, HPER430 and HPER432

HPER 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.

HPER 602 Elementary Computer Statistics 3
Overview of elementary statistics and their use in research. Emphasis on the use and interpretation of package computer routines (SPSS). Discusses experimental designs utilizing analysis of variance and other research procedures.

HPER 604 Sports in America: A Historical Perspective 3

HPER 605 Program Development in Athletic Injury Rehabilitation 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 return to competition. Involves a series of case studies and planning/planning/implementing a rehabilitation program for a specific injury.
RESTRICTIONS: For students in the athletic training curriculum.

HPER 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.
HPER 610 Seminar: Teaching Lifetime Activities 3
Concentration on five lifetime sports, including archery, badminton, bowling, golf and tennis. Discusses methods of teaching the skill, including proper progression, skill analysis, use of teaching aids and safety responsibilities. Presents an opportunity to upgrade individual proficiency level in each activity.
RESTRICTIONS: Open to graduate students only

HPER 612 Mechanical Analysis of Sport Skills 3
A mechanical interpretation and analysis of human performance in sport based upon a critical review of current research. Practical demonstrations and exercises are used to further identify the important laws that govern motion of the human body. Stresses the relationship between anatomical structure and mechanical function

HPER 628 Photography in Sport 3
Discusses basic design and operation principles of photographic systems with emphasis on use and application in sport activities. Deals primarily with black/white film and color slides. Extensive darkroom experiences provided

HPER 629 Sport Psychology Skills Training 3
Presents work in a field setting with University athletes and students. Emphasis on research and designing of workshops and lectures for University, high school and recreational teams and/or individual athletes in the areas of psychological skills training to improve individual and team performances

HPER 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 teaching methods

HPER 640 Creative Dance for Children 3
Focuses on creative dance for elementary school children. Course content will include theory related to the structure and content of creative dance lessons. Ideas and techniques for planning lessons will be included

HPER 644 Outdoor Experimental Education for Teachers and Recruiters 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 evolvement of the outdoor education movement in schools in America. Investigates activities both in and around schools and in natural areas

HPER 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

HPER 650 Perceptual Motor Development 3
Analysis of perceptual motor concepts and theory. Emphasis on screening techniques utilized to identify perceptual motor difficulties in children and development of remediation programs

HPER 650 Administration of Physical Education and Sports 3
Provides students with knowledge of the basic principles of administration with specific application to the areas of physical education and athletics

HPER 664 Field Study in Physical Education and Sport 3
Affords an opportunity to apply information derived from the graduate course of study to a physical education or sport setting. Includes selecting, organizing, conducting, evaluating and presenting a seminar on a project, plus developing a professional portfolio

HPER 665 Cardiovascular Assessment I 3
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

HPER 670 Critical Issues in Physical Education and Athletics 3
Focuses on three themes: Historical Perspective, Current Issues Facing Physical Education and Athletics, and Trends Toward the Future in Physical Education

HPER 675 Cardiovascular Assessment II 3
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

HPER 685 Advanced Exercise Prescription 3
Instructs students in exercise recommendations for populations with special needs. Exercise prescription for cardiac patients, diabetics, pulmonary disorders and others with special needs will be discussed
PREREQ: CB I and CV II

HPER 690 Biomechanical Methods 3
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

HPER 800 Advanced Physiology of Exercise 3
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

HPER 803 Introduction to Laboratory Instruments 3
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

HPER 807 Motor Learning 3
Evaluation and application of research literature concerned with motor learning as it relates to teaching elementary and secondary physical education. Laboratory work includes major research techniques used in motor learning. Research proposal required at completion of the course

HPER 810 Biomechanics of Sports 3
Mechanics of human motion. Investigation into the action of forces on bodies during the performance of sport activities
PREREQ: College algebra, trigonometry and calculus

HPER 840 Advanced Human Anatomy 3
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

HPER 869 Master's Thesis 1-6

HOTEL, RESTAURANT
INSTITUTIONAL MANAGEMENT

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 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 280 Property Management 3
Introduction to problems of cost and operational control of security, safety, parking, preventive maintenance, laundry, HVAC, electrical, refrigeration, plumbing, fire prevention, care of guest rooms and public space. Emphasis on equipment, personnel and technology

HRIM 311 Hospitality Contract Management 3
Reviews contract management field as applied to hotel operations, non-commercial and recreational food service, and facilities management. Emphasizes processes of site audits, proposal construction, the bidding procedure and the development of management systems

HRIM 313 Principles of Gaming Management 3
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

HRIM 320 Hotel, Restaurant and General Food Service Purchasing 3
Principles of purchasing food and beverage supplies for hotels, restaurants and general food service, and marketing selection principles, buying procedures, choice of supplier and receiving. Field trips to suppliers
HRIM 366 INDEPENDENT STUDY 1-6

HRIM 380 MANAGEMENT OF LODGING OPERATIONS 3
Management of front desk, housekeeping, maintenance, security and conference operations
PREREQ: HRIM280

HRIM 381 MANAGEMENT OF FOOD AND BEVERAGE OPERATIONS 3
Management tools available to control sales and expenses in food and beverage operations. Analysis of centers of responsibility. Cost management approach to development of control systems
PREREQ: NITD321

HRIM 382 MANAGERIAL ACCOUNTING AND FINANCE IN THE HOTEL INDUSTRY 3
Generation and analysis of quantitative information for planning, control and decision making by managers at various levels. Use of timely and relevant information as a vital tool in management
PREREQ: ACCT208

HRIM 466 INDEPENDENT STUDY 1-6

HRIM 480 HUMAN RELATIONS IN THE HOTEL INDUSTRY 3
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

HRIM 481 MARKETING IN THE HOTEL INDUSTRY 3
Application of marketing principles in hotel, restaurant and institutional management settings. Development of marketing strategies in both profit and non-profit hospitality operations

HRIM 482 LAW OF INNKEEPING 3
Introduction to the laws relating to hotel, restaurant and institutional operations
PREREQ: ACCT352

HRIM 487 MANAGEMENT SYSTEMS IN THE HOTEL INDUSTRY 3
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
PREREQ: HRIM380

HRIM 488 HOTEL, RESTAURANT AND INSTITUTIONAL MANAGEMENT PRACTICUM I 4
Structured experience in a hospitality industry environment. At least 160 hours in planned activities associated with the management and operation of a subsystem of a hospitality property. A weekly on-campus seminar

RESTRICTIONS: Requires proof of 800 hours paid work experience in the food service and lodging industry

HRIM 489 HOTEL, RESTAURANT AND INSTITUTIONAL MANAGEMENT PRACTICUM II 6
Structured experience in a hospitality industry environment. At least 250 hours in planned activities associated with the management and operation of a hospitality property. A weekly on-campus seminar
PREREQ: HRIM488

HUMAN RESOURCES

HURE 165 SEMINAR 1 PF

HURE 380 METHODS OF INSTRUCTION 3
Identification, selection and evaluation of developmentally appropriate strategies and resources for instruction in formal and non-formal Home Economics/Family Life educational settings

HURE 401 INTERDISCIPLINARY GERONTOLOGY 3
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 will be studied

HURE 601 INTERDISCIPLINARY GERONTOLOGY 3
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

HURE 650 RESEARCH METHODS 3
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

INDIVIDUAL AND FAMILY STUDIES

IFST 101 INTRODUCTION TO COMMUNITY AND FAMILY SERVICES 1
Broad overview of the many services available within the community and state to assist individuals and families in resolving major life concerns and problems. Insights into the human services profession by leaders in the field

IFST 116 EXPLORING RETIREMENT 1
Evaluation of biases in traditional attitudes toward aging and retirement; examination of mental and physical capabilities of senior citizens and how this influences redefining of occupational goals and leisure activities after retirement; and discussion of post-retirement occupations, activities and adventures

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 FOUNDERATIONS OF FAMILY STUDIES 3
Fundamental descriptions of family forms and issues as they affect individual families and cohorts in historical and contemporary perspective. Emphasis on multicultural diversity and social change in families

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 225 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: IFST221 or IFST220

IFST 230 EMERGING LIFE STYLES 3
Interdisciplinary approach to the processes stereotyping masculine and feminine behaviors in women's and men's liberation; and an analysis of the present opportunity structure for individual choices

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 238 INTRODUCTION TO HUMAN SEXUALITY 3
Exploration of historical, physiological and interpersonal aspects of sexuality. Explores factual information and discusses significance of this information for personal lives

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 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: EDST202 or IFST201

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: EDST202 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.
PREREQ: IFST222 and IFST224
RESTRICTIONS: Includes field experiences

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: IFST101 and IFST225

IFST 347 HUMAN SERVICE DELIVERY SYSTEMS 3
Focuses on organizational and work related issues, including program development, networking, fund raising, administrative procedures and program evaluation. Basic skills required for the development, delivery and administration of a wide range of human service programs including preventive interventions for families and individuals.
PREREQ: IFST101 and IFST225

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 381 CURRICULUM AND EVALUATION 3
Foundations of curriculum development and evaluation as applied to programming in formal and non-formal Home Economics/Family life educational settings.
PREREQ: HURE380

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 for society of the biological, psychological and sociocultural determinants of human sexuality. This course deals with sexuality explicit materials.

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: EDST202 or IFST201

IFST 405 IMPACT OF AGING ON THE FAMILY 3
Psychological, physical and financial impact of aging persons on younger family members; increased interdependence and dependence; and family adjustment, both positive and conflicting.

IFST 410 THE HOSPITALIZED CHILD 3
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.
PREREQ: IFST222 and IFST224

IFST 422 FAMILY RELATIONSHIPS 3
Interpersonal relationships and problems in courtship, marriage and the family in contemporary society.
PREREQ: IFST202

IFST 426 VOCATIONAL PROGRAM PLANNING IN HOME ECONOMICS 3
Emphasis on career and vocational education and their implementation in home economics programs of the elementary, middle, junior and senior high, and adult levels.

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.

IFST 430 TEACHING FAMILY LIFE 3
Selection, presentation and evaluation of subject matter and materials essential to understanding relationships within the family. Emphasis on needs, interests and abilities of secondary school students. May be cross-listed with WOMS430.
PREREQ: IFST221 and IFST422

IFST 435 EARLY CHILDHOOD PROGRAMS FOR CHILDREN WITH EXCEPTIONALITIES 4
Philosophy, organization and operation of programs for young children with exceptionality; development and adoption of curriculum, materials, facilities and equipment. Clinical experience with children and programs.
PREREQ: EDST230 and IFST340

IFST 438 LEADERSHIP DEVELOPMENT IN HUMAN SEXUALITY 3
Seminar/practicum for organizing and leading discussion groups in human sexuality. Trains group leaders to facilitate effective communication skills and responsible sexual decisions, integrating research and theories with individual and family life experiences.
PREREQ: IFST238 or IFST401
RESTRICTIONS: Requires permission of instructor. For undergraduate teaching assistants only.

IFST 440 EARLY CHILDHOOD ADMINISTRATION, LEADERSHIP AND ADVOCACY 3
Organization and administration of programs for young children. Development of effective strategies for leadership and advocacy. Consideration of personnel, facilities, regulations, quality programming and business management.
PREREQ: IFST340

IFST 445 PARENT RESOURCES 2
Emphasis on techniques in working and communicating with parents, understanding parent-child relationships and effectively utilizing parent, teacher, home, school and community resources.
PREREQ: IFST101
COREQ: IFST459 or EDDV400

IFST 449 INTERNSHIP IN COMMUNITY SERVICES 3-9 PF
On-the-job experience in a community and family service agency.
RESTRICTIONS: Requires permission of instructor.

IFST 450 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 452 ASSESSMENT OF YOUNG CHILDREN 3
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

IFST 459 CHILD DEVELOPMENT PRACTICUM 1-9 PF
Supervised student teaching experience.
PREREQ: IFST435, IFST452 and IFST470
RESTRICTIONS: Requires permission of instructor.

IFST 460 WOMEN IN INTERNATIONAL DEVELOPMENT 3
See SOCI460 for course description.

IFST 463 ATYPICAL INFANT AND TODDLER 3
Sensory, motor, affective and psychosocial development in infancy and toddlerhood. Observation and participation with infants Early diagnosis, assessment and treatment strategies for disabilities of the infant and toddler period.
PREREQ: IFST221 and IFST236

IFST 465 SEMINAR 1-3 PF

IFST 466 INDEPENDENT STUDY 1-12
INDIVIDUAL AND FAMILY STUDIES

IFST 470  FAMILIES AND CHILDREN AT RISK  3
Deals with socio-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: IFST211 or PSYC325

IFST 475  TOPICS IN INDIVIDUAL AND FAMILY STUDIES  1-3
Selected topics focusing on current issues affecting families from an interdisciplinary and global perspective
RESTRICTIONS: Prerequisites vary by topic and instructor

IFST 480  IFST SENIOR SEMINAR  1-3
Discussion-oriented and problem-centered with emphasis on the role and contributions of the individual to the profession and society

IFST 601  DEVELOPMENT THROUGH THE LIFESPAN  3
Exploration of all segments of the lifespan from a bio-psycho-social perspective. Special emphasis on research and theory concerning families and the lifespan as contexts of development

IFST 603  BASIC 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

IFST 605  IMPACT OF AGING ON THE FAMILY  3
Psychological, physical and financial impact of aging persons on younger family members; increased dependency, family adjustment, both positive and conflicting

IFST 606  SKILLS DEVELOPMENT IN INDIVIDUAL AND FAMILY STUDIES  3
Application of theories and concepts necessary to specific skills and techniques central to working within the student's field of specialization

IFST 610  THE HOSPITALIZED CHILD  3
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

IFST 614  EVALUATION PRACTICES  3
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

IFST 621  FAMILY STUDIES  3
Critical analysis of selected topics and readings in family studies. Empirical and theoretical perspectives relevant to the study of family relationships, developmental issues and trends in family life

IFST 623  APPLIED HUMAN DEVELOPMENT IN THE SCHOOLS  3
See EDST623 for course description

IFST 630  TEACHING OF FAMILY LIFE  3
Selection, presentation and evaluation of subject matter and materials basic to understanding relationships within the family. Emphasis on needs, interests and abilities of secondary school students

IFST 637  PROGRAM PLANNING AND DEVELOPMENT  3
Foundations of program planning and development including models and rationales, methods, techniques and program assessment as they relate to the organization and administration of formal and informal educational programs as well as community programs

IFST 638  ADOLESCENCE AND YOUTH THEORIES  3
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

IFST 639  CURRICULUM PRACTICES  3
Reviews foundations of curriculum and instruction as they relate to the origin and administration of educational programs in community and family agencies and institutions; curriculum development experiences for adult and adolescent learning with emphasis on concept and task analysis

IFST 640  EARLY CHILDHOOD ADMINISTRATION, LEADERSHIP AND ADVOCACY  3
Organization and administration of programs for young children. Development of effective strategies for leadership and advocacy. Consideration of personnel, facilities, regulations, quality programming, and business management

IFST 641  INFANT DEVELOPMENT AND STIMULATION  3-6
Cognitive, social, emotional and motor development from conception to two years, with implications for home and group care. Concurrent observation of infants required

IFST 642  LEADERSHIP IN HUMAN SERVICES  3
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

IFST 645  PROGRAMMING FOR YOUNG CHILDREN WITH SPECIAL NEEDS  3
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

IFST 650  COMPUTERS IN EARLY CHILDHOOD  3
Integration of microcomputers into the early childhood, developmental curriculum. Concepts include 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

IFST 651  ADVANCED CHILD DEVELOPMENT  3
Theoretical approaches in psychosocial development in children, and influences on development of self-concept, sex-role behavior, moral development and prejudice

IFST 654  STATISTICAL METHODS IN INDIVIDUAL AND FAMILY STUDIES  3
Presentation of and practice with statistical procedures for developmental and family studies designs such as simple linear regression, multiple regression, logistic response function, path analysis, discriminant analysis, categorical data analysis and factor analysis. Some basic procedures for nonparametric statistical analyses
PREREQ: EDDV665

IFST 655  MEASUREMENT TECHNIQUES FOR CHILDREN AND FAMILIES  3
Construction and analysis of developmental ratings, behavioral coding procedures, interviews, questionnaires, tests and sociometric measures appropriate for studying behavioral development of children and families through the life cycle

IFST 656  SUPERVISION: FUNCTIONS AND TECHNIQUES  3
Functions and principles of effective supervision in family agencies and educational and business settings; focuses on commonalities of skills, techniques and training

IFST 658  READINGS IN CHILD DEVELOPMENT  3
Emphasis on literature dealing with development of the young child

IFST 660  TEACHING OF LIFE SPAN DEVELOPMENT  3
Strategies and techniques for effective teaching of life span development at the post-secondary level, including observation, teaching opportunities and mentorships with faculty

IFST 662  CURRICULUM ANALYSIS IN EARLY CHILDHOOD  3
Examination and evaluation of curriculum designs

IFST 663  ATYPICAL INFANT  3
Sensory, motor and psychosocial development in infancy. Observation and participation with infants. Early diagnosis and assessment of developmental disabilities

IFST 665  SEMINAR  1-3

IFST 668  RESEARCH  1-6

IFST 669  SUPERVISED FIELD EXPERIENCE AND STUDY  1-6
Supervised work with children and/or families in a community setting
RESTRICTIONS: Credit may be distributed over more than one semester

IFST 815  RESEARCH ISSUES AND DESIGNS  3
Examination of issues in design, sampling, measurement and analysis techniques applicable to research in family studies
PREREQ: One graduate-level methods and design course

IFST 828  TRENDS AND ISSUES IN INDIVIDUAL AND FAMILY STUDIES  3
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

IFST 850  CHILD AND FAMILY THEORY  3
Analysis of theories of individual development, behavior and family life, and applications to research models. Emphasis on historical and philosophical influences on theory building, the functions of theories, the process of theory construction and critical comparisons of specific theoretical perspectives on children and families

IFST 855  FAMILY PROCESSES  3
Advanced study of selected topics in family processes. Theory, research and interpretation of family interaction over the life cycle, emphasizing historical and contextual influences. Topics include intergenerational relationships; family communication, affiliation and support; stress, adaptation and coping; and conflict, power and violence

IFST 860  DIVERSITY IN FAMILY STRUCTURES  3
Analysis of family patterns in American society and in other cultures. Impact of socioeconomic, political and demographic change on family structures and kin relationships (including trends in marital status, parenthood, mortality rates); ethnic, racial and cultural variations; and historical and life course changes in family patterns

IFST 865  ADVANCED SEMINAR IN FAMILY STUDIES  3
Varying special interest topics in family studies. Topics usually presented from an interdisciplinary perspective
RESTRICTIONS: Requires permission of instructor. May be repeated for credit as topic varies
ITALIAN

ITAL 101  ELEMENTARY ITALIAN I  3
Introduction to the Italian language and development of speaking, listening, reading and writing skills through the use of basic texts. Language laboratory as needed.
PREREQ: ITAL101 or ITAL105

ITAL 102  ELEMENTARY ITALIAN II  3
Completion of basic Italian.
PREREQ: ITAL101 or ITAL105

ITAL 105  ITALIAN I - ELEMENTARY  4
Introduction to the Italian language and development of speaking, listening, reading and writing skills through the use of basic texts. Language laboratory as needed.
PREREQ: ITAL105
RESTRICTIONS: Two to three years of high school Italian acceptable in lieu of Prerequisite

ITAL 107  ITALIAN III - INTERMEDIATE  4
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

ITAL 111  INTERMEDIATE ITALIAN I  3
Review of grammar. Increasing mastery of the basic skills of speaking, listening, reading and writing.
PREREQ: ITAL102 or ITAL106
RESTRICTIONS: Three years of high school Italian acceptable in lieu of Prerequisite

ITAL 112  INTERMEDIATE ITALIAN II  3
Continued practice in speaking and writing, and reading texts of average difficulty. Grammar review as needed.
PREREQ: ITAL111
RESTRICTIONS: Four years of high school Italian acceptable in lieu of Prerequisite

ITAL 200  ITALIAN GRAMMAR REVIEW  3
Systematic review of fundamental aspects of Italian grammar. Study of special problem areas. Some conversational practice.
PREREQ: ITAL107 or ITAL112

ITAL 205  ITALIAN CONVERSATION  3
Practical use of Italian by means of oral reports and discussions. Emphasis on improvement of basic conversational skills. Grammar review and written work when appropriate.
PREREQ: ITAL107
RESTRICTIONS: Prerequisite requires a minimum grade of B. One 200-level Italian course may be substituted for Prerequisite

ITAL 206  CULTURE THROUGH CONVERSATION  3
Discussion of topics drawn from contemporary Italian life. Designed for students who wish to broaden their knowledge of Italian culture while improving their oral and aural language skills.
PREREQ: ITAL107
RESTRICTIONS: Taught abroad only

ITAL 208  CONTEMPORARY ITALY I  3
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.

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

ITAL 212  ITALIAN READING AND COMPOSITION: DRAMA AND PROSE  3
Reading and discussion of some major 20th-century plays and prose texts. Several short compositions. Grammar review where appropriate.
PREREQ: ITAL200, ITAL205 or ITAL206

ITAL 250  INTRODUCTION TO BUSINESS ITALIAN  3
Familiarizes students with characteristics of business Italian (vocabulary, technology, terminological and syntactical patterns) and aspects of the Italian business community.
PREREQ: ITAL107

ITAL 305  ADVANCED ITALIAN CONVERSATION AND COMPOSITION  3
Discussion of current cultural, social and political topics in Italy. Vocabulary building, grammar exercises and frequent compositions.
PREREQ: Any 200-level course conducted in Italian.

ITAL 306  PRACTICAL ORAL/WRITTEN EXPRESSION  3
Offered abroad only, is designed to strengthen skills in grammar and vocabulary in preparation for advanced courses offered in second part of the semester. Class exercises include oral exercises, discussion of articles and video, textual analysis and compositions.
PREREQ: Any two 200-level Italian courses conducted in Italian
RESTRICTIONS: Taught abroad only

ITAL 308  CONTEMPORARY ITALY II  3
Discussion and study of issues related to contemporary cultural, political and social developments in Italy, including its place in today's European community. The course will be conducted in Italian.
PREREQ: Any two 200-level Italian courses taught in the Italian language
RESTRICTIONS: Taught abroad only

ITAL 310  SURVEY OF ITALIAN LITERATURE  3
Development of Italian literature from its origins to the mid-17th century. Study and discussion of representative works.
PREREQ: ITAL111 or ITAL121

ITAL 311  SURVEY OF ITALIAN LITERATURE  3
Development of Italian literature from the mid-17th century to the present. Study and discussion of representative works.
PREREQ: ITAL111 or ITAL121

ITAL 325  ITALIAN CIVILIZATION AND CULTURE  3
A survey of the major cultural, social and political developments in Italy from the 15th century to the present.
PREREQ: ITAL111 or ITAL121

ITAL 355  SPECIAL TOPICS  3
Explores an area of special interest in Italian literature or cultural studies. Topics vary and will be announced in the registration booklet.
PREREQ: ITAL310 or ITAL311
RESTRICTIONS: May be repeated for credit when topics vary.

ITAL 366  INDEPENDENT STUDY  1-3

ITAL 401  ADVANCED ITALIAN GRAMMAR AND STYLISTICS  3
Introduction to the various written and spoken styles of contemporary Italian from colloquial to formal. Exercises in writing and speaking, with special emphasis on the grammatical structure of the Italian language. Some translation.
PREREQ: Any two 300-level Italian courses.

ITAL 403  HISTORY OF THE ITALIAN LANGUAGE  3
Development of the Italian language from its Latin origins. Exposition of the questions dealing with linguistic analysis of old Italian texts; and the effects of social, political and cultural factors on usage. Influences from and on other languages.
PREREQ: Any two 300-level Italian courses.
RESTRICTIONS: May be offered jointly with ITAL603
ITAL 455 Selected Authors, Works and Themes 3
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. May be offered jointly with ITAL455.

ITAL 466 Independent Study 1-3

ITAL 601 Advanced Italian Grammar and Stylistics 3
Introduction to the various written and spoken styles of contemporary Italian from colloquial to formal. Exercises in writing and speaking, with special emphasis on the grammatical structure of the Italian language. Self-paced, computer-assisted individual study
PREREQ: ITALN105
RESTRICTIONS: May be repeated for credit when topics vary

ITAL 603 History of the Italian Language 3
Development of the Italian language from its Latin origins. Exploration of the questione della lingua; linguistic analysis of old Italian texts; and the effects of social, political and cultural factors on usage. Influences from and on other languages
RESTRICTIONS: May be offered jointly with ITAL403

ITAL 655 Selected Authors, Works and Themes 3
Seminar on works of one or more outstanding authors or of a special theme
RESTRICTIONS: Can be repeated for credit when topics vary. May be offered jointly with ITAL455.

JAPANESE

JAPN 105 Japanese I - Elementary 4
Introduction to the Japanese language and development of speaking, listening, reading and writing skills through the use of basic texts. Language laboratory as needed.

JAPN 106 Japanese II - Elementary/Intermediate 4
Completion of basic Japanese. Increasing mastery of the basic skills of speaking, listening, reading and writing
PREREQ: JAPN105
RESTRICTIONS: Two to three years of high school Japanese acceptable in lieu of Prerequisite

JAPN 107 Japanese III - Intermediate 4
Continued practice in speaking and writing, and reading texts of average difficulty
PREREQ: JAPN106
RESTRICTIONS: Four years of high school Japanese acceptable in lieu of Prerequisite. Satisfies the Arts and Science foreign language requirement

JAPN 200 Japanese Grammar and Composition 3
Further study of Japanese grammar, KANJI characters and reading and writing skills for communication
PREREQ: JAPN107

JAPN 205 Japanese Conversation 3
Practical use of Japanese by means of oral reports on a variety of topics including family, school, and work life. Emphasis on improvement of conversational skills for social situations which require different politeness levels, as well as grammatical and written competence
PREREQ: JAPN107
RESTRICTIONS: Prerequisite requires a minimum grade of B

JAPN 206 Culture Through Conversation 3
Discussion of topics drawn from contemporary Japanese culture. Designed for students who wish to broaden their knowledge of Japanese culture while improving their oral and aural language skills
PREREQ: JAPN107
RESTRICTIONS: Taught abroad only.

JAPN 208 Contemporary Japan I 3
Introduction to contemporary Japan, its culture, people, way of life and issues confronting them
RESTRICTIONS: Taught abroad only, in both English and Japanese. Not for major credit. Does not satisfy language requirement

JAPN 240 Basic Technical Japanese 3
Introduction to technical Japanese vocabulary and KANJI reading
PREREQ: JAPN107

JAPN 250 Introduction to Business Japanese 3
Familiarizes students with characteristics of business Japanese. Vocabulary, terminology, syntactical patterns and aspects of the Japanese business community
PREREQ: JAPN107

JAPN 305 Japanese Conversation and Composition 3
Discussion of current cultural, social and political topics in Japanese. Vocabulary building, grammar exercises and frequent compositions
PREREQ: JAPN205

JAPN 340 Technical Japanese II 3
Further study in the reading and writing of technical Japanese, including the translation of technical writings
PREREQ: JAPN240

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: JAPN305
RESTRICTIONS: May be repeated for credit when topics vary

JAPN 366 Independent Study 1-3
PREREQ: One 200-level Japanese course

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 208 Introduction to Jewish Philosophy 3
See PHIL208 for course description

JWST 264 The Jewish Holocaust: 1933-1945 3
See HIST264 for course description

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 380 Women Writers 3
See ENGL380 for course description

JWST 382 Studies in Multicultural Literature in English 3
See ENGL382 for course description

LATIN

LATN 100 Individualized Elementary Latin 1-6
Self-paced, computer-assisted individual study of fundamentals of Latin. No formal classroom component. Content identical to LATN101/102
RESTRICTIONS: May be repeated for up to six credits. Maximum of six credits of LATN100, LATN101 or LATN102 may be counted toward graduation

LATN 101 Elementary Latin I 3
Course for beginners

LATN 102 Elementary Latin II 3
Completion of basic Latin
PREREQ: LATN101
RESTRICTIONS: One year of high school Latin acceptable in lieu of Prerequisite

LATN 201 Roman Letters 3
The letter as a literary form in the Roman world. Readings from the letters of Cicero and Pliny
PREREQ: LATN214

LATN 202 Historicists of the Republic 3
Selected readings from the works of Livy, Sallust and Cornelius Nepos
PREREQ: LATN214
LATIN

LATN 213 Cicero 3
Readings in Cicero’s orations and review of grammar and syntax.
PREREQ: LATN 102

LATN 214 Vergil 3
Vergil’s Aeneid. Review of grammar and readings in the poetry of Vergil.
PREREQ: LATN 213

LATN 301 Roman Drama 3
Readings in selected dramas of Plautus, Terence and Seneca.
PREREQ: LATN 214

LATN 302 Roman Didactic Poetry 3
Readings in Roman didactic poetry, such as Lucretius’ De Rerum Natura.
PREREQ: LATN 214

LATN 303 Historians of the Empire 3
Selected readings from Tacitus, Suetonius and Ammianus.
PREREQ: LATN 214

LATN 366 Independent Study 1-3

LATN 401 Roman Elegiac Poetry 3
Readings in the Roman love poetry of Catullus, Tibullus, Propertius and Ovid (Amores).
PREREQ: LATN 214

LATN 402 Roman Satire 3
Readings in selected satires of Horace, Persius, Petronius, Juvenal and Seneca.
PREREQ: LATN 214

LATN 403 Roman Lyric Poetry 3
Readings in the lyric poetry of Catullus and Horace.
PREREQ: LATN 214

LATN 404 Vergil 3
In-depth study of the Eclogues, Georgics and Aeneid of Vergil.
PREREQ: LATN 214

LATN 421 Advanced Latin Prose Composition 3

LATN 431 History of Latin Literature 3

LATN 455 Selected Authors, Works and Themes 3
Works of one or more outstanding authors or on a special theme.
PREREQ: Two 300-level Latin literature courses.
RESTRICTIONS: May be repeated for credit when topics vary.

LATN 466 Independent Study 1-3

LATN 597 Latin Readings for Ph.D. Candidates 1 RP
Supervised study of Latin for reading knowledge. Treatment of the fundamentals of grammar and syntax. Lecture/problem sessions supplemented by computerized instruction.

LATN 601 Roman Elegiac Poetry 3
Readings in the Roman love poetry of Catullus, Tibullus, Propertius and Ovid (Amores).

LATN 602 Roman Satire 3
Readings in selected satires of Horace, Persius, Petronius, Juvenal and Martial.

LATN 603 Roman Lyric Poetry 3
Readings in the lyric poetry of Catullus and Horace.

LATN 604 Vergil 3
In-depth study of the Eclogues, Georgics and Aeneid of Vergil.

LATN 655 Selected Authors, Works and Themes 3
Works of one or more outstanding authors or on a special theme.
RESTRICTIONS: May be repeated for credit when topics vary.

LEGAL STUDIES

LEST 301 Introduction to Legal Studies 3
Introduces legal studies as a multidisciplinary field.

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.

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 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/multicultural communities, language change, role of universal grammar in language learning, lexical access and parsing.
PREREQ: LING 101.

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 LING 130.
PREREQ: LING 130.
RESTRICTIONS: Requires interview with instructor if Sign Language has been studied elsewhere.

LING 132 American Sign Language III 3
Continuation of LING 131.
PREREQ: LING 131.
RESTRICTIONS: Requires interview with instructor if Sign Language has been studied elsewhere.

LING 133 American Sign Language IV 3
Continuation of LING 132.
PREREQ: LING 132.
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 do multicultural societies choose a common language? What is the relation between language and thought?)

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 WOMS 222.

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 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 posited by connectionist models of cognition.

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 330 Cross-Language Equivalence 3
Focuses on the problem of expressing similar ideas and concepts in two or more languages by examining the linguistic factors that either inhibit or facilitate the transmission of a concept or idea from one language to another. Covers such topics as contrastive analysis and translation.

LING 358 Linguistics and Language Arts 3
See EDST 358 for course description.

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LING 365 Undergraduate Seminar in Linguistics 3
Topics vary. Emphasis is on writing papers of significant length on two separate topics in linguistics.
PREREQ: LING101

LING 366 Independent Study 1-3

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 403 Romance Languages Lexicography 3
Introduction to the place of the dictionary in learning, teaching and translating languages. Information concerning the planning, compiling and evaluating of dictionaries written in French, Spanish, Italian and Portuguese. History of Romance-language lexicography and its typology, including both monolingual and bilingual dictionaries. May be cross-listed with FILT403

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

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

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 FILT421 for course description

LING 422 Language Syllabus Design 3
See FILT422 for course description

LING 424 Second-Language Testing 3
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 FILT424

LING 426 Theory and Techniques of Interpretation 3
Overview of simultaneous and consecutive interpretation in theory and practice. Topics include: translation vs interpretation, linguistic and extralinguistic components, task analysis, the bilingual interface of source and target languages, models of memory as well as cognitive aspects of text and information processing

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 440 Structure of French 3
Survey of the sound system of contemporary French, together with major grammatical elements, lexicon and derivational processes. Dialect variation in French-speaking countries, and the extension of French outside of France as a second language. Phono logical and grammatical analyses of French
PREREQ: LING101 or equivalent

LING 450 Structure of Italian 3
Formal analysis of the phonology, morphology and syntax of contemporary Italian. Discussion of major dialects and regional variations of the standard language. Sociolinguistic profile of major contemporary Italian speech communities.
PREREQ: LING101 or equivalent

LING 460 The Structure of German 3
Linguistic description of the phonology, morphology and syntax of contemporary German. Analysis of major regional and stylistic varieties of the spoken language, and exercises in transcription
PREREQ: LING101 or equivalent

LING 462 Language Acquisition 4
See EDST462 for course description

LING 466 Independent Study 1-3

LING 470 Structure of Chinese 3
Survey of the major structural features of Mandarin Chinese. Topics include phonology, compounding, aspect, word order, the ba and bei constructions, interrogative and negative sentences, covariants and the serial verb construction
PREREQ: LING101 or equivalent

LING 476 Second Language Acquisition and Bilingualism 3
See EDST476 for course description

LING 477 The Structure of English 3
See EDST477 for course description

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 or equivalent

LING 492 History of Linguistics 3
The history of linguistic thought from Panini through the 20th century. Emphasis on the continuity of trends and issues in the development of linguistic science

LING 495 The Structure of Japanese 3
PREREQ: LING101 or equivalent

LING 496 Psycholinguistics 3
Linguistic approaches to cognition. Issues in the relation of language to thought, universal language acquisition, and theories of syntactic and semantic processing.
PREREQ: LING101 or equivalent

LING 497 Sociolinguistics of English in Inner City 3
Application of sociolinguistic principles and research to the teaching of multilingual 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

LING 499 Issues in Teaching LEP 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
Social-linguistic 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
Study of the principles and techniques of second-language testing, including measurement of the four skills and of communicative competence. Bilingual measures. Discrete point versus integrative or pragmatic measures. Practice in item construction and analysis. May be cross-listed with FLIT624.

LING 626 THEORY AND TECHNIQUES OF INTERPRETATION 3
Overview of simultaneous and consecutive interpretation in theory and practice. Topics include: translation vs. interpretation, linguistic and extralinguistic components, task analysis, the bilingual interface of source and target languages, models of memory as well as cognitive aspects of text and information processing.

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 640 STRUCTURE OF FRENCH 3
Survey of the sound system of contemporary French, together with major grammatical elements, lexicon, derivational processes, dialect variation in French-speaking countries, and the extension of French outside of France as a second language. Students perform phonological and grammatical analyses of French.
PREREQ: LING101 or equivalent.

LING 650 STRUCTURE OF ITALIAN 3
Formal analysis of the phonology, morphology and syntax of contemporary Italian. Discussion of major dialects and regional variations of the standard language. Sociolinguistic profile of major contemporary Italian speech communities.
PREREQ: One syntax and one phonology course.

LING 660 THE STRUCTURE OF GERMAN 3
Linguistic description of the phonology, morphology and syntax of contemporary German. Analysis of major regional and stylistic varieties of the spoken language. Sociolinguistic profile of major contemporary German speech communities.
PREREQ: LING101 or equivalent.

LING 670 STRUCTURE OF CHINESE 3
Survey of the major structural features of Mandarin Chinese. Topics include phonology, compounding, aspect, word order, the ba and bei constructions, interrogative and negative sentences, copverbs and the serial verb construction.
PREREQ: LING101 or equivalent.

LING 675 LANGUAGE ACQUISITION 4
See EDST675 for course description.

LING 676 SECOND LANGUAGE ACQUISITION AND BILINGUALISM 3
See EDST676 for course description.

LING 677 THE STRUCTURE OF ENGLISH 3
See EDST677 for course description.

LING 680 INTRODUCTION TO SOCIOLUMINISTICS 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 the 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 692 SEMANTICS II 3
A continuation of LING691. Focuses on such topics as formal semantics, including Montague grammar, the interface between semantics and pragmatics, negation, quantification, conjunction, etc.
PREREQ: LING691.

LING 695 THE STRUCTURE OF JAPANESE 3
PREREQ: LING101 or equivalent.

LING 696 PSYCHOLUMINISTICS 3
Study of linguistic approaches to cognition. Issues in the relation of language to thought, universal, language acquisition and theories of syntactic and semantic processing.
PREREQ: LING101 or equivalent.

LING 697 SOCIOLOGICALLY PRINCIPLES OF TRANSLATION 3
Application of sociolinguistic principles and research to the teaching of multilingual students in American educational systems. Topics include societal multilingualism, language attitudes, vernacular language education, diglossia, institutional 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 I2 acquisition, LEP educational models, integrating language and content instruction, documentation and assessment of LEP skills, and understanding cultural diversity.

LING 801 OLD ENGLISH 3
See ENGL801 for course description.

LING 803 MIDDLE ENGLISH 3
See ENGL803 for course description.

LING 804 LINGUISTIC PRINCIPLES OF TRANSLATION 3
Translation as linguistic science rather than literary art. Contrastive analysis, stylistics and lexical problems such as neologisms and matching of levels of speech. Supervised work in translation of texts of various types. Relating conceptual construction of various linguistic theories (e.g., systemic linguistics, transformational generative grammar, meaning-text model theory) to the realities of language translation.

LING 808 LEXICOGRAPHY AND LEXICOLINGUISTICS 3
Seminar course in linguistic principles in the compilation of dictionaries. Theoretical contributions of different schools of linguistics to problems of lexicography and the contribution of working lexicographers to linguistic data. The relationship of lexicography to translation. A linguistic evaluation of lexicographical theory.

LING 820 ADVANCED STUDIES IN ESL METHODOLOGY 3
Discussion of current issues in second language acquisition and their impact on classroom methods. Design of experimental research on ESL/P classes activities. Formulation of principles for second language instruction.

LING 824 SEMINAR IN SECOND LANGUAGE TESTING 3
Analysis of major issues in second language testing, including latent trait measurement, problems of ascertaining validity and calibrating items and interactive testing. Special emphasis on current research in oral reading proficiency testing, the testing of small groups and on the introspective vs. the interactive testing research methods.
PREREQ: LING624.

LING 830 SYNTACT 3
In-depth investigation of syntactic universals and recent developments in the theory of syntax.
PREREQ: LING610.

LING 831 TOPICS IN SYNTACT 3
Current topics in syntactic theory, problems in the syntactic analysis of specific languages.
PREREQ: LING630.

LING 848 SEMINAR IN LANGUAGE DEVELOPMENT 3
See EDST848 for course description.

LING 850 LINQUISTICS AND WRITING 3
Survey of writing systems. Problems of text structure.

LING 851 LINQUISTIC FIELD METHODS 3
Development of skills and techniques in various kinds of field analysis. Use of native informants. Discussion of the relationship between data collecting and grammatical statements.

LING 861 TOPICS IN PHONOLOGY 3
Detailed examination of one or more current (controversial) issues in phonological theory.
PREREQ: LING608.

LING 862 ACQUISITION OF PHONOLOGY 3
Development of phonology in normal children from babbling stage through acquisition of phonemes and basic phonological rules of a language. Examination of data from a variety of languages, focusing on language specific and universal phenomena.
PREREQ: LING608.

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LING 863  PROJECTS IN ACOUSTIC PHONETICS  3
The course begins with a brief review of the articulatory, acoustic, and perceptual char-
acteristics of speech and computer-based laboratory instrumentation. The remainder of the
course is reserved for conduct of research projects in acoustic phonetics, speech
analysis, or speech synthesis. Projects will be suggested by the instructor; however, stu-
dents may (with Instructor’s approval) choose a project of their own design.
PREREQ: LING867

LING 880  SECOND LANGUAGE ACQUISITION  3
A detailed analysis of current issues in second language acquisition based on extensive
readings of research findings. Topics include monitor model, pidginization process, natu-
ral versus formal second language acquisition, and adult- versus child acquisition.

LING 881  SOVIET PSYCHOLINGUISTICS I  3
Study of the theories of Vygotsky, Luria, Leont’ev and others. Basic concepts in Soviet the-
ory: activity, zone of proximal development and regulation.

LING 882  SOVIET PSYCHOLINGUISTICS II  3
Advanced problems in Soviet theory of language learning. Non-Soviet extensions of the
theory. Application of theory to second-language acquisition.
PREREQ: LING881

LING 890  STUDIES IN LINGUISTICS  3
Varying topics in linguistics, such as grammatical theory, grammatical analysis, syntax,
historical-comparative linguistics, stylistics and grammar testing. May be crosslisted with
ENGL890

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

LING 969  DOCTORAL DISSERTATION  1-12 PF

LIBERAL STUDIES

MALS 600  NATURE AND HUMAN NATURE  3
Concentrates on salient views of nature and human nature, and the ways in which they
have been shaped by the historical circumstances and disciplinary perspectives from
which they were developed.
RESTRICTIONS: Open to MAls majors only

MALS 603  THE AMERICAN FRONTIER: FACT AND FICTION  3
Uses novels, films and more traditional sources of information to examine the role of the
frontier in shaping American attitudes and values.
RESTRICTIONS: Open to MAls majors only

MALS 605  CHINA AND THE WEST  3
Survey of historical and cultural contacts between China and the West before the 19th
century. Presents, among other topics, the old silk road, medieval Christian missions to
China, Marco Polo, the Jesuits in Peking, introduction of Western learning into China
and the Chinese vogue in the West during the 17th and 18th centuries.
RESTRICTIONS: Open to MAls majors only

MALS 610  FORCE, CONFLICT AND CHANGE  3
From antiquity to the present, the use of force and the resolution of conflict have been
among humanity’s enduring preoccupations. Examines ideas about these issues, and
associated questions such as the meaning of “heroism” and “just war.”
RESTRICTIONS: Open to MAls majors only

MALS 611  DOCUMENTARY: JOURNALISM AND FILM  3
Explores non-fiction narratives, both in print and on film. It looks at social reporting from
the Victorian Era to the present, drawing analogies between the techniques of literature
and cinema.
RESTRICTIONS: Open to majors only

MALS 612  MORAL CHARACTER: VALUES, VIRTUES, RESPONSIBILITIES  3
Tests the hypothesis that lives are more meaningful in direct proportion to developed
moral character. Addresses “What is a worthy life?” by exploring such concepts as self-
knowledge, integrity, autonomy, courage, justice, work, love and community. Readings
from philosophers and developmental psychologists.
RESTRICTIONS: Open to MAls majors only

MALS 613  LATIN AMERICAN EXPERIENCE  3
Examines recurring issues and problems in Latin America. The conflict between church
and state, nationalism and a place in world affairs, tensions between the individual and
society and the influence of the United States.
RESTRICTIONS: Open to majors only

MALS 614  THE FRENCH REVOLUTION: IDEAS, INTERPRETATIONS AND DISSENT  3
Examines ways in which the French Revolution of 1789-1815, with all its complex events
and movements, has been perceived and conceptualized by contemporaries, commen-
tators and professional scholars. In-depth study of its literature to see how human beings
invented concepts and interpretations to make sense of the French Revolution.
RESTRICTIONS: Open to MAls majors only.

MALS 615  REASON, REVOLUTION AND THE RIGHTS OF MAN  3
Examines eighteenth-century French and English movement away from Cartesian ratio-
nalism and towards a rejection of reason leading to romanticism and revolution and an
application of reason leading to a discussion of civil and human rights.
RESTRICTIONS: Open to majors only

MALS 616  ON THE NATURE OF GOOD AND EVII: INQUIRIES IN LITERATURE, PSYCHOLOGY AND RELIGION  3
Examines the conflict between church and society and the influence of the United States
MALS 617  AMERICAN ART IN CONTEXT  3
Explores non-fiction narratives, both in print and on film. It looks at social reporting from
the Victorian Era to the present, drawing analogies between the techniques of literature
and cinema.

MALS 618  STUDIES IN THE HISTORY OF ART  3
Survey of historical and cultural contacts between China and the West before the 19th
century. Presents, among other topics, the old silk road, medieval Christian missions to
China, Marco Polo, the Jesuits in Peking, introduction of Western learning into China
and the Chinese vogue in the West during the 17th and 18th centuries.
RESTRICTIONS: Open to MAls majors only

MALS 619  THE SCIENTIST IN SOCIETY  3
Scientific research is directly influenced by the society in which it is conducted. In addi-
tion to financial limitations, constraints are imposed by societal norms of what are
acceptable topics and procedures for research. Focus on the philosophical basis of sci-
ence as well as consequences to society of the scientific revolution.

MALS 647  PHILOSOPHY OF TECHNOLOGY  3
This course is designed to give the non-specialist in art history an understanding of how
social, economic, religious, and cultural attitudes in America are reflected in its art,
arbitrage, and decorative arts from the colonial period to the present. Discussion
encompasses such subjects as patronage, regionalism, ethnicity, and gender

MALS 869  MASTER’S THESIS  1-6

MALS 879  SYNTHESIS PROJECT  3-6

MATERIALS SCIENCE

MASC 302  MATERIALS SCIENCE FOR ENGINEERS  3
Crystal binding and structure, energetics and structure of lattice defects; elasticity, plastici-
ity, and fracture; phase equilibria and transformations; relations of structure and treat-
ment to properties; structures of inorganic and organic polymers; and electronic and
magnetic properties.

MASC 406  CORROSION AND PROTECTION  3
How structural materials degrade by interaction with their environments. High-tempe-
ration oxidation and sulfidation of alloys. Electrochemical attack on alloys by electrolytes in
relation to metallurgical structure. Stress corrosion cracking. Aggressive environments
Testing and control methods.
PREREQ: Physical chemistry.

MASC 601  STRUCTURE AND PROPERTIES OF POLYMER MATERIALS  3
Measurement and control of the microstructure and properties of solid polymers. Struc-
ture generation, structure-property models and effects of processing on properties. May
be crosslisted with CHEG601.
PREREQ: MASC602

MASC 602  STRUCTURE OF MATERIALS  3
Fundamentals of crystallography. Crystal structure analysis by X-ray and electron diffrac-
tion. Characterization of materials by optical microscopy, scanning and transmission
electron microscopy. Simplified approach to image theory and diffraction theory
PREREQ: MASC602

MASC 603  ANALYTICAL TECHNIQUES IN MATERIALS SCIENCE  3
Laboratory course in optical microscopy, X-ray diffraction, scanning and transmission
electron microscopy, electron diffraction. X-ray fluorescence and microanalysis. Auger
analysis and other spectroscopic techniques.
PREREQ: MASC602 and MASC602
COREQ: MASC602